



Janardhan Rai Nagar Rajasthan VidhyaPeeth

(Deemed To Be University), Udaipur

**OUR BELOVED FOUNDER**



Late Manishi Pt. Janardan Rai Nagar

16th june 1911 – 15th August, 1997

Popurlaly known as ‘jannu bhai’, the Late manishi’s vision, farsightedness and sacrifice have enabled us reach the stature we enjoy today. He lit the lamp of knowledge by giving birth to an institution, named ‘Hindi Vidhyapeeth’ on august 21, 1937 to spread education among those who were economically handicapped, and thereby enable them to learn the meaning of freedom since then, the institution has been catering to the growing educational needs of an economically poor society having a rich socio-cultural heritage. Although the Manishi is not amongst us today, his ideals inspire us to fulfil the mission of imparting qualitative education to the society through preservation of our long cherished sociocultural values. We cherish his deeds and ideals, and strive to walk on the path shown by him.



Janardhan Rai Nagar Rajasthan VidhyaPeeth

(Deemed To Be University), Udaipur

**Vice chancellor’s message**



It gives me immense pleasure to learn that the 1st volume of international journal of physiotherapy and cancer rehabilitation is being published by department of physiotherapy. Sincere effort and knee intrest taken by the members of department in the development of academics and research activities deserve all the admiration. I wish to express with a deep sense of joy and satisfaction on the release of this volume and the same moment to continue even in greater magnitude in the coming years so that the department accomplishes commendable place in the luminous field of physiotherapy and cancer rehabilitation at the international level.

Wishing all a scintillating success.

Prof. S.S. Sarangdevot

Vice chancellor



Janardhan Rai Nagar Rajasthan VidhyaPeeth

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**Editorial desk**

It gives me immense pleasure to write editorial for this 1st volume of IJPCR. The department of physiotherapy J.R. Nagar Rajasthan Vidhyapeeth (Deemed to be) University journal with a vision to promote physiotherapy and cancer rehabilitation including palliative care and uptake knowledge through new innovative research papers, case reports and review articles in various field of physiotherapy and cancer rehabilitation specialities. This journal with consistent precious publications ultimately aims to reach out to he international standards.

Our world is changing we face mounting challenges of Health Care to name a few. Their solution will require new ideas, discoveries, talents and innovations the fruits of research. To achieve them we must start by changing the way we do research there has to be free movement of people &ideas.

At this juncture I wish to express my profuse thanks to all those who made an appreciable contribution for this journal and further I anticipate that their majestic effort shall continue, so to bring greater glory to our endevours.

The arena of physiotherapy which as a matter of fact, works as a back bone of medical rehabilitation field should further be developed, for greater benefit to our suffering humanities.

I implore & solicit all our members to spare no stone unturned in this noble and glorious mission.

I whole heartedly wish to express my deepest sense of gratitude to Honb’e chancellor & Honb’e vice chancellor for their untiring help, relentless support and tremendous encouragement without which the present work would not have achieved its glorious completion.

On the behalf of editorial board I request to all the physiotherapist academicians, clinicians, Palliative care team members, research scholars and students to contribute articles for this journal.

I pray to almighty to grant all of us still greater success in times to come.

Dr. Shailendra Mehta

Editor in chief

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**ARTICLES FOR JOURNAL**

**Post-surgical treatment of Mastectomy: application of the lymphotaping Bellia System Italia**

**Author prof. Bellia Rosario - physiotherapist**

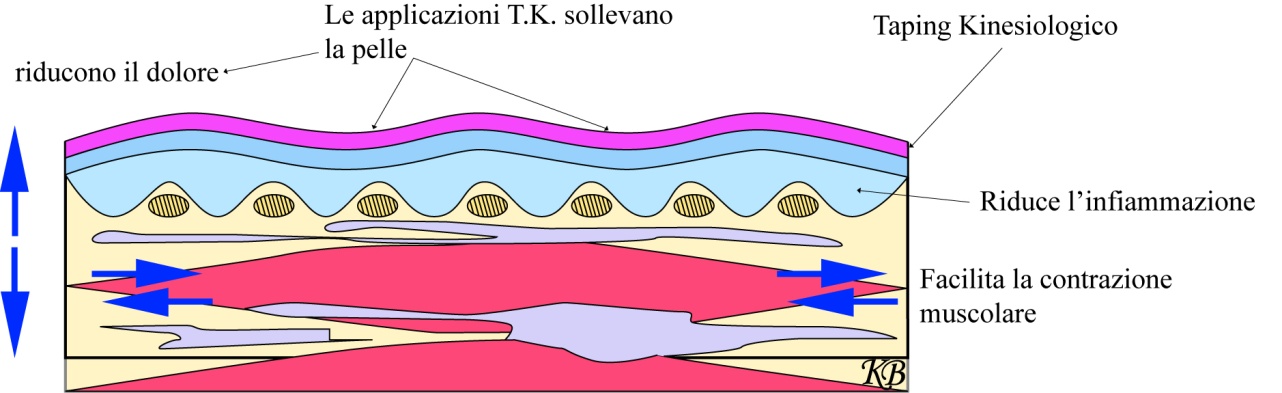
**President of the Associazione Italiana Taping Kinesiologico®**

**Incidence in the world:**

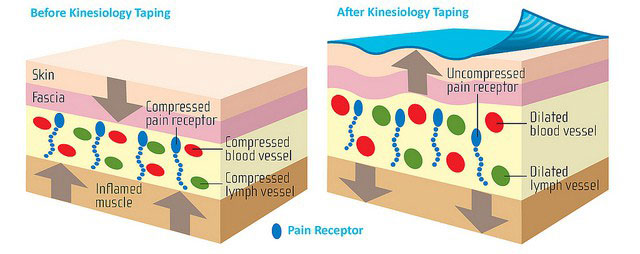
Female breast cancer is by far the most frequently diagnosed malignancy, accounting for about 29% of all oncological diagnoses in women. The risk of having a breast cancer diagnosis over a lifetime is one in eight women. It is estimated that in Italy over 47,000 cases are diagnosed each year. The incidence presents some differences between geographical areas with higher levels in the central-northern areas and lower in the South. It is the leading cause of cancer mortality and represents 17% of all cancer deaths among Italian women. Breast cancer shows high levels of survival, around 85% at 5 years after diagnosis. The most recent AIRTUM estimates indicate that in Italy 522,235 women had a diagnosis of breast cancer during their lifetime.

**Application technique of Linfotaping Bellia System after mastectomy**

The body surface covered by kinesiological taping forms convolutions in the skin that increase interstitial space and, by reducing the pressure, allow the lymphatic and blood system to freely drain fluids. Thus a "flywheel" of actions is created which allow the body to heal itself biomechanically.



**This image is the property of prof. Bellia Rosario**

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**Check if this image has copyright restrictions before publishing it**

**Mechanisms of action of linfotaping:**

1. **The first action** is given by the skin that is raised, the space that is created reduces the

interstitial pressure and a lymphatic flow is activated towards the area where the pressure has been reduced.

1. **The second action** is achieved through body movement, the tape lifting the skin in an

undulatory manner amplifies the stretching / contraction effect. The adhesions of the connective tissue are therefore reduced obtaining an improved smoothness of the filaments between the interstitial cells, of the endothelium, of the lymphangs and the fibers of the connective tissue. Thus the doors of the lymphatic vessels are more easily opened and the sap flows more quickly.

**C) The third action** is the conductor function of the tape. A liquid has the property of moving into certain guide rails. The tape provides a faster conduction of the sap along the conduction structures in the desired direction.

**Contraindications to the application of elastic adhesive taping:**

1) irritated or damaged skin

2) ascertained allergy to "acrylic glue"

3) non-technical diagnosis

4) "serious" diseases, of uncertain diagnosis

5) In the raised floors

6) Thrombosis risk

**"Physical" treatment of edema**

**1) Attack phase:** lymphatic drainage massage, followed by 10 minutes rest in a sloping position and restraint, which will then be accompanied by kinesiological taping (10 to 30 days);

**2) Maintenance phase:** it must be adapted to the clinical process of the patient: it passes to the elastic brace (usually 2nd or 3rd compression class)

**3) Phase of absence of the therapist:** the patient must be able to self-manage having learned all the rules of hygiene, habits and rules of use of restraint. The patient must not become an addicted physiotherapist.

**Schematically, the lymph-taping determines the following effects:**

**a) increase in the speed of venous-lymphatic flow:** determined by the tape in the area below with the movement of the fluids, a distension of the vessels; the overall effect is an increase in blood flow velocity within the venous vessels and lymphatic outflow.

**b) biochemical effects: the forces of tension and stretching** that are generated in the area subjected to the application of lympho-taping contribute to reducing tissue inflammation.

**c) effects on edema:** the decompression caused by lympho-taping is transmitted to the subcutaneous tissues, causing an increase in interstitial pressure; this modifies the transmural pressure causing a reduction in the filtration and an increase in the reabsorption of both the lymphatic capillary and the venular side.

It is important to emphasize that the chosen technique will be related to the conditions of each individual patient.

**Global decongestant treatment:**

We recommend the synergic association of the different methods in order to obtain the best possible result for the patient:

a) manual lymph drainage (DLM)

b) follow-up pneumatic pressotherapy

c) multi-layer bandage (multi-component) or short elasticity

d) specific kinesiological lympho-taping

e) selective joint mobilization exercises

f) sectorial toning exercises (isotonic).

g) adequate diet.

**Lympho-taping technique with insufficient lymph node function or missing lymph nodes after surgical removal**

If the lymphatic flow is blocked, for example after a resection of the lymph nodes, the lymph will

be diverted with the help of the tape towards the next or alternative functioning lymph node

station.

**Method - mobilization of liquids: with "ballistic feedback - recoil effect" technique:**

The base of the fans, of a size suitable for the bandaging area, will be positioned proximally (furthest

from the heart) while the wings will be distal in direction with a 45 ° inclination and with a belt

tension of about 10-30%, with position in lengthening of the zone to be bandaged. We will have a

tissue action that we can define as "retroaction or recoil effect": the tape will lift the skin by means

of the elastic action that goes from the wings towards the base, this will facilitate the "sliding" of

the sap in the opposite direction, that is towards the heart, therefore with a pushing action towards

the following lymphatic station. This technique is indicated for emo-lymphatic drainage in subjects

who do not have full-blown lymphatic disorders and who have a good chance of movement The

tape will produce an action similar to the therapist's hand while performing the lymphatic drainage

massage. With the application of the tape the draining lymphatic facilitation will be activated

by the general body movement, following the three-dimensional trend of the "fascial" structure. This

technique is less effective in patients with poor body mobility.

** **

**Indications for lymph taping:**

a) All edema

b) Inflammations and pains (rheumatological and traumatological)

c) Localized infections and / or localized sores (do not band the focal zone)

d) Scars

e) Light venous insufficiencies (heavy legs)

f) Recovery after muscular effort

g) Treatment of hematomas

h) Trophic disorders.

**Linfotaping in the direction of alternative lymphatic drainage pathways after removal of axillary lymph nodes:**

**Drainage of axillary ganglia:**

1) Upper lymph nodes

2) Medium lymph nodes

3) Lower lymph nodes

** **

** **

**Escape routes or alternative lymphatic drainage of the upper limb after mastectomy.**

**The so-called "collateral routes" or "alternative routes" are decisive in the management of lymphedemas characterized by a mechanical obstacle or ablation of lymph glandular stations:**

**• The way of Mascagni (in the deltoid area)**

**• The way to Caplan (in the triceps area)**

**• The anterior and posterior transthoracic pathway**

**• The inguino-axillary way**

**• The suprapubic route**

**• The intergluteal pathway.**

** **

****

**Conclusions and considerations on specific aspects:**

**a) rules of application**

1. Perform first: manual lymphatic drainage, anti-edema exercise

2. Carry out later: rest on slopes and gentle movements.

**b) tricks to optimize the Bellia System® kinesiology lymph taping:**

1) The tape always applies to tension 0 - 5% and with stretched leather

2) The base of the tape goes over or over the working lymph node

3) The wings of the fans run along a trajectory respecting the draining lines

4) Calculate the alternative routes well in the case of missing lymph nodes

5) Examine the integrity of the skin well before applying the elastic tape

6) In subsequent applications, observe the "drained areas" to cover those to be drained.

**EFFECT OF BMI ON MUSCULOSKELETAL PAIN AMONG TEACHERS OF ABUROAD**

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1Professor & Principal, 2Student

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**ABSTRACT-**

**OBJECTIVE:**

The objective of the study was to assess the effect of BMI on Musculoskeletal pain among teachers & its prevalence.

**METHODS:**

All Data were collected by a questionnaire. A questionnaire was distributed to all subjects, total 150 (75 males & 75 females), each subjects were passed to complete the self-administered questionnaire if they fulfil inclusion criteria.  
A standardized Nordic Musculoskeletal Questionnaire (NMQ general section) was used to collect data on Musculoskeletal symptoms (ache, pain, discomfort) from different regions of the body during last 12 months & the earlier seven days, as well as pain affecting work ability during the past 12 month.This was used as an assessment tool for Musculoskeletal pain in different body region. Also, reliability: 0.61 (Cronbach’s, Alpha validity 0.71)   
Numerical Pain Rating Scale(NPRS) was used for the perception of pain intensity, which ranges 0-10 is applied,where 0 means no pain & 10 means ‘the worst’’ unbearable pain.  
Numerical Pain rating Scale was widely used because it is easily administered & requires little to no training or equipment.

**RESULTS:**

A total 150 teachers (50% male & 50% female) selected in the study.The study showed significant relationship between the BMI & Musculoskeletal pain in mainly low back pain & knee joint, while other region like Neck, shoulder, Elbow, wrist, Upper back, hip & thigh & Ankle & feet did not show significant relationship with score.

Since the readings are in nominal scale, to find the relation,chi-square test is used. Any statistical test is said as significant if p-value is <0.05.The most reported musculoskeletal pain level showed prevalent of low back severe pain among teachers, followed by knee pain**.**

**CONCLUSION:**

This Study has shown that the most of the teachers were suffering from musculoskeletal pain & significant risk factors, & correlations were observed between BMI & Musculoskeletal pain symptoms in teachers.

**Key Words:** Work related musculoskeletal pain, Low back pain, WMSDs, BMI, Teachers.

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**INTRODUCTION-**

In many Countries the prevention of work-related musculoskeletal disorders has been considered as a national priority (1)

Several studies have been conducted on the prevalence of MSDs among teachers in many developed & developing countries of the world. These studies have identified teachers as one of the occupational groups that are at the risk of developing MSDs. (2)

Musculoskeletal disorder has a high impact for the individual as well as for society, the origin of MSDs is complex & Multi factorial. (3) Musculoskeletal disorders defined by the health & safety executive (HSE),The term musculoskeletal disorders (MSDs) includes any injury, damage or disorder of the joints or other tissues in the upper/lower limbs or the back.Uncomfortable working position, working too long without breaks and working in awkward posture. (4)

Musculoskeletal pain is defined as pain perceived related to musculoskeletal, when there is risk of tissue damage or when such damage has occurred, pain can signal that there is a need for recovery of tissues.(5)

Individual factors like age, sex, anthropocentric dimensions, muscle strength, physical fitness, mobility, psychological & social factors contribute to musculoskeletal disorders. (6)

Several studies have linked obesity with musculoskeletal disorders & repetitive work. (7) The epidemic of obesity has become pandemic defined as an epidemic occurring over a wide geographic area & affecting an exceptionally high proportion of populations. The risk in obesity rates was first noted in the United States, but has speed to other industrialized nation & it is even now being documented in developing countries, Indeed the global extent of obesity pandemic was formally recognized by the WHO in 1997, & worldwide obesity rates are increasing dramatically.(8)

Overweight & obesity are one of the world most challenging public health problems (WHO 2003). The prevalence of overweight has reached epidemic proportions in most western countries including Portugal. Overweight & obesity are high among employed adults & have shown a consistent increase over the past few decades. (7)

Obesity is defined as a physiological condition in which excess body fat has accumulated to an extent that can negatively affect health(8). Obesity occurs when energy intake exceed the energy expenditure. Humans expend energy through daily life, we can measure obesity by body mass index(BMI). (9)

Body mass index (BMI) is a ratio derived from the weight(Kg.) and height of a person(metres). The BMI is defined as the body mass divided by the square of the body height, and is expressed in units of kg/m2, resulting from mass in kilograms and height in metres, introduced as a Quetelet Index in 1830’s several decades to estimate population trends in fat. (8)

A BMI value in the range of <18.5 kg/m2 is defined as underweight, 18.5 - 24.9 kg/m2 is defined as normal, 25 - 29.9 kg/m2 is overweight, 30-34.9 kg/m2 is obese class 1, 35 - 39.9 kg/m2 is obese class 2, & 40 > 49 kg/m2 is obese class 3/or morbidly obese..(8) High BMI is the independent risk factor for MSDs, for symptoms of neck shoulder upper & lower limbs, evidence was also found that high BMI is an independent risk factors for development of MSD’s symptoms.(3)

Compared to normal weight patients, underweight patients & obese class two & three patients had higher odds of reporting moderate to severe pain. (11) According to public health prospective effective well documented initiatives for reducing weight improving physical capacity & reducing Musculoskeletal pain among health care workers are therefore needed.(7)

Some occupational factors have been associated with the development of work related musculoskeletal pain among many groups & these postures have great burden on their health & quality of life. Work-related musculoskeletal pain is the most common cause of chronic pain in general population, with estimated high lifetime prevalence of MSDs. (2)

Teachers have been identified as one of the occupational group that are at the risk of developing work related Musculoskeletal pain (WRMSP), this may due to the fact that teaching is one of most stressful jobs (2)& teaching profession is accompanied by occupational burden that arise from the specific physiological demand of profession.(12)

College professors are exposed the numerous pressure sources which affect their quality of life & teaching activities. (13) Among these populations, college teachers who are having administrative activities, conciliating teaching research & extension are exposed to numerous pressure sources beyond those arising from changes in labour system, such as high work load, short pause for rest, intensive working place & requirements for beyond those arising from changes on labour & attraction. (13) When, such situations are associated to a high level of stress, quality of life of this category is considerable inspired including several health disorders such as Musculoskeletal problem which are prevalent among teachers.(13) Prolonged exposures to unfavourable working conditions during teaching become a health risk factors. Despite this the impact of muscular pain specifically has not been given sufficient attention in the literature. (14)

Not with standing studies discussing musculoskeletal disorder in this population are still scare in the literature. The incidence of work related Musculoskeletal disorders (WRMSDs) is increasing in recent years, due to organizational changes & work related requirement often leading to medical leaves & workers functional incapacity, so measuring WRMSDs reports is needed to collect data to quantify prevalence & to evaluate different affected populations.

Among tools to evaluate such symptoms, the Nordic Musculoskeletal questionnaire is a tool developed to standardize musculoskeletal pain & discomfort thus helping studies populations. There is much anecdotal evidence amongst education professionals about the aches & pains they experience at work & also from health care professionals (e.g. Physiotherapist, osteopaths, chiropractors) who treat them, (4) & it is worth stressing that these are few scientific studies related to Musculoskeletal risk factors among teachers & this deficit is even more severe with regard to college teachers since studies focus on teachers of other educational levels.

So, college teachers deserve attention on the potential health risk & problem related to their labour activity. (13)

**AIM OF STUDY**

To assess the effect of BMI on Musculoskeletal pain among teachers & its prevalence.

**METHODOLOGY**

**Study design:** Descriptive observational study

**Study Setting**: Abu Road

**Population:** Teachers of various school & colleges (Government & private) in Abu road.

**Sample size:** 170 subjects were being selected for this Study but 20 subjects were excluded from the study.

**Sampling Techniques :** Convenient sampling techniques.

**Source of data collection**: Teachers working in academic setup, Abu road (Rajasthan).

**Method of data collection :** Through the data available; contacts to the teachers working in academic field in Abu road & explain them about the study & procedure & those subject were willing to participate and meet inclusion & exclusion criteria. Then their written consent was being taken & collect their data.

**Inclusion criteria:**

* Teachers age group of 25 - 40 years.
* Both sex & gender are included.
* Minimum 2 years of job experience.
* Minimum 6 - 8 working hours /day, with minimum 3 lectures per day were accepted in this study.

**Exclusion criteria:**

* Teachers on leave.
* Part time teachers
* Chronic anomalies
* Any major surgery & other condition
* Any current fracture

**Tools**

1. Standardized Nordic Musculoskeletal questionnaire
2. Numerical pain rating scale

**Material used for this study**

1. Weight machine
2. Height measurement tape
3. Data collection form
4. Calculator

**PROCEDURE**

This Study was conducted at the Aburoad. Prior to the Study written consent was taken from all subjects & also explained about procedure & aim of the Study. Then subject was taken & collected the data, which covered

(1). Personal details (including Age, weight, height, job tenure, education, health, medical background)

(2). Musculoskeletal problem in different body regions

a). Measurement of BMI-

Height was measured in standing position without shoes, using a wall mounted height tape. Weight was measured when the subject was in light clothes, without shoes & empty pockets & then BMI was calculated as weight (kg)/height2 (m)

b). Musculoskeletal problem Assessment

All Data were collected by a questionnaire.

Questionnaire were distributed to all subjects total 150 (75male & 75 female), each subjects was passed to completed the self-administered questionnaire if they fulfil inclusion criteria.

Standardized Nordic questionnaire (NMQ general section) were used to collect data on Musculoskeletal symptoms (ache, pain, discomfort) from different regions of the body during last 12 month & the previous 7 days, as well as pain affecting work ability during the past 12 month. This was used as an assessment tool for musculoskeletal pain in different body region. Also reliability: 0.61(Cronbach’s, Alpha validity 0.71) .

After that for the perception of pain intensity through the Numerical pain rating scale scored for 0-10 applied where 0 means no pain & 10 means worst unbearable pain & assessed it.

Numerical Pain rating Scale was widely use because it is easily administered & requires little to no training or equipment.

**RESULTS:**-

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Crosstab** | | | | | | | |
| **Count** | | | | | | | |
|  | | **LOWERBACK** | | | | | **Total** |
| **4+** | **4++** | **0** | **1+** | **4+++** |
| **BMI** | **Normal** | **20** | **18** | **32** | **1** | **3** | **74** |
| **Obese** | **1** | **1** | **3** | **0** | **1** | **6** |
| **Overweight** | **16** | **7** | **36** | **0** | **11** | **70** |
| **Total** | | **37** | **26** | **71** | **1** | **15** | **150** |

**Table 1:-** Shows association between BMI and lower back, where p≤0.05.

|  |  |  |  |
| --- | --- | --- | --- |
| **Chi-Square Tests** | | | |
|  | **Value** | **P-VALUE** | **RESULT** |
| **Pearson Chi-Square** | **11.390a** | **.052** | **P>0.05 NOT SIG** |

**Table 2:-** Therefore, we conclude that there is a significant association between BMI and lower back Pain.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Crosstab** | | | | | | |
| **Count** | | | | | | |
|  | | **KNEE** | | | | **Total** |
| **4+** | **4++** | **0** | **4+++** |
| **BMI** | **Normal** | **19** | **3** | **49** | **3** | **74** |
| **Obese** | **1** | **1** | **4** | **0** | **6** |
| **Overweight** | **27** | **2** | **38** | **3** | **70** |
| **Total** | | **47** | **6** | **91** | **6** | **150** |

**Table 3:-** The above table shows association between BMI and knee (p ≤0.05)

|  |  |  |  |
| --- | --- | --- | --- |
| **Chi-Square Tests** | | | |
|  | **Value** | **P-VALUE** | **RESULT** |
| **Pearson Chi-Square** | **6.110a** | **.071** | **P>0.05 NOT SIG** |

**Table 4:-**. Therefore from table 3 & 4, we conclude that there is a significant association between BMI and knee Pain.

**DISCUSSION**

This study analyzed correlation between prevalence of musculoskeletal pain & BMI. The high prevalence of Musculoskeletal disorders among school teachers was well documented (Erick & smith 2011, Durmus & llano 2012, Darkish & Al-unfair 2013, Abdulmonem et la 2014). (15) (16)

This study shows a high prevalence of musculoskeletal pain particularly low back pain & knee pain. According to this review the main risk supporting their causal relationship with low back & knee WMSDs were increase BMI. Similar finding were also reported on a systematic review conducted by the NRC/IOM. (17)

There, was however a paucity of literature MSDs amongst South African school teachers (kormas et al, 2011) this to determine the prevalence & association between BMI & Musculoskeletal symptoms. (4)

A recent study was founded that the causes of LBP to be associated with standing for a prolonged time, specific sitting habits a sudden change in posture & carrying heavy objects (Abolfotouch et al ,2015). This correlates with the current study in which highly significant relationships were founded between standing for a prolonged period of time & low back pain. (P = 0.05).

Standing for prolonged time was the second most common aggravating factors for low back pain & several epidemiological studies showed that the significant association among uncomfortable back support & LBP, & Mengestu & Zeke found the same result with low back pain. Prevalence of 57.5% & Abdulmonem A, Hunam A, Elaf A, Hammer T, Jehan A, also found the same result the prevalence of LBP 66.9% & more over study of Abdulmonem et al, also further confirmed these findings in teachers & concluded that Low back pain had the highest prevalence of all the Musculoskeletal regions in school teachers. (18)

Several study literatures showed that prolonged sitting may lead to acute low back pain (Anderson 1999) due to the compressive load on the spine & changed with in the passive structures. (Sheehan et all.2016). The predominance if Musculoskeletal pain & discomfort symptoms in lumbar spine of teachers was also found by carvalho & Alexander,who evaluated 2006, elementary school professors & have found a prevalence of 63.1% of Musculoskeletal symptoms in lumbar region. (19) (13)

After the low back pain, knee pain is the next most frequent site of musculoskeletal pain found in this study & same result found the previous similar study.

Several justifications presented in the literature for this high percentage among them, poor postures adopted during work, performing repetitive activities and lack of fitness (20) (13).Several study founded very high prevalence of Musculoskeletal pain among school teachers which is affecting their work by missing out working days & Eventually affecting the education system as a whole. (16)

The ministry of health points that preventing WRMSDs should be based on strategies improving worker's health in their workplaces, altering them about ergonomic & environmental risks including physiotherapeutic assistance to evaluate guide & if necessary treat possible disorders. (13)

**CONCLUSION**

This Study has shown that the most of teachers were suffering from musculoskeletal pain & significant risk factors, & correlations were observed between BMI & Musculoskeletal pain symptoms in teachers.

Based on the outcomes of this study the following conclusions are made:

There is a high prevalence BMI & low back pain & knee pain among teachers in Abu road.

This is needed to supply evidence for a global intervention for teachers, focus on preventing injuries linked to ergonomic strategies directed to movements, postures & the whole overload required during work, thus decreasing the prevalence of WRMSDs, improving teachers’s quality of life & productivity.

Health is essential to efficiency of the highest attainable level in almost any line of work. It is peculiarity important for teachers, not only because of strenuous demand & energies but also because teacher’s health is the corner stone of any effective school/college health program.

**CONFLICT OF INTEREST:-**None

**SOURCE OF FUNDING:-**Self

**REFERENCES**

1. Malikraj.sa Senthil Kumar.T b Ganguly.A.K (2011) “Ergonomic intervention on musculoskeletal problems Welders” International Journal of Advanced Engineering Technology, IJAET/Vol.II/ Issue III/33-35
2. AC Odole, CA Gbiri, OT Sobiyi, B Oketola . (2013) “Prevalence, Pattern and Correlates of Work Related Musculoskeletal Pain among Selected school Teachers in Ibadan Nigeria.”
3. L1, Verhagen EA, Oude Hengel KM, Koppes LL, van der Beek AJ, Bongers PM (2013) BMC Musculoskeletal Disorder; 14:238. Doi: 10.1186/1471-2474-14-238.

The relation between body mass index and musculoskeletal symptoms in the working population. Related

1. Lorna Taylor (2011) Work related Musculoskeletal disorders in UK early years & primary teaching professionals.
2. Ebtesam Mo'awad El-Sayed Ebied (2015) “Musculoskeletal Pain among Primary School Teachers: A Recommended Health Promotion Intervention for Prevention and Management”. World Journal of Nursing Sciences 1 (3): 54-61.
3. P Parimalam K Balakamakshi (2016) Musculoskeletal Problems Of Women Bamboo Workers In Madurai, India.
4. Isabel Moreira-Silva, Rute Santos, Sandra Abreu and Jorge Mota (2013) “Associations Between Body Mass Index and Musculoskeletal Pain and Related Symptoms in Different Body Regions Among Workers.Sage Journals 3(2) 1-6,DOI:10.1177/2158244013491952.
5. Md. Salah Uddin, Muhammad Millat Hossain, Md. Shofiqul Islam,Md. Obaidul Haque, Umma Kulsum, Ehsanur Rahman, Mohammad Habibur Rahman, Md. Fazlul Karim Patwary(2015) “Prevalence of obesity among musculoskeletal patients” International Journal of Physiotherapy and Researc, Vol 3(1):889-93. ISSN 2321-1822,DOI: 10.16965.
6. James A. Levine, Lorraine M. Lanningham-Foster, Shelly K. McCrady, Alisa C. Krizan, Leslie R. Olson, Paul H. Kane, Michael D. Jensen, Matthew M. Clark(2005).Interindividual Variation in Posture Allocation: Possible Role in Human Obesity.Science,307(5709)584-586
7. Ashril Yusof, P. Ku, Wan Wan Abas, Noor Azuan, Noor Azuan Abu O(2012).Biomechanical evaluation of the relationship between postural control Body mass index.Journal of biomechanics 45,1638-1642
8. Diana M. Higgins()The Relationship between body mass index and diagnosis in Veterans.Pain Psychology, Critical Care, and Pain Medicine Service/Research Service Boston Healthcare System Professor, Dept. of Psychiatry, Boston University School of Medicine.
9. Marjeta Kovac, Bojan Leskosek, Vedran Hadzic and Gregor Jurak(2013).Occupational health problems among Slovenian physical education teachers. Kinesiology 45(2013) 1:92-100
10. José Pereira de Lima Júnior, Tarcísio Fulgêncio Alves da Silva(2014).Analysis of musculoskeletal disorders symptoms in professors of the University of Pernambuco – Petrolina Campus. Rev Dor. São Paulo,15(4):276-80
11. Ebtesam Mo'awad El-Sayed Ebied(2015).Work- Related Musculoskeletal Pain among Primary School Teachers: A Recommended Health Promotion Intervention for Prevention and Management. World Journal of Nursing Sciences 1 (3): 54-61.
12. Erick PN, Smith DR(2011).A systematic review of musculoskeletal disorders among school teachers. BMC Musculoskelet Disord.12:260. doi: 10.1186/1471-2474-12-260.
13. Alsiddiky Abdulmonem, Algethami Hanan,Ahmed Elaf, Tokhtah Haneen and Aldouhan Jenan(2014).The prevalence of musculoskeletal pain & its associated factors among female Saudi school teachers. Pak J Med Sci.,30(6): 1191–1196.doi:10.12669/pjms.306.5778
14. Da Costa BR, Vieira ER(2010).Risk factors for work-related musculoskeletal disorders: a systematic review of recent longitudinal studies. Am J Ind Med.,53(3):285-323. doi: 10.1002/ajim.20750
15. Rempel DM, Krause N, Goldberg R, Benner D, Hudes M, Goldner GU(2006).A randomized controlled trial evaluating the effects of two works interventions on upper body pain & incident musculoskeletal disorders among computer operators. Occup Environ Med. 63(5):300-6.
16. Carvalho AJFP, Alexandre NMC(2006). Musculoskeletal symptoms in Elementary School teachers. Rev Bras Fisioter,10(1):35-41.
17. Mozzini CB, Polese JC, Beltrame MR(2008). Prevalence of osteomuscular symptoms in workers of a metallic packaging company of Passo Fundo - RS. RBPS; 21(2):92-7

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2. metallic packaging company of Passo Fundo - RS
3. Prevalence of osteomuscular symptoms in workers of a
4. metallic packaging company of Passo Fundo - RS
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**WSH approach towards stroke rehabilitation and prevention**

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**What is stroke?**

Acute focal cerebral deficit resulting from vascular disease lasting more than 24 hours’

Stroke is sometimes called a “brain attack”.

With a heart attack, blood supply to the heart is reduced or stopped.

With a stroke, blood supply to part of the brain is reduced or stopped.

This means that part of the brain does not receive enough oxygen.

Millions of brain cells die every minute during a stroke, increasing the risk of permanent brain damage, disability or death.

One common cause of blockage that leads to stroke is blood clot or build –up of fatty deposits (arteriosclerosis) in blood vessels that supply the brain. The reduction in blood flow results in an ischemic stroke. Most strokes are ischemic.

Another common cause of stroke is a leaking vessel in the brain. This is called a hemorrhagic stroke.

**TYPES OF STOKE**

The reduction in blood flow results in an ischemic stroke. Most strokes are ischemic.

**CAUSES OF ISCHEMIC STROKE**

Thrombus

Calcific debris

Atheromatous

Arterial

Vegetation

Embolism

Cardiac source

Valvular heart disease

Atrial fibrillation

Myocardial infarction

Carotid or vertebral

Artery source

Atheroma

Dissection

Another common cause of stroke is a leaking vessel in the brain.

This is called a hemorrhagic stroke.

Hemorrhagic stroke is by far the most common kind of stroke, accounting for about 88 percent of all strokes. Stroke can affect people of all ages, including children. Many people with ischemic strokes are older (60 or more years old), and the risk of stroke increases with age. Each year, about 55,000 more women than men have a stroke, and it is more common among African-Americans than members of other ethnic groups. Many people with stroke have other problems or conditions which put them at higher risk for stroke, such as high blood pressure (hypertension), heart disease, smoking, or diabetes.

**Intracerebral hemorrhage**

Intracerebral hemorrhage occurs when a diseased blood vessel within the brain bursts, allowing blood to leak inside the brain. (The name means within the cerebrum or brain). The sudden increase in pressure within the brain can cause damage to the brain cells surrounding the blood. If the amount of blood increases rapidly, the sudden buildup in pressure can lead to unconsciousness or death. Intracerebral hemorrhage usually occurs in selected parts of the brain, including the basal ganglia, cerebellum, brain stem, or cortex.

The most common cause of intracerebral hemorrhage is high blood pressure (hypertension). Since high blood pressure by itself often causes no symptoms, many people with intracranial hemorrhage are not aware that they have high blood pressure, or that it needs to be treated. Less common causes of intracerebral hemorrhage include trauma, infections, tumors, blood clotting deficiencies, and abnormalities in blood vessels (such as arteriovenous malformations).

Intracerebral hemorrhage occurs at all ages. The average age is lower than for ischemic stroke. Less common than ischemic strokes, hemorrhagic strokes make up about 12 percent of all strokes.

**Subarachnoid hemorrhage**

Subarachnoid hemorrhage occurs when a blood vessel just outside the brain ruptures. The area of the skull surrounding the brain (the subarachnoid space) rapidly fills with blood. A patient with subarachnoid hemorrhage may have a sudden, intense headache, neck pain, and nausea or vomiting. Sometimes this is described as the worst headache of one’s life. The sudden buildup of pressure outside the brain may also cause rapid loss of consciousness or death.

Subarachnoid hemorrhage is most often caused by abnormalities of the arteries at the base of the brain, called cerebral aneurysms. These are small areas of rounded or irregular swellings in the arteries. Where the swelling is most severe, the blood vessel wall becomes weak and prone to rupture.

The cause of cerebral aneurysms is not known. They may develop from birth or in childhood and grow very slowly. Some people have multiple aneurysms. Subarachnoid hemorrhage can occur at any age, including in teenagers and young adults and is slightly more common in women than men.

**Pediatric Stroke**

Pediatric Stroke is always a shock to learn that a child has had a stroke. Most of us know an older adult who has had a stroke, but could never imagine it happening to a child. All parents wants to understand exactly how and why their child had a stroke. Because many children with stroke are already sick with something else, it can be frustrating to try to understand everything that is happening all at once. Sometimes medical terms and concepts can seem overwhelming.

Sickle cell disease (SCD) is the most common cause of childhood stroke. Stroke occurs in 17 to 24 percent of children with SCD, most often between the ages of 3 and 10.

 In those with SCD, ischemic strokes most often occur in children under the age of 15 and adults over the age of 30, while hemorrhagic strokes most often occur in young adults between the ages of 20 and 30.

This section is designed to help the families of children with stroke by providing general information about stroke that is easy to understand. Every child is different, and some of the information here might not apply to your child. Our goal is to give you the tools to understand stroke and ultimately make it easier to communicate with your child’s doctor.

**TIA**

A transient ischemic attack (TIA) is a kind of "warning stroke" or "mini-stroke" that produces stroke-like symptoms but no permanent damage. Recognizing and treating TIAs can reduce your risk of a major stroke.

**Signs and Symptoms**

If you are having a stroke, you might:

Feel a sudden numbness or weakness of the face, arm, or leg, especially on one side of the body Be confused about where you are or what you're doing Have trouble speaking or understanding what others are saying Have trouble seeing in one or both of your eyes Have trouble walking, be dizzy, or lose your balance Have a sudden, severe headache that seems to come out of nowhere.

**Risk Factor**

Some risk factors for stroke can't be changed—such as family history, age, gender, race (stroke death rates are higher for African Americans even at younger ages) and previous heart attack or stroke. But there are many other stroke risks that you can change: High blood pressure Cigarette smoking High cholesterol Diabetes Carotid artery disease Obesity Physical inactivity all of these risks can be reduced through lifestyle changes, such as regular exercise. As experts in designing exercise programs tailored for people with health problems, physical therapists can help you reduce your risks for stroke.

**Clinical Features of Stroke**

Stroke can cause a range of long term problems such as:

Muscle will initially be flaccid followed by spasticity if proper rehab is not provided it will advance to contracture then deformity and finally handicap.

Inability to move on one side of the body    (hemiparesis)

Severely limited movements

Memory loss

Slowed or slurred speech

Balance problem

Weakness in the leg or arm on one side of the body

Off and on numbness

Unusual physical sensation

Sensitivity to cold temperature

Difficulty in remembering words

Dependency

Little role in activities of daily living

Depression

**Latest Approaches**

   Constraint induced movement therapy

   Menta Move

   Matrix-Rhythm-Therapy®

   Aerobics modified

    Robotic arm

    Core stability

    Wii games

    Mirror therapy

**Constraint induced movement therapy**

  Constraint-induced movement therapy (CI) forces the use of the affected side by restraining the unaffected side. With CI therapy, the therapist constrains the survivor’s unaffected arm in a sling. The survivor then uses his or her affected arm repetitively and intensively for two weeks.

Menta Move

Neuroplasticity defined as ‘ability of brain to reorganize itself and relearn lost functions’ Neuroplasticity allows the neurons in the brain to compensate for injury and to adjust their activities in response to new situations. The brain compensates for damage by reorganization and forming new connections between intact neurons e.g. if one hemisphere of brain is damaged the intact hemisphere may take over the control of that function. In order to reconnect, the neurons need to be stimulated through activity.

Mental Practice of Motor Skill: This is an auto suggestive method based on Psychological Intervention. A purposeful action or a motor skill is mentally practiced by the subject without really executing it i.e. Subject imagines that he is performing a particular activity.

**The Matrix-Rhythm-Therapy®**

It is a basic kind of therapy of the modern 21st century Scientific Medicine that settles on the matter of fact that cells of all biologic systems are rhythmically vibrating as long as they are alive.  The Matrix-Rhythm-Therapy® enables our therapist to apply this sensitive but deep-penetrating remedial massage which uses the body’s self-healing capacities.

A Germany surgeon by the name of Dr. Randall spent many years conducting scientific studies and found that all living cells vibrate at specific rate. This vibration provides the delivery mechanism to supply the bodies’ cells with the optimum environment (known as extra cellar matrix) needed to support the demand on our bodies. The vibration allows our bodies to maintain a level of health.

**Aerobics modified**

Aerobic exercise refers to physical activity that requires the body to use oxygen to generate energy. Participating in aerobic exercise is important to maintain a healthy body. A major benefit of aerobic exercise is that it conditions the heart and lungs. It does so by increasing the oxygen available to the body and enabling the heart to use oxygen more efficiently. In addition, aerobic exercise can also control body fat, increase energy, decrease tension, increase stamina, and improve mood. There are several different types of aerobic exercises that can be done at different levels of intensity for varying periods of time

After a stroke, it is common to experience continued difficulties in mobility, for example in walking. It is important to continue to exercise despite these challenges to avoid a vicious cycle, where difficulty in mobility leads to lack of exercise, and lack of exercise leads to further muscle weakening and reduced fitness. Inactivity can contribute to physical complications, including osteoporosis and decreased circulation. It can also lead to loss of independence, depression, and social isolation. The more inactive you are, the harder it is to maintain cardiovascular, mental, and neurological health. Modification in exercise such as chair aerobics, quick repetition of movements all will be framed in according to the level of impairment.

**Robotic arm**

Stroke patients get helping hand from 'telepathic' robot arm which can respond to your thoughts. Stroke patients who have lose the use of their arms could find a helping hand in the form of a robotic arm that can 'telepathically' respond to your thoughts. The research, led by Rice University and the University of Houston, has led to an exo-skeleton which covers the arm from fingertips to elbow and can help perform simple tasks, as well gently assisting - and sometimes resisting - movement to build strength and accuracy.

**Core stability**

When people talk about ‘the core’, they are generally referring to the region of the body which includes the abdominal wall, the pelvis, the diaphragm, and the lower back. Core stability is related to a person’s ability to activate the muscles within this region. When switched on, theses muscles provide support to the spine and pelvis during movement. Our core is literally at the center of everything we do.

From simple activities like picking up our shoes or opening a door, to more dynamic movements such as those within sport, and, in the case of triathlon: swimming, cycling and running.

Our core is our foundation from which we generate power. One popular quote which highlights this is: ‘You can’t shoot a canon from a canoe’. This means, without a solid base, your limbs are limited to how well they can action movement. With this in mind it is easy to see why the core plays such a vital role in performance, and why its ability to function is critical in maximizing our physical potential and increasing our capacity to prevent the occurrence of injury.

**Wii games**

Active Wii video games may bring some fun into stroke recovery, helping patients regain lost strength and motor skills in the process. It’s a lot easier to stick with exercises that are fun to do than with those that feel like a chore. That’s especially true for victims of stroke going through rehabilitation. That’s why the use of video games to aid stroke rehabilitation has become a major focus of research. There’s growing evidence that virtual reality gaming systems like the Wii™ can help stroke victims regain some arm function and even improve balance and visual impairments.

Hemiplegia and hemiparesis are conditions that affect one side of the body, causing it to present with weakness often with reduced movement and limited active control in the limbs and trunk. Hemiplegia can affect people at any age and is caused by an injury or an illness that affects the brain, such conditions leading to hemiplegia can be stroke/CVA, acquired brain injury or an injury/illness at birth.

The Wii has proven to be very popular within the rehabilitation. It is very flexible and forgiving with regard to the movements that are needed to play the game, offering the opportunity for a patient to work an affected upper limb with reasonable success (depending upon the severity of the hemiplegia), benefiting from the visual feedback that the console and controllers offer.

**Mirror Therapy**

It is a form of motor imagery in which a mirror is used to convey visual stimuli to the brain through observation of one's unaffected body part as it carries out a set of movements. The underlying principle is that movement of the affected limb can be stimulated via visual cues originating from the opposite side of the body. Hence, it is thought that this form of therapy can prove useful in patients who have lost movement of an arm or leg including those who have had a stroke.

Mirror therapy is used to improve motor function after stroke. During mirror therapy, a mirror is placed in the patient’s mid sagittal plane, thus reflecting movements of the no paretic side as if it were the affected side. This systematic review summarizes the effectiveness of mirror therapy for improving motor function, activities of daily living, pain, and visuospatial neglect in patients after stroke.

**Group Therapy**

This approach usually involves a few number of physiotherapists and their assistants along with the care taker of the stroke patients. A detailed assessment is taken of the patients with stroke. With respect to the outcome result of assessment the patients are categorized according to the level of impairment in the following groups:

1. Early group       Mostly wheel chair bound

2. Advance group   Able to stand and walk with support. Exercise therapy regime should be designed after reviewing the assessment.

**Preventing another Stroke**

After stroke, survivors tend to focus on rehabilitation and recovery. But, preventing another (or recurrent) stroke is also a key concern. Of the 795,000 Americans who have a stroke each year, 5 to 14 percent will have a second stroke within one year. Within five years, stroke will recur in 24 percent of women and 42 percent of men.

Percentage of Reoccurrence after First Stroke Within 30-Days  3% to 10%  Within 1-Year    15% to 14% Within 5-Years  25% to 40%

Your Lifestyle Choices Everyone has some stroke risk. But, there are two types of stroke risk factors. One type your client can’t control. The other he or she can.

Advice your patient as following: • Monitor your blood pressure; if it is high, make sure it is treated. • Find out if you have atrial fibrillation (an irregular heartbeat which allows blood to pool in the heart and cause blood clots).

• Quit smoking. • Limit alcohol. • Check your cholesterol levels and make sure bad cholesterol is controlled. • Manage your diabetes. • Exercise often. • Eat foods low in sodium (salt) and saturated or trans-fat. • Monitor circulation problems with the help of your doctor.

**Role of menthol infused Kinetic tapes in Lymphoedema management**

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**Introduction:**

The human lymphatic system comprises lymphatic vessels and lymph nodes running parallel to the circulatory system. Lymphoedema occurs when there is an imbalance due to reduced lymph transport capacity leading to accumulation of interstitial fluid and protein. This failure of lymphatic system to adequately transport excess water, proteins and waste products away from the affected area results in a chronic inflammatory response manifesting as swelling, and lead to skin and tissue changes. This abnormal accumulation of protein rich interstitial fluid resulting from insufficient lymphatic drainage has serious multiple, disabling and chronic sequelae too. Secondarily proliferation of neutrophils, macrophages and fibroblasts along with accumulation of collagen leads to chronic inflammation and fibrosis. Apart from reported deleterious effects on patients physical and psychological well being, it has been widely documented that lymphoedema affects body image, reduces self esteem, causes pain, discomfort, functional impairments, depression, anxiety and problems with sexual, familial and social relationships. Lymphoedema increases the risk of cellulitis and frequency of hospitalization.

Cancer related lymphoedema commonly occurs after treatment of breast cancer, with a prevalence of 6-54%. Upper limb lymphoedema occurs in 24 – 49 % of cases with total mastectomy and in 2 -49 % of cases with axillary lymph node dissection. Cancer related damage to the lymphatic system occurs as a result of surgery, radiotherapy or progression of the neoplastic disease.

Physical therapy, accepted as a gold standard therapy, in various duration, frequency and settings has been shown to have a positive effect on the management and maintenance phase of lymphoedema. A program combining skin care, manual lymphatic drainage, exercises and compression therapy is recognized as the best practice in lymphoedema management. Although practice routinely uses bandaging, patients do not adhere to treatment with Multilayer compression Bandages, as its use makes them feel like prisoner to the disease and brings back the negative memories of cancer and its treatment. Standard care and management also have significant economic consequences, require frequent bandage changes and the expensive compression hosiery drain available resources, having economical consequences. Treating cancer related lymphoedema also must take into consideration the climatic considerations of a country, with majority of patients disliking the treatment due to hot and humid conditions.

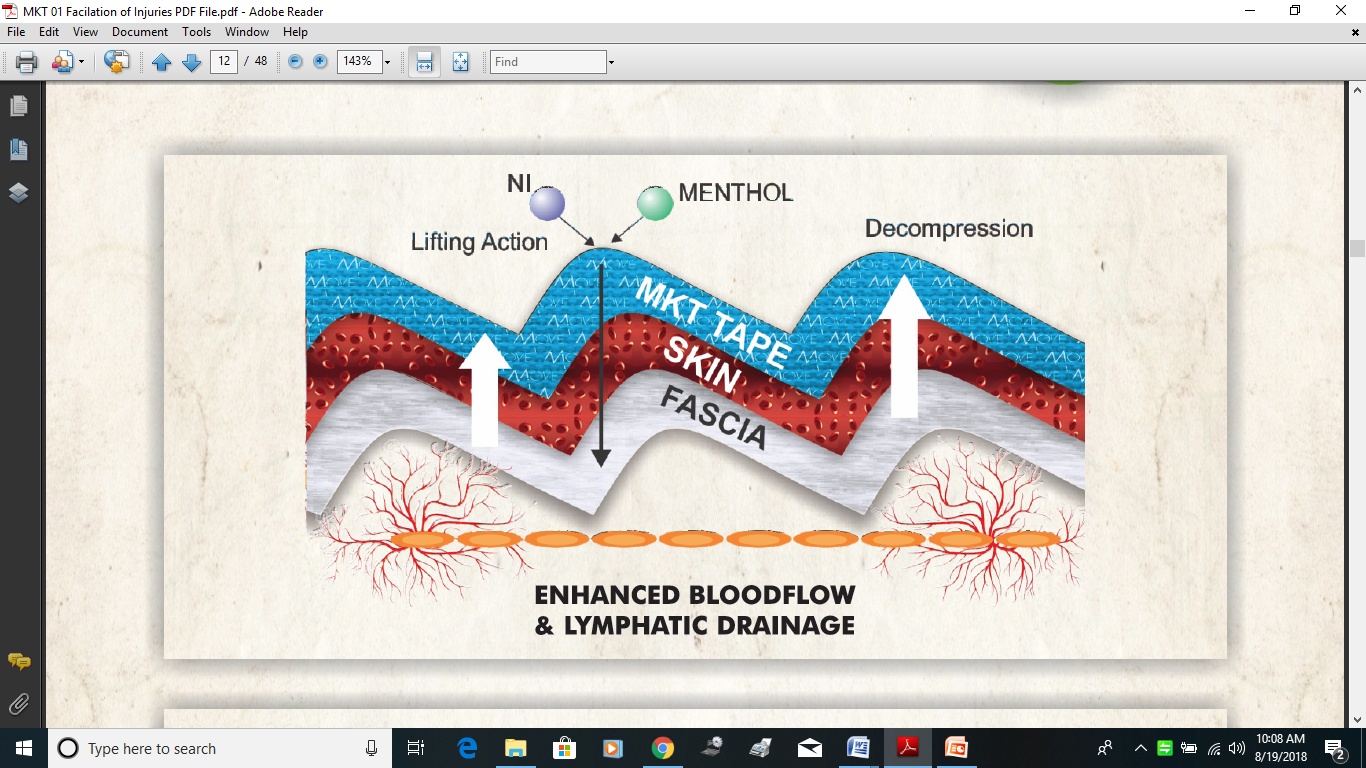
Well-documented, promising and inexpensive methods from alternative medicine are still needed. It is important to have safe, effective and evidence based treatment options. Move kinetic taping (MKT) could be recommended in advanced cancer related lymphoedema when bandaging may not be tolerated, or is contraindicated due to pain or because it reduces the patients quality of life. Taping is also extremely useful on body parts where garment fitting is problematic. Taping can be used in addition to compression bandaging to cross-watersheds. MKT causes significantly less discomfort, difficulty and inconvenience than bandaging. Also Move kinetic tapes can be recommended in hot and humid conditions where bandages may be uncomfortable. Other advantages are that a patient can take a shower without taking the tape off. Patients can wear it from 1 – 4 days (for cotton tapes) and 1 to 8 days (for synthetic or rayon tapes) and even longer.

Wound protection is a major problem with kinetic taping. Because of the adhesive characteristics of the kinetic tape, putting on and removing the tape in lymphoedema therapy requires particular attention. There is a higher possibility of allergic reaction to tape and skin inflammation in area of kinetic tape application if adequate precautions and sensitivity testing are not done prior to application.

**Mechanism of action:**

Move kinetic tapes have been suggested as a promising treatment option for acute sport injuries, musculoskeletal disorders and also edema. One of the physiological effects of the tape is decongestion of lymphatic fluid accumulated under the skin. Move kinetic tapes can provide directional pull that guides the lymph fluid in the desired direction of drainage. This is important in routing and rerouting the lymphatic fluid in the lymphatic vessels, and thus reducing swelling and edema. After applying the kinetic tape, the taped area will form convolutions to increase the space between the skin and muscle. Once the skin is lifted, the flow of blood and lymphatic fluid is promoted. Application of kinetic tapes increases the pressure difference within lymph vessels, increases the flexibility of underlying connective tissue, and also induces a micromassaging effect.

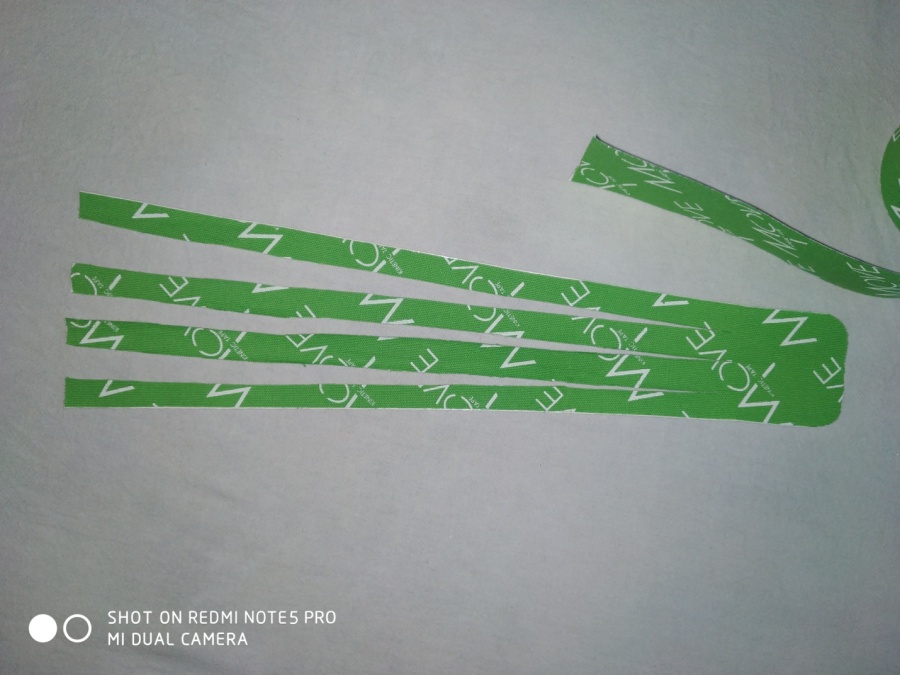
In addition the taping addresses fascia and myofascia which connects musculoskeletal, neural, visceral & vascular systems. Fascia, a largely forgotten structure is addressed by appropriate taping methods to either hold the fascia in place or creating movement. MKT reduces pain by reducing the increased mechanical tension in the region of inflammation, edema and swelling by fascial unloading and Move “lift”; as the elasticity of the tape produces wrinkles in the skin and thus indirectly increasing the interstitial space between the layers of fascia, resulting in unloading effects. (fig-1 below explains mechanism of action)



*(Fig – 1: Skin lift and wrinkles with Move Kinetic Taping)*

**Method of application:**

Move lymphatic Correction "Move Canal" or “Channeling” techniques are used to create areas of decreased pressure under the MKT Tape that act as channels to direct the exudate to the nearest lymph duct. Tape is applied with the base near the lymph node to which the exudates is to be directed, and the remaining tape is applied in a fan-like pattern with none to very light, or 0-15% of available tension. The Move Kinetic tapes are applied to facilitate lymph drainage towards anterior trunk, posterior trunk, towards the unimpaired side. A premeasured and sized tape of fan shape application (fig-2) is taken. Firm anchor/ base with no tension is applied near the area of draining lymph nodes, with tails of the tape applied to anterior, medial and posterior aspects of the limb (figure-3,4) with 5 – 15 % tension, followed by anterior and posterior chest. A classical complication of dysfunctional lymphatic system is accumulation of large quantities of metabolic waste, the move kinetic tapes application naturally channelize and pass it through the nodes as drainage points. Activating the lymphatic channels helps in better filtering of toxins and optimizing functional efficiency.



(fig -2 – typical fan shaped application of MKT)

(fig 3,4 – limb application; draining to cubital and axillary lymph nodes)

We here propose an adaptation to the conventional taping, menthol infused tapes, the ***Move Kinetic Tapes (MKT)*** have additional adjunct beneficial effect over the mechanical and sensori motor effects. The addition of *menthol*, with its cooling and analgesic properties, functions as a counter – irritant. Findings also suggest that the negative ions within the tape, absorbed through the skin could easily relieve pain and inflammation, and accelerate the healing due to tissue damage.

**Conclusion:**

The mechanism of action and mode of application of MKT suggests it to be an effective, economical and therapeutic supplement to standard care in management of lymphoedema due to dysfunctional lymph drainage post cancer and surgeries. Further clinical research is needed to validate the findings.

**References:**

1. Pumpa KL, Fallon KE, Bensoussan A, Papalia S. The effects of topical Arnica on performance , pain and muscle damage after intense eccentric exercise. Eur J Sport Sci 2014;14(3): 294-300
2. Ye T, Wu Y, Shang L, Deng X, Wang S. Improved lymphatic targeting: effect and mechanism of synthetic borneol on lymphnode uptake of 7 –ethyl-10hydroxycamptothecin nanoliposomes following subcutaneous administration Drug Deliv. 2018 Nov;25(1): 1461-1471
3. Ya-Hui Chou, Shu-Hua Li, Su-Fen Liao Case Report: Manual lymphatic Drainage and kinesio taping in the Secondary Malignant Breast Cancer related Lymphedema in an arm with Arteriovenous (A-V) fistula for hemodialysis doi.org/10.1177/1049909112457010
4. Bosman J. Lymphtaping for lymphoedema: an Overview of the treatment and its effects. Br J Community Nurs, 2014 Apr:Suppl: S12
5. M Gatt, Willis S, Leuschner S. A meta analysis of the effectiveness and safety of kinesiology taping in the management of cancer related lymphoedema. European journal of Cancer care 26, 2017
6. A Smykla, K Walewicz, R Trybulski, T Halski, M Kucharzewski, C Kuci, K Klakla, J Taradaj Effect of kinesiology Taping on breast cancer related Lymphoedema Randomized Single blind Controlled pilot Study Biomed Res Int 2013: 2013: 767106
7. MKT website: [www.universityofmkt.com](http://www.universityofmkt.com)

**Healing by relieving muscular congestion**

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**Do you still remember from dental school that muscles constantly vibrate by tensing and**

**relaxing in a specific rhythm? This micro activity activates the musculoskeletal system’s**

**metabolism and prevents illness. If this harmonic and rhythmic metabolism is no longer**

**in balance, it may result in a number of different symptoms. Successful prevention**

**involves an understanding of oral microbiology and the musculoskeletal system—a**

**concept that Dr Ulrich Randoll has combined into a revolutionary new therapy.**

The area of liquid around our cells and organs, the extracellular matrix, is a component of the

body’s connective tissue, which makes up a large part of our body. That is where collagen

fibres are found. Connective tissue is full of nerve pathways, which direct nerve signals. To

keep cells healthy, the extracellular liquid depends on the permeability and transportability of

this transit space. Illnesses are errors in cell logistics. Cells that have become biologically

unbalanced experience congestion and a deceleration in their extracellular matrix. This means

that the affected areas of these cells no longer have a sufficient supply. These illnesses or

disruptions to the body’s processes lead back to cellular regulation level. Essentially, the wellbeing

of each cell depends on its environment.

“Pain and loss of mobility ultimately result from problems in cell logistics. This is the tissue

crying out for oxygen,” explained doctor and dentist Dr Ulrich Randoll. The cell does not

have enough oxygen to create energy. The musculature suffers from a lack of oxygen,

meaning it can no longer relax, so it stays constricted and becomes gradually harder. This

results in a lack of elasticity and the pressure on the vessels inside the muscles increases.

Randoll is the Chief Scientific Officer of the Dr. Randoll Institute, a non-profit organization

for research and education, and the medical director of a private clinic. He views biological

systems as regulated complex systems constructed by three interacting areas: information,

process and structure.

Matrix Rhythm Therapy (MaRhyThe) is a systemic biological approach to getting the body

back on track, developed by Randoll. It rebalances the tissue and cells by simulating

physiological muscle vibrations with a therapeutic device, the patented Matrixmobil, which is

a handheld applicator with a swivel head. It moves to and fro at 8– 12Hz, which is the

frequency at which muscle cells vibrate. Based on coherent muscle rhythms, it targets the

musculoskeletal system using the physiological frequency and amplitude spectrum. This

vibration window functions as a pacemaker for the body, as the musculoskeletal system has a

major role in transporting liquids in the body and in microcirculation. The entrainment effect

is used to gently reactivate cellular processes, flush the cells and readjust the whole system.

The oxygen content of tissue and the exchange of nutrients and metabolites are both increased

so that cellular supplies are optimised.

These magnetic and mechanical vibrations have a variety of uses. They promote circulation,

relieve pain, improve oedema, and have become a regular feature in regenerative medicine,

including plastic surgery. With MaRhyThe, the therapist can gently target deep tissue

painlessly. “Employees and employers are equally relieved, as 70 % less backache and

considerably fewer absences have been realised thanks to the preventative use of MaRhyThe,”

Randoll stated.

**What dentists should know**

When it comes to craniofacial orthopaedics, musculoskeletal, fascial and nerve systems, and

the relationship between muscles, occlusion and pain become therapeutic focal points. “With

this holistic approach to dentistry, we see the masticatory apparatus integrated into the

complex interplay of body, mind and soul. We pay special attention to musculoskeletal

burdens in connection with the occlusion,” said Randoll. “Symptoms affecting the masticatory

apparatus can influence the body as a whole, and vice versa.”

Randoll previously worked in oral and maxillofacial surgery and trauma surgery at the

University of Erlangen-Nürnberg in Germany. Sometimes, the usual clinical therapies would

not work for some patients and there were simply no further options for therapy. This

encouraged him to develop a new holistic therapeutic method. The result was MaRhyThe, a

practice-relevant, systemic biological therapeutic method that has a direct influence on

cellular processes: “MaRhyThe achieves deeply effective relaxation, almost a resetting of

neuromuscular systems, and should be used as a preventative measure by staff and dentists

themselves,” stated Randoll.

MaRhyThe has been tried and tested in dental medicine for many years now. “We use the

masticatory apparatus to process stress. Preventative changes to the inner structure can be

triggered to help relieve stress. MaRhyThe helps tense muscles reset to zero. They can relax

again once congestion has been cleared,” explained Dr Hans-Christian May, a dentist and

health practitioner in Munich in Germany. MaRhyThe is, therefore, perfect for preventing the

development of illnesses, as it counteracts chronic degenerative processes and inflammation

and promotes healing. This pleasant and painless treatment does not result in any reactive

responses that could cause new tension. Healing is improved, as cellular conditions have been

optimised.

**An interdisciplinary understanding of muscular function**

One example of this systemic biological tendency is patients with temporomandibular joint

dysfunction syndrome (TMD). Success has been achieved in such patients by releasing

muscular tension around the cervicothoracic transition at a cellular micro level using

MaRhyThe. This inter-organ and interdisciplinary understanding of muscular function is

central to treating TMD, as it explains the relationship between cellular neuromuscular micro

functions and macro movements.

In his Munich-based community practice, May uses MaRhyThe in preparation for splint

adjustments and as a complementary treatment during splint therapy, among other things. To

establish the static and dynamic positions of the temporomandibular joint, the muscles are

relaxed before measurements are taken. “The muscles have to relax to allow for reliable tissue

so we can take exact and reproducible measurements,” he said. The splint position should

represent the relaxed muscle position from the very beginning. It then works as a kind of

reminder. Many patients think that their tension, neck pain and shoulder pain are normal,

according to May. By involving osteopathy and manual techniques, even long-term painful

cramps and muscle tension can be rapidly improved. This muscle-relaxing therapy is

accompanied by sessions based on hypnotherapy in the spirit of a holistic systemic biological

concept.

MaRhyThe is not just a contribution to physical therapy, but also combines dentistry and

medicine to offer a preventative and curative approach for systemic biological disorders.

**Impact of Manipulation and Exercise Therapy on Sacroiliac Joint Dysfunction**

**Mukesh kumar ,Ph.D research scholar JJTU University**

**and Principal Sriganganagar college of allied health sciences**

**Background:** The sacroiliac joint dysfunction (SIJD) has been found to be the primary culprit for lower back pain (LBP), but it is still overlooked and treated as LBP. There are no guidelines or appropriate therapeutic protocols for SIJD. Thus, there is a need for an effective treatment strategy for SIJD.

**Objective:** To compare exercise therapy (ET), manipulation therapy (MT), and a combination of the 2 (EMT) in terms of their effectiveness in treating SIJD.

**Study Design:** A comparative, prospective, single-blind randomized controlled trial.

**Setting:** Physiotherapy department, Tantia University, Sriganganagar, Rajasthan, India.

**Methods:** A total of 51 patients with lower back or buttock pain resulting from SIJD were randomly assigned to 1 of 3 study groups: ET, MT, or EMT. The ET group received posterior innominate self-mobilization, sacroiliac joint stretching, and spinal stabilization exercises. The MT group underwent posterior innominate mobilization and SIJ manipulation. Lastly, the EMT group received manipulation maneuvers followed by exercise therapy. Pain and disability were assessed at 6, 12, and 24 weeks after the interventions.

**Results:** All 3 groups demonstrated significant improvement in pain and disability scores compared to the baseline (P < 0.05). The difference among these therapeutic protocols was found to be a function of time. At week 6, MT showed notable results, but at week 12, the effect of ET was remarkable. Finally, at week 24, no significant difference was observed among the study groups.

**Limitations:** A major limitation of the present study is lack of a control group receiving a type of intervention other than the experimental protocols. Another limitation is the short duration of follow-ups.

**Conclusions:** Exercise and manipulation therapy appear to be effective in reducing pain and disability in patients with SIJD. However, the combination of these 2 therapies does not seem to bring about significantly better therapeutic results than either approach implemented separately.

sacroiliac joint dysfunction (SIJD) is pain in the lower back caused by alteration in the normal joint motion ascribable to hypomobility or

hypermobility (1). SIJD has been found to be the primary cause of lower back pain (LBP) in 15 to 40% of patients (2-6). Pain in the sacroiliac joint (SIJ) region can additionally cause groin and thigh pain. Tenderness in the SIJ upon palpation is a reliable sign that the SIJ is the source of pain (6). SIJ functionality is affected by different pathological changes, the commonest of which seem to be related to biomechanical inefficiencies (7).

Standard physical therapy interventions can be employed to correct the underlying pathology and to alleviate the symptoms in SIJD. Such interventions in- clude repetitive exercises, manual joint mobilization, manipulation, sacroiliac belts, massage, patient edu- cation, aerobic conditioning, and electrotherapeutic modalities (6,8-9).

Although exercise therapy is provided as a valu- able method in LBP treatment (10-14), few studies have been concerned with the efficacy of this option in SIJD. Moreover, manipulation has some therapeutic effects such as stretching of the soft tissues around the joint, improving range of motion, reducing edema and muscle spasm, correcting joint defects, and controlling pain (15,16).

In spite of the high prevalence of SIJD, there are no guidelines or appropriate therapeutic protocols for this syndrome. Physicians usually refer to it as LBP only. In- deed, SIJD is still overlooked as a potential contributor to LBP. Furthermore, only a few studies have sought to compare the effectiveness of different therapeutic mo- dalities (6,17). This motivated us to evaluate supportive care by comparing the effects of exercise therapy and manipulation on pain intensity and disability in patients with SIJD in Iran. Moreover, this trial aimed to provide a more detailed insight into the short- and long-term effects of the 3 treatment choices under investigation on the clinical features of SIJD.

**Methods**

This study was conducted as a single-blind random- ized controlled trial (i.e., where the data analyzer was blind to the study) with 6-, 12-, and 24-week follow-ups in the Sports Medicine Department of Rasoul Akram Hospital in Tehran during the period spanning De- cember 2013 to February 2016. Patients with LBP were recruited from musculoskeletal clinics of Rasoul Akram Hospital. The patients who met the following criteria were included in the study: LBP or buttock pain last- ing for at least 3 months, age over 20 years, no history of spine and hip surgery in the year prior to the study, no pregnancy, no osteoporosis (T-score < 2.5 in bone densitometry) or bone fractures, no pain radiating below the knees, not receiving physical therapy in the lower back and buttocks over the preceding 3 months, non-injection of corticosteroids or anesthetics in the SIJ during the previous month, absence of sacroileitis or sacroiliac infection, and testing positive in at least 3 of the following:

• Gaenslen’s Test

• Standing Forward Bending Test

• Patrick’s Test

• Gillet Test

• Yeoman’s Test

• Thigh Trust Test and other sacroiliac tests.

The participants were excluded if they had intensi- fied pain, were involved in other treatments for pain relief, and discontinued the intervention protocol for any reason.

The 56 eligible patients were divided into 3 groups. The written informed consent of all the pa- tients was obtained prior to inclusion in the study. The computer-generated randomization was applied by a staff member blind to the study. Of the total number of eligible patients, 19 were allocated to the “exercise therapy” (ET) group, 18 to the “manipulation therapy” (MT) group, and 19 to the “exercise plus manipulation therapy” (EMT) group. All the patients were requested not to receive other treatments for 24 weeks.

**Study Protocol**

The patients in the ET group were instructed by a sports medicine specialist how to perform the exercises at home on a daily basis. They were also asked to visit the hospital once a week until week 12 for supervised exercises. After that, they did not perform exercises until week 24. The exercises were posterior innomi- nate self-mobilization, sacroiliac joint stretching, and spinal stabilization. A brief description of each exercise follows.

1) Self-mobilization Exercises

Posterior innominate self-mobilization was done in a supine position. The patient grasped behind the flexed knee and gently moved it toward the trunk. This exercise rocked the innominate in a posterior direction.

2) Sacroiliac Joint Stretches

These exercises were performed in both right side- lying and left side-lying positions. The patient was in the side-lying position, with the upper hip being flexed 70 to 80 degrees and the knee flexed about 90 degrees. The patient’s trunk was then rotated toward the upper side as far as was comfortable. The patient was instruct- ed to lift the top leg into hip abduction and internal rotation and resist the researcher or the partner for 5 seconds. The patient was instructed to breathe and ex- hale as the trainer gently over-pressured the trunk rota- tion. The patient was then instructed to relax the hip and leg and allow the leg to drop toward the floor. As the patient relaxed, a gentle overpressure was applied

to the foot as the patient was allow- ing the hip and leg to drop further to the floor. This exercise was done 5 times a day with 2 minutes of rest between the sequences.

3)Spinal Stabilization Exercises

These exercises were in four phases. Each new phase began every three weeks.

Phase 1

- Supine abdominal draw-in

- Abdominal draw-in, with one knee drawn to the chest

- Abdominal draw-in, with the heels sliding backward one after the other

- Abdominal draw-in, with both knees drawn to the chest

- Supine twist

- Prone bridging on elbows

- Side bridging on elbows

- Prone cobra

- Quadruped opposite arm-leg lift

Phase 2

- Abdominal draw-in with feet on the medicine ball plus abdomi- nal draw-in with feet on the ball and added movement

- Prone bridging on elbows with single-leg hip extension

- Quadruped opposite arm-leg lifts, with cuff or dumbbell weights

Phase 3

- Prone bridging, with the feet on the ball

- Side bridging with single-leg hip abduction

- Quadruped opposite arm-leg lifts on “half foam rollers”

- Twisting while seated on medicine ball

Phase 4

The exercises in Phase 4 were performed dynamically, meaning that the therapist threw a soccer ball-size medicine ball to the pa- tient who was trying to stay in the position pertinent to the exercises in Phase 3.

It should be noted here that each exercise was to be repeated 10 times a day.In the MT group, 2 manual maneuvers of posterior innominate rota- tion were implemented: i.e., posterior innominate mobilization and SIJ manipulation as shown in Figs. 1 and 2,, respectively. It is to be noted that the former is low-velocity and low-amplitude, while the latter is high- velocity and low-amplitude. The maneuvers were performed in the first session by the sports medicine specialist with 8 years of experience in manipulation. Immediately afterward, the Standing Forward Bending Test (18) and Gillet Test (19) were administered, with the negative results indicating the effectiveness of the manipulation for rotating innominate posteriorly. In the case of positive results, both maneuvers were repeated immediately, and then the aforementioned tests were administered again. If the test results were still positive, the respec- tive patients were excluded. The patients testing nega- tive were asked to refer back to the therapist at the designated follow-up times.

In the EMT group, first the manipulation maneu- vers depicted in Figs. 1 and 2 were performed. If these maneuvers proved effective, the exercises for the ET group were taught to the patients, who were asked to do the prescribed exercises at home on a daily basis. They were additionally requested to visit the hospital once a week until week 12 to receive supervised exer- cises. Following this period, they were asked to only perform unsupervised home-based exercises until week 24.

**Outcome Measures**

The outcomes were pain and functionality. These were evaluated both subjectively and objectively be- fore the treatment and at 6, 12, and 24 weeks. Sub- jectively, pain was evaluated using the Visual Analog Scale (VAS), and functionality was assessed using the Oswestry Disability Index (ODI) and the Roland-Morris Back Pain Questionnaire. The reliability and validity of the Persian version of the functionality questionnaires has been confirmed in the literature (20). Functionality was also objectively evaluated via the “timed up and go” and “self-paced walk” tests (21).

**Statistical Analysis**

Data analysis was performed using SPSS 23 (IBM Corporation, NY, USA, 2015). The normality of the dis- tribution of the continuous variables was determined using the Shapiro-Wilk test. The data pertinent to these variables are shown as either mean ± SD or median, as appropriate. The categorical variables were analyzed using the chi-squared test. Pretreatment differences among the 3 groups were determined using ANOVA. Repeated-measures analysis was used for evaluating the time effect in the follow-ups. To determine the treatment effect, the data were analyzed using either a random effects mixed model or a generalized estimat- ing equations model, as appropriate. The Tukey’s test was used for pairwise comparisons of the study groups. To assess the intra-tester reliability of objective tests, 10 healthy subjects had repeated measurements 7 days apart in a pilot study. The test-retest reliability of the “timed up and go” and “self-paced walk” tests was assessed using interclass correlation coefficients (ICC) at the 95% confidence level. The ICCs between the first and second measurements were 0.90 and 0.95 for “timed up and go” and “self-paced walk” tests,respectively.

For all tests, statistical significance was set at an α level of < 0.05 (2-tailed).

**Results**

Of the 56 patients who met the inclusion criteria,51 patients were subjected to the final assessment, equaling a dropout of about 9%. More particularly, 2 patients in the ET group were excluded because of their irregular visits and failure to do home-based exercises at weeks 12 and 24. In addition, 1 patient in the MT group refused to complete the study protocol due to the disappearance of pain. Finally, 2 patients in the EMT group preferred to try other treatments since there was no improvement in their pain. Therefore, ultimately 17 patients remained in each group for analysis .

Of the 51 patients being analyzed, 12 (23.5%) were men and 39 (57.6%) women. Gender distribution was not significantly different from 1 group to another (P= 0.28).

The mean age of the patients was 46.8 years (rang- ing 23-60 years). There was no statistically significant difference in age distribution among the 3 groups (P= 0.22).

The mean weight of the participants ranged from 51 to 98 kg. No significant differences were noted in weight distribution between the study groups (P = 0.84).

Following the classification developed by the American College of Sports Medicine, a moderate phys- ical activity of less than 90 minutes per week was deter- mined as an activity factor of less than 1.5 (22). Sixty- two percent of the patients had this rating. In terms of physical activity, the statistical difference among the 3 groups did not reach significance (P = 0.76).

Table 1 presents the time effect of the 3 interven- tional methods. For all groups, the subjective measures showed significant improvement in each follow-up compared to the baseline (P < 0.001). However, the ob- jective measures revealed dramatic improvement only until week 12.

Table 2 compares the study groups in terms of the outcome parameters measured at 4 points in time. As the table shows, except for the ODI, there was no sta- tistically significant difference among the 3 methods at baseline. At week 6, MT showed a higher score than the other two methods, and at week 12, ET yielded better results. However, at week 24, there was no significant difference among the 3 methods.

**The Tukey’s Pairwise Analysis Results**

**ET vs. MT**

All the outcomes in the MT group were better than in the ET group at week 6. However, at weeks 12 and 24, ET was as effective as MT in two of the parameters (i.e., the objective functional tests) (P < 0.001) and more effective in terms of the other parameters (P = 0.024).

Table 1. The time effect of the 3 interventional methods as demonstrated by the outcome measures of the study.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Baseline | Week 6 | Week 12 | Week 24 | Treatment effect |
| Pain (VAS) |  |  |  |  |  |
| ET | 5.5 | 3.64 | 0.35 | 2.23 | <0.001 |
| MT | 4 | 0.64 | 2.47 | 2.82 |
| EMT | 4.7 | 2.35 | 0.47 | 2.64 |
| ODI |  |  |  |  |  |
| ET | 28.52 | 23.52 | 11.17 | 19.64 | <0.001 |
| MT | 23.58 | 11.94 | 20.17 | 22.17 |
| EMT | 28.52 | 18.47 | 12.17 | 22.11 |
| Roland-Morris |  |  |  |  |  |
| ET | 9.52 | 7.41 | 1.35 | 3.58 | <0.001 |
| MT | 6.64 | 1.47 | 5.35 | 6.05 |
| EMT | 10.12 | 4.17 | 1.64 | 4.41 |
| Timed up and go |  |  |  |  |  |
| ET | 12.58 | 12.11 | 10.35 | 11.76 | 0.087 |
| MT | 11.7 | 10 | 11.05 | 11.52 |
| EMT | 11.88 | 10.7 | 9.58 | 11.7 |
| Self-paced walk |  |  |  |  |  |
| ET | 25.17 | 24.35 | 22 | 24.05 | 0.139 |
| MT | 24 | 21.94 | 23.17 | 23.41 |
| EMT | 26.29 | 24.58 | 23.11 | 23.35 |

Table 2. A comparison of the study groups in terms of the outcome parameters measured at 4 points in time.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **ET** | **MT** | **EMT** | **P value** |
| Pain (VAS) |  |  |  |  |
| 5.52 | 4 | 4.7 | 0.064 |
| Baseline |
| Week 6 | 3.64 | 0.64 | 2.35 | < 0.001 |
| Week 12 | 0.35 | 2.47 | 0.47 | < 0.001 |
| Week 24 | 2.23 | 2.82 | 2.64 | 0.037 |
| ODI |  |  |  |  |
| 28.52 | 23.58 | 28.52 | 0.006 |
| Baseline |
| Week 6 | 23.52 | 11.94 | 18.47 | < 0.001 |
| Week 12 | 11.17 | 20.17 | 12.17 | < 0.001 |
| Week 24 | 19.64 | 22.17 | 22.11 | 0.075 |
| Roland-Morris |  |  |  |  |
| 9.52 | 6.64 | 10.12 | 0.063 |
| Baseline |
| Week 6 | 7.41 | 1.47 | 4.17 | < 0.001 |
| Week 12 | 1.35 | 5.35 | 1.64 | < 0.001 |
| Week 24 | 3.58 | 6.05 | 4.41 | 0.066 |
| Timed upand go |  |  |  |  |
| 12.58 | 11.7 | 11.88 | 0.451 |
| Baseline |
| Week 6 | 12.11 | 10 | 10.7 | < 0.001 |
| Week 12 | 10.35 | 11.05 | 9.58 | 0.053 |
| Week 24 | 11.76 | 11.52 | 11 | 0.544 |
| Self-paced walk |  |  |  |  |
| 25.17 | 24 | 26.29 | 0.114 |
| Baseline |
| Week 6 | 24.35 | 21.94 | 24.58 | 0.01 |
| Week 12 | 22 | 23.17 | 23.11 | 0.395 |
| Week 24 | 24.05 | 23.41 | 23.35 | 0.164 |

**ET vs. EMT**

No significant difference was observed between the ET and EMT groups in all measures at weeks 12 and 24 (P > 0.05). However, at week 6, EMT proved more efficient than ET in subjective tests, VAS, and the objec- tive test of “timed up and go” (P = 0.032).

**MT vs. EMT**

Adding exercise therapy to manipulation did not reduce the intensity of pain (P = 0.123). However, the EMT group produced better results than the MT group in terms of Roland-Morris score at weeks 4 and 12 (P = 0.024), ODI at weeks 4 and 24 (P = 0.023), and function- ality objective tests at weeks 12 and 24 (P < 0.001).

**Discussion**

To the best of our knowledge, this work is one of the first studies comparing different therapeutic mo- dalities for SIJD in Iran. The results showed that all the 3 methods (i.e., ET, MT, and EMT) can reduce pain and disability compared to the baseline. It is noteworthy that this positive effect persisted for 24 weeks in the subjective tests and for 12 weeks in the objective tests although the results from the objective tests are more valid to the researchers. A possible explanation for the more enduring results of the subjective tests is that a rewarding experience with the tests made the patients answer the questions favorably.At week 6, MT yielded better results than ET in terms of pain relief, showing the quicker positive ef- fect of the former. This could be due to its analgesic effect, either from structural (23-25) or neurological processes (26,27). Another plausible explanation is the antispasmodic effect of manipulation as confirmed by Orakifard et al (15). The quick onset of MT results in this study echoes the findings of Kristin and colleagues (28), who demonstrated the positive role of 4 manual high- velocity and low-amplitude techniques in reducing pain and disability in patients with SIJD over a period of 2 weeks. A previous study of the authors of this study (16) showed that 2 high-velocity and low-amplitude tech- niques of posterior innominate rotation followed by daily low-velocity and low-amplitude self-mobilization techniques for 1 month could improve pain and func- tionality in the patients with SIJD.

In line with the present study, Hidalgo’s (29) sys-tematic review demonstrated moderate to strong evi- dence supporting the greater utility of manipulation compared to sham treatment in controlling chronic non-specific LBP in the short run. Similarly, another systematic review, by Ruddock (30), supported the positive effect of spinal manipulation on chronic non- specific LBP compared to sham therapy. On the other hand, another systematic review by Assendelft et al (31), suggests that manipulation is not particularly more beneficial than other conventional methods like exercise therapy, needling, and analgesics in treating chronic LBP; however, this later review suggests that manipulation is more effective in controlling pain in acute LBP.

In a review of the studies into the effect of ma- nipulation on acute LBP, Chaitow (32) approves of the findings of Assendelft et al’s (31) study and argues that it is not reasonable to dismiss spinal manipulation as a clinical treatment option for acute LBP.

In our study, after week 6, MT was not superior to ET in treating chronic LBP, and indeed it was less effec- tive. The possible reason why MT was more effective at week 6 was explained above.

At week 12, ET showed better outcome than the other treatment modalities, confirming that ET takes more time to begin to be effective because neuromus- cular adaptation in muscles needs at least 6 weeks to take place (23).

At week 24, there was no significant difference among the 3 treatment groups. This could be attributed to the fact that the effect of ET declined in the interval between week 12 and week 24, when the patients did not perform any exercise. Indeed, the sustainability of the effect of prescribed exercises depends on their continuity.

A systematic review conducted by Standaert et al(33) concluded that although various methods are used, there is hardly any evidence to support that exercise therapy and manipulation are equally effective in re- ducing chronic LBP and improving performance.

Given the positive effect of ET and MT when imple- mented alone, we expected that a combination of these 2 modalities would be more effective. However, we ob- served that EMT results were better than the outcome brought about by ET only at week 6. This is because, as already discussed, the positive effect of MT appears at week 6, but the effect of ET needs more time to appear. In other words, MT adds no extra positive effect to that of ET after week 6. However, Hidalgo’s review (29) re- ported moderate evidence for the effectiveness of EMT compared to ET in terms of pain relief, improvement in functionality, and quality of life in both the short run and the long run.

As for the comparison between MT and EMT, contrary to our expectation, the EMT group did not outperform the MT group at week 6 in any of the measures. A plausible explanation for this could be that the patients in the EMT group, who received ET after MT, were not so motivated to perform ET due to the faster pain relief emanating from MT. However, at week 12, EMT yielded significantly better results than MT in all measures. Moreover, at week 24, there was no difference between MT and EMT because, as previously stated, between weeks 12 and 24, the subjects did not keep to any of the therapeutic protocols.

A comparison between the ET, MT, and EMT groups in UK BEAM (United Kingdom back pain exercise and manipulation) trial team’s study (34) showed that the patients receiving exercise therapy benefited little at month 3, and nothing at month 12; those in the manip- ulation group gained little to moderate advantage at month 3, and little at month 12; and finally the patients who received both exercise therapy and manipulation improved moderately at month 3, and little at month12. According to that study, manipulation yielded bet- ter results in chronic LBP, and the authors also found that in most parameters evaluating pain and disability (i.e., Roland disability, Von Korff pain score, SF-36, and fear avoidance beliefs), the most satisfying results were observed at month 3, but those results did not persist until month 12. These findings are in line with the re- sults of the present study.

It is to be noted at this juncture that the bulk of the past research seems to have been concerned with the effect of ET on LBP (13,35-42) rather than on SIJD. With this in mind, the authors hope that the present study could be a trigger for more research into this syndrome.

**Limitations**

A major limitation of the present study is lack of a control group receiving a type of intervention other than the experimental protocols. Another limitation is the short duration of follow-ups.

**Conclusion**

The present study was aimed at comparing ET, MT, and EMT in terms of their effectiveness in treating SIJD. All 3 treatment options succeeded in relieving pain and improving functionality for a period of 24 weeks compared to baseline. Furthermore, the therapeutic effect of MT appeared more quickly (at week 6), but ET proved more effective in improving functionality at week 12. In addition, no significant difference was ob- served between ET, MT, and EMT after 6 weeks. Overall, it can be concluded that manipulation can be an effec- tive approach to reducing pain in the SIJ.

**Suggestions**

In the present study, we examined the combined effect of self-mobilization, SIJ stretching, and spinal sta- bilization exercises on the alleviation of SIJD symptoms. A possible avenue of research would be to study the role of exercise type in reducing pain and disability and to draw a comparison among these exercises. Addition- ally, it would be interesting to evaluate the long-term effects of different therapeutic methods.

**References**

1. Cohen I, Rainville J. Aggressive exercise as treatment for chronic low back pain. Sports Medicine 2002; 32:75-82.
2. O’Sullivan PB, Beales DJ, Beetham JA, Cripps J, Graf F, Lin IB, Avery A, Tucker B.. Altered motor control strategies in subjects with sacroiliac joint pain during the active straight-leg-raise test. Spine 2002; 27:E1-E8.
3. Liliang PC, Lu K, Liang CL, Tsai YD, Wang KW, Chen HJ. Sacroiliac joint pain after lumbar and lumbosacral fu- sion: Findings using dual sacroiliac joint blocks. Pain Medicine 2011; 4:565-570.
4. DePalma MJ, Ketchum JM, Saullo TR. Etiology of chronic low back pain in pa- tients having undergone lumbar fusion. Pain Medicine 2011; 5:732-739.
5. Sembrano JN, Polly DW, Jr. How often is low back pain not coming from the back? Spine 2009; 34:E27-32.
6. Al-subahi M, Alayat M, Alshehri MA, Helal O, Alhasan H, Alalawi A, Takrouni A, Alfaqeh A. The effectiveness of phys- iotherapy interventions for sacroiliac joint dysfunction: A systematic review. J Phys Ther Sci 2017; 29:1689-1694.
7. Timm KE. Sacroiliac joint dysfunction in elite rowers. J Orthop Sports Phys Ther 1999; 29:288-293.
8. Jonely H, Brismee JM, Desai MJ, Reoli R. Chronic sacroiliac joint and pelvic girdle dysfunction in a 35-year-old nulliparous woman successfully managed with mul- timodal and multidisciplinary approach. J Man Manip Ther 2015; 23:20-26.
9. Luukkainen RK, Wennerstrand PV, Kauti- ainen HH, Sanila MT, Asikainen EL. Effi- cacy of periarticular corticosteroid treat- ment of the sacroiliac joint in non-spon- dylarthropathic patients with chronic low back pain in the region of the sacroiliac joint. Clin Exp Rheumatol 2002; 20:52-54.
10. Standaert CJ, Friedly J, Erwin MW, Lee MJ, Rechtine G, Henrikson NB, Nor- vell DC. Comparative effectiveness of exercise, acupuncture, and spinal ma- nipulation for low back pain. Spine 2011; 36:S120-S130.
11. Sung PS. Multifidi muscles median fre- quency before and after spinal stabili- zation exercises. Arch Phys Med Rehabil 2003; 84:1313-1318.
12. Souza GM, Baker LL, Powers CM. Elec- tromyographic activity of selected trunk muscles during dynamic spine stabili- zation exercises. Arch Phys Med Rehabil 2001; 82:1551-1557.
13. Hayden JA, van Tulder MW, Malmivaara AV, Koes BW. Meta-analysis: Exercise therapy for nonspecific low back pain.Annals Intern Med 2005; 142:765-775.
14. Simopoulos TT, Manchikanti L, Gupta S, Aydin SM, Kim CH, Solanki D, Nampia- parampil DE, Singh V, Staats PS, Hirsch JA. Systematic review of the diagnostic accuracy and therapeutic effectiveness of sacroiliac joint interventions. Pain Physician 2015; 18:E713-E756.
15. Orakifard N, Kamali F, Mohammadi M, Piroze S. Sacroiliac joint manipula- tion effect on the pain of compression and reflex Hafman. Birjand University of Medical Sciences. 2011 18:302-311. http://idml.research.ac.ir/
16. Nejati P, Karimi F, Safarcherati A. The ef- fect of manipulation in sacroiliac joint dysfunction. Journal of Isfahan Medical School 2016; 34:1218-1224.
17. Hansen HC, McKenzie-Brown AM, Cohen SP, Swicegood JR, Colson JD, Manchikanti L. Sacroiliac joint interven- tions: A systematic review. Pain Physician 2007; 10:165-184.
18. Vincent BS, Gibbons P. Inter-examiner and intra-examiner reliability of the standing flexion test. Manual Therapy 1999; 4:87-93.
19. Meijne W, van Neerbos K, Aufdem- kampe G, van der Wurff P. Intraexam-iner and interexaminer of the Gillet Test.J Manipulative Physiol Ther 1999; 22:4-9.
20. Mousavi SJ, Parnianpour M, Mehdian H, Montazeri A, Mobini B. The Oswes- try Disability Index, the Roland-Morris Disability Questionnaire, and the Que- bec Back Pain Disability Scale: Transla- tion and validation studies of the Iranian versions. Spine 2006; 31:E454-E459.
21. Bennell K , Dobson F, Hinman R. Mea- sures of physical performance assess- ments: Self-Paced Walk Test (SPWT), Stair Climb Test (SCT), Six-Minute Walk Test (6MWT), Chair Stand Test (CST), Timed Up & Go (TUG), Sock Test, Lift and Carry Test (LCT), and Car Task. Arthritis Care Res (Hoboken) 2011; 63:350-370.
22. Swain DP, Brawner CA, Chambliss HO, Nagelkirk PR, Bayles MP, Swank AM. ACSM’s Resource Manual for Guide- lines for Exercise Testing and Prescrip- tion. Seventh edition. Wolters Kluwer, Lippincott Williams & Wilkins, Balti- more, MD, pp. 340.
23. Bogduk N, Jull G. The theoretical pa- thology of acute locked back: A basis for manipulative therapy. Man Med 1985; 1:78-82.
24. Shekelle P. Spine update: Spinal manip- ulation. Spine 1994; 6:858-861.
25. Triano J. Biomechanics of spinal manip- ulative therapy. Spine J 2001; 1:121-130.
26. Pickar J, McLain R. Responses of mecha- nosensitive afferents to manipulation of the lumbar facet in the cat. Spine 1995; 20:2379-2385.
27. Pickar J. Neurophysiological effects of spinal manipulation. Spine J 2002; 2:357-371.
28. Kirstin A, Shearar, Christopher J, Colloca A, Horace LW. Randomized clinical trial of manual versus mechanical force ma- nipulation in the treatment of sacroiliac joint syndrome. J Manipulative Physiol Ther 2005; 28:493-501.
29. Hidalgo B, Detrembleur C, Hall T, Ma- haudens PH, Nielens H. The efficacy of manual therapy and exercise for differ- ent stages of non-specific low back pain: An update of systematic reviews. J Man Manip Ther 2014; 22:59-74.
30. Ruddock J K, Sallis M H, Ness A, Perry R E. Spinal manipulation vs sham ma- nipulation for nonspecific low back pain: A systematic review and meta-analysis. J Chiropr Med 2016; 15:165-183.
31. Assendelft WJ, Morton SC, Yu EI, Sut- torp MJ, Shekelle PG. Spinal manipula- tive therapy for low back pain. Cochrane Database Syst Rev 2004; 1:CD000447.
32. Chaitow L, Comeaux Z, Dommerholt J, Ernst E, Gibbons P, Hannon J, Lewis D, Liebenson C. Efficacy of manipulation in low back pain treatment: The validity of meta-analysis conclusions. J Bodyw Mov Ther 2004; 8:25-31.
33. Standaert CJ, Friedly J, Erwin MW, Lee MJ, Rechtine G, Henrikson NB, Norvell DC. Comparative effectiveness of exer- cise, acupuncture, and spinal manipu- lation for low back pain. Spine (Phila Pa 1976) 2011; 36:S120-S130.
34. UK BEAM Trial Team. United Kingdom back pain exercise and manipulation (UK BEAM) randomised trial: Cost ef- fectiveness of physical treatments for back pain in primary care. BMJ 2004; 329:1381.
35. Hodges PW, Richardson CA. Inefficient muscular stabilization of the lumbar spine associated with low back pain: A motor control evaluation of transverses abdominis. Spine 1996; 21:2640-2650.
36. Rainville J, Hartigan C, Martinez E, Limke J, Jouve C, Finno M. Exercise as a treatment for chronic low back pain. Spine J 2004; 4:106-115.
37. Smidt N, de Vet HC, Bouter LM, Dekker J, Arendzen JH, de Bie RA. Bierma. Ef- fectiveness of exercise therapy: A best- evidence summary of systematic re- views. Aust J Physiother 2005; 51:71-85.
38. Mior S. Exercise in the treatment of chronic pain. Clin J Pain 2001; 17:S77-S85.
39. Cohen I, Rainville J. Aggressive exercise as treatment for chronic low back pain. Sports Med 2002; 32:75-82.
40. Turk DC, Dworkin RH, Allen RR, Bellamy N, Brandenburg N, Carr DB, Cleeland C, Dionne R, Farrar JT, Galer BS, Hewitt DJ, Jadad AR, Katz NP, Kramer LD, Man- ning DC, McCormick CG, McDermott MP, McGrath P, Quessy S, Rappaport BA, Robinson JP, Royal MA, Simon L, Stauffer JW, Stein W, Tollett J, Witter J. Core outcome domains for chronic pain clinical trials: IMMPACT recommenda- tions. Pain 2003; 106:337-345.
41. Koumantakis GA, Watson PJ, Oldham JA. Trunk muscle stabilization training plus general exercise versus general ex- ercise only: Randomized controlled trial of patients with recurrent low back pain. Phys Ther 2005; 85:209-225.
42. Ghiasi F, Mehraeen M. The effect of William’s exercise on non-specific and chronic referral low back pain. J Kerman- shah Univ Med Sci 2009; 12:330-342.

**EXERCISE REHABILITATION IN BREAST CANCER**

**Dr. Smriti Neha**

Breast cancer is the most common cancer in women worldwide, and the probability of an arbitrary woman being diagnosed with breast cancer during her lifetime is about 10-13%. (1); among these women, 38% were diagnosed more than 10 years ago.

Because of its high incidence and relatively good prognosis, breast cancer is the most prevalent cancer among women in the world. However, breast cancer is still the leading cause of cancer-related death among women in many developed countries, and is the most common cause of death of women aged 40–60 years (1). Breast cancer mortality rates have declined, possibly due to earlier detection, improvements in surgical resection, radiation, and systemic therapies (2). Thus, as more patients survive breast cancer, the number of women living with long-term side effects also increases (2).

**CLINICAL PRACTICE**

Today, three screening tests are routinely in use for detection of breast cancer: mammography, physical breast exam, and breast self-exam. When a breast tumor is detected, a more detailed examination can be done (mammogram and/or ultrasound and/or MRI (Magnetic Resonance Imaging). The final diagnosis is performed by microscopic examination of fine-needle aspirations (cytology) or a biopsy (histology) (3). Even though the routines related to breast cancer diagnosis are efficient, patients may have to wait several weeks before treatment. This delay waiting period may impose additional psychological challenges for the woman.

**Treatment options of breast cancer patients and morbidities.**

Breast cancer treatment involves multiple medical disciplines. The treatment depends on the patients age, menopausal status as well as disease stage and pathological features; type, tumor grade, multifocal receptor status, and family predisposition (3). Disease stage is determined by tumor size, the number and location of lymph nodes involved, and the presence or absence of distant metastatic disease. The treatment consists of local treatments such as surgery and radiotherapy, systemic treatment such as chemo and hormone therapy, and monoclonal antibodies (4;5).

**Surgery**

Surgical procedures have been modified during the last decades (6). With *radical mastectomy* (Halsteds method), major side effects occurred (extensive and frequent arm and shoulder morbidities). It was therefore replaced by m*odified radical mastectomy* in the 1970-80’s. Postsurgical side effects were reduced without increase in local relapses or decreased survival rates. Breast conserving treatment was then developed. Randomized studies showed that only removing the tumour (lumpectomy) and a rim of normal surrounding breast tissue were as safe as modified radical treatment, if the patient was treated with postoperative radiotherapy to the whole breast (7;8).

Axillary lymph node dissection (ALND) is now done in less than 50 % of the patients due to sentinel lymph node biopsy (SLNB) (9;10). The status of the axilla is one of the most important prognostic factors in breast cancer. Subsequent decisions on supplementary treatment depend on how much lymph nodes are affected as well as other patient and tumour characteristics.

Mastectomy is still recommended for patients with large tumours and for patients when irradiation is contraindicated. Other factors may need to be taken into account as well when consider mastectomy (e.g. genetic factors and high risk of relapse) (3). For these patients, breast reconstruction can be performed concomitantly with mastectomy or at a later time.

**Systemic (neo) adjuvant treatment**

Systemic therapy is indicated for patients with high and intermediate risk of cancer recurrence. In most cases systemic treatment is given shortly after surgery (adjuvant), e.g. endocrine- and/or chemotherapy; some patients also receive monoclonal antibody therapy, e.g. trastuzumab (Herceptin). In some cases, chemotherapy is given before surgery (neoadjuvant) to try to shrink the tumour (down-stage) to make surgical removal possible. The type of chemotherapy or monoclonal antibody treatment is selected based on the type, size, and grade of the tumour and the molecular characteristics and involvement of lymph nodes in the axilla. Other combinations of chemotherapies can be given depending on tumour characteristics. Endocrine therapy is only given to patients after histologically proven estrogen (ER) and/or progesterone (PgR) receptors(3,11).

**Side effects of regular treatment**

Several health problems/side effects may develop following breast cancer diagnosis and treatment (presented in Table 1). Side effects can follow surgery, either ALND or SLNB, but are less common and often less severe following SLNB (9). Common side effects are temporary or permanent numbness of the skin on the inside of the upper arm, temporary or long-term limitation of arm and shoulder movements, and swelling of the breast and arm called lymphedema. Lymphedema is the most sig-nificant of these side effects and may develop into a permanent health problem. Significant lymphedema is reported in 10-50 % of women who have had axillary lymph node dissection and approximately 5-20 % of women who have had sentinel lymph node biopsy. Lymphedema may result in cosmetic deformity, loss of functionality, physical discomfort, recurrent episodes of erysipelas, and psychological distress. Pain is reported by 12 - 51% of patients 1 year after treatment (12), most frequently due to nerve injuries during surgery; the treatment is often pharmacological.

Early side effects due to radiation can include irritation, rubor in the skin during radiation treatment, and tiredness resulting in reduced physical activity. The majority of skin reactions disappear a few weeks after treatment is completed. Late side effects can include slightly darker skin in the treated area and continued sensitivity to sun exposure. Later development of teleangectasis, skin- and lung fibrosis may occur. If the axilla has been irradiated, there is an increased risk of reduced mobility of the shoulder, lymhedema, especially after ALND and when several lymph nodes have been affected (13). Pulmonary sequela as radiation pneumonitis (incidence 2-29%) is rarely of clinical consequence.

Side effects of chemotherapy shows individual variation and is also depending on the type of drug used (14). Common acute side effects are: alopecia (hair loss), nausea, fatigue, increased risk of weight gain, increased risk of infection, and temporary effects on bone marrow with lower blood counts, especially white blood cells (leucocytes).

The most common side effect of endocrine therapy is weight gain, symptoms of menopause, hot flashes, and vaginal dryness.. Some drugs may cause an increased risk of osteoporosis and bone fractures (15).

Cardiac toxicity is a concern in breast cancer survivors (14). There is known for a long time that anthracyclines cause acute and chronic cardiotoxicity. However, the cardiotoxic effects of radiation therapy, hormonal therapy (including tamoxifen and the aromatase inhibitors), and chemotherapy with taxanes and trastuzumab treatment have emerged more recently (3;11;14). A single breast cancer patient may receive anthracyclines, trastuzumab and radiotherapy before commencing hormonal therapy (14).

One major consequence of breast cancer and associated treatments is weight gain. Physical inactivity has also been observed as a consequence of various breast cancer treatment modalities (2). There is some studies that show an association between weight gain and increased breast cancer recurrence and mortality (16;17).

Common long term side effects and consequences after breast cancer are listed in table 1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 1. Long term side effects and consequences after breast cancer treatment Problem type** | **Side effects related to the disease** | | **Side effects related to treatments** | | **Type of treatment** |
| **Fatigue**  **Depression** | **X** | | **x** | | **Chemotherapy**  **Endocrine therapy**  **Irradiation** |
| **Lymphedema** | **X** | | **x** | | **Surgery**  **Irradiation** |
| **Shoulder movement impairments** | **X** | | **x** | | **Surgery,**  **Axillary dissection**  **Irradiation** |
| **Weight gain** | | **x** | | **Chemotherapy**  **Endocrine therapy**  **Hormone therapy** | |
| **Cardio-respiratory** | | **x** | | **Chemotherapy**  **Irradiation**  **Monoclonal antibodies** | |
| **Skeletal**  **Bone marrow**  **Osteoporosis** | | **x** | | **Chemotherapy**  **Endocrine therapy (Aromatase Inhibitors)** | |
| **Pain** | **x** | | **x** | | **Surgery**  **Chemotherapy** |
| **Slightly increased risk of thrombosis (blood clot)** | | **x** | | **Chemotherapy**  **Endocrine therapy** | |

**REHABILITATION OF BREAST CANCER PATIENTS**

Rehabilitation is a process in which different caregivers use a combination of their specific treatment modalities. In the following paragraphs we will therefore describe the most common modalities.

***Physiotherapy***

Physiotherapy for breast cancer patients is based on the same principles as for other patient groups, although they have some special problems related to their cancer and its treatment. Physiotherapy uses both passive and active stimuli in prevention, treatment and rehabilitation. It involves careful examination of the musculoskeletal system and the application of knowledge, stimuli, and skills.

Impaired shoulder function and development of arm lymphedema, i.e. an arm volume difference between the arms of >150 ml or circumferential arm difference of >2 cm, are common side effect of treatment for early breast cancer. Therefore, complications following cancer treatment, such as lymphedema, scar adherence, pulmonary complications, range of motion, and muscle strength, are of major importance.

Water displacement, circumference measurement, and tissue tonometry are important methods used to evaluate the status of lymphedemous limbs. Goniometers and dynanometers are used to measure the range of motion and muscular force/endurance, respectively.

The American College of Sports Medicine (ACSM) roundtable on exercise guidelines for cancer survivors describes that exercise during and after cancer treatment is safe and can help patients improve their physical capacity and quality of life (18). The ACSM guidelines indicate specific exercise programs oriented towards impairments associated with disease and medical treatment (18). Strength exercise does not have any negative effects on an existing SL (19); instead, it has beneficial effects such as improvement of strength (20) and lower exacerbation rates (21). However, these recommendations do not include any information about the prevention of SL in breast cancer patients.

They showed that exercise in the form of progressive resistance training as well as combined exercise therapies consisting of physiotherapy, physical therapy, MLD, stretching, massage, and/or kinesiotherapy are safe and might have a preventive effect.

In the past, physicians believed that cancer patients must avoid exercise (18), and literature indicating that exercise can cause or exacerbate lymphedema still exists (22). However, the present review revealed that 5 out of 8 trials reported significant preventive effects of resistance training and exercise on SL incidence. Park et al. (23) investigated the incidence and risk factors of SL(secondary lymphedema) in breast cancer patients. They demonstrated that women who exercised regularly, performed preventive self-care, and received information about the possible appearance of a lymphedema before local treatment had a lower risk of developing lymphedema. Proposed mechanisms included that exercise promotes the contractility of the skeletal muscles and subsequently provides primary pump mechanisms for lymph and venous drainage (24,25).

Besides radiation and the number of surgically removed lymph nodes (30), overweight also contributes crucially to the development of SL (26–28). In the study by Sagen et al. (29), a significant risk increase was observed in patients with a body mass index of >25 kg/m2 (p = 0.005). Shaw et al. (31) also referred to the relationship between overweight/obesity and the development of lymphedema (32). According to Bicego et al. (24), further risk factors include obstruction, trauma, and inflammation (33). Physical inactivity results in a decrease in lymph circulation. Physical exercise maintaining or improving the ‘range of motion’ of the shoulder therefore seems to be an effective and preventive measure. Additional benefits include improved muscle strength/fitness and maintenance of body weight.

Further, Ahmed et al. (22) recommend that breast cancer patients should perform strength training of the upper body because this does not promote the risk or symptoms of lymphedema. Besides, Sagen et al. (29) recommend that patients with axillary lymph node dissection continue to exercise without restriction in daily living. In addition, considering early exercise intervention in women with breast cancer is important and necessary (34). The studies by Ahmed et al. (22) and Schmitz et al. (40) show that progressive strength training can generate a preventive effect. Combined exercise therapy can result in similar effects (35-37). Exercise additionally supports muscular pump function and should be performed at a moderate level of intensity and with a small number of repetitions. The application of MLD seems to have prophylactic effects only in combination with exercise, and current data does not show any evidence for MLD as a single primary prophylactic method (38). To guarantee the safe and effective performance of the exercises, the support of a certified exercise therapist during the first months of the exercise training is also advised

(39).

**REFERENCES**

1. Cancer Registry of Norway. Cancer in Norway 2007 - Cancer inci-dence, mortality, survival and prevalence in Norway. Oslo: Cancer Registry of Norway; 2008.

2. World Cancer Research Fund AIfCR. Food, nutrition, physical activ-ity, and the prevention of cancer. A global perspective. Washington (DC): American Institute for Cancer Research (AICR) 2007.

3. Sosial og Helsedirektoratet. Nasjonalt handlingsprogram med ret-ningslinjer for diagnostikk, behandling og oppfølging av pasienter med brystkreft. Nasjonale faglige retningslinger. 2007.

4. Norsk bryst cancer gruppe (NBCG).

5. Moulder S, Hortobagyi GN. Advances in the treatment of breast can-cer. Clin Pharmacol Ther 2008;83(1):26-36.

6. Harris JR, Lippman ME, Veronesi U, Willett W. Breast cancer (1). N Engl J Med 1992;327(5):319-28.

7. Fisher B, Anderson S, Bryant J, Margolese RG, Deutsch M, Fisher ER, et al. Twenty-year follow-up of a randomized trial comparing total mastec-tomy, lumpectomy, and lumpectomy plus irradiation for the treatment of in-vasive breast cancer. N Engl J Med 2002;347(16):1233-41.

8. Veronesi U, Cascinelli N, Mariani L, Greco M, Saccozzi R, Luini A, et al. Twenty-year follow-up of a randomized study comparing breast-conserving surgery with radical mastectomy for early breast cancer. N Engl J Med 2002;347(16):1227-32.

9. Kim T, Giuliano AE, Lyman GH. Lymphatic mapping and sentinel lymph node biopsy in early-stage breast carcinoma: a metaanalysis. Cancer 2006;106(1):4-16.

10. Schlichting E, Harr ME, Sauer T, Babovic A, Karesen R. [Sentinel lymph node biopsy in breast cancer]. Tidsskr Nor Laegeforen 2006;126(16):2098-100.

11. Johansen K, Lønning P, Naume B, Norderhaug I, Norum J, Jan Abel J, et al. Ny medikamentell behandling av brystkreft. Adjuvant behandling med trastuzumab ved tidlig stadium av brystkreft. Rapport fra Kunnskaps-senteret 2006;Rapport nr 02 2006

12. Rietman JS, Dijkstra PU, Hoekstra HJ, Eisma WH, Szabo BG, Groothoff JW, et al. Late morbidity after treatment of breast cancer in rela-tion to daily activities and quality of life: a systematic review. Eur J Surg On-col 2003;29(3):229-38.

13. Lee TS, Kilbreath SL, Refshauge KM, Herbert RD, Beith JM. Progno-sis of the upper limb following surgery and radiation for breast cancer. Breast Cancer Res Treat 2008;110(1):19-37.

14. Bird BR, Swain SM. Cardiac toxicity in breast cancer survivors: re-view of potential cardiac problems. Clin Cancer Res 2008;14(1):14-24.

15. Howell A. The 'Arimidex', Tamoxifen, Alone or in Combination (ATAC) Trial: a step forward in the treatment of early breast cancer. Rev Re-cent Clin Trials 2006;1(3):207-15.

16. Goodwin PJ, Esplen MJ, Winocur J, et al. Development of a weight management program in women with newly diagnosed locoregional breast cancer. I: Bitzer J, Stauber M, editors. Psychosomatic Obstretics and Gyne-cology.Bologna, Italy: Monduzzi Editore International Proceedings Divi-sions; 1995. p. 491-6.

17. Reeves GK, Pirie K, Beral V, Green J, Spencer E, Bull D. Cancer inci-dence and mortality in relation to body mass index in the Million Women Study: cohort study. BMJ 2007;335(7630):1134.

18. Schmitz KH, Courneya KS, Matthews C, Demark-Wahnefried W, Galvao DA, Pinto BM, Irwin ML,Wolin KY, Segal RJ, Lucia A, Schneider CM, von GruenigenVE, Schwartz AL; American College of SportsMedicine: American College of Sports Medicineroundtable on exercise guidelines for cancer survivors.Med Sci Sports Exerc. 2010; 42: 1409–1426.

19. Keilani M, Hasenoehrl T, Neubauer M, Crevenna R:Resistance exercise and secondary lymphedema inbreast cancer survivors – a systematic review. SupportCare Cancer 2016; 24: 1907–1916.

20. Nelson NL: Breast cancer-related lymphedema and resistanceexercise: a systematic review. J Strength Cond Res 2016; 30: 2656–2665

21. Schmitz KH, Ahmed RL, Troxel A, Cheville A, SmithR, Lewis-Grant L, Bryan CJ, Williams-Smith CT,Greene QP: Weight lifting in women with breast-cancer-related lymphedema. N Engl J Med 2009; 361: 664–673.

22. Ahmed RL, Thomas W, Yee D, Schmitz KH: Randomized controlled trial of weight training and lymphedema in breast cancer survivors. J Clin Oncol 2006; 24: 2765–2772

23. Park JH, Lee WH, Chung HS: Incidence and risk factors of breast cancer lymphoedema. J Clin Nurs 2008;17: 1450–1459.

24. Bicego D, Brown C, Ruddick M, Storey D, Wong C,Harris SR: Exercise for women with or at risk for breast cancer-related lymphedema. Phys Ther 2006; 86:1398–1405.

25. Witte CL, Witte MH: Contrasting patterns of lymphatic and blood circulatory disorders. Lymphology 1987; 20: 171–178.

26. Erickson VS, Pearson ML, Ganz PA, Adams J, Kahn KL: Arm edema in breast cancer patients. J Natl Cancer Inst 2001; 93: 96–111.

27. Hayes SB, Freedman GM, Li T, Anderson PR, Ross E:Does axillary boost increase lymphedema compared with supraclavicular radiation alone after breast conservation? Int J Radiat Oncol Biol Phys 2008; 72: 1449–1455.

28. Paskett ED, Naughton MJ, McCoy TP, Case LD, Abbott JM: The epidemiology of arm and hand swelling in premenopausal breast cancer survivors. Cancer Epidemiol Biomarkers Prev 2007; 16: 775–782.

29. Sagen A, Karesen R, Risberg MA: Physical activity for the affected limb and arm lymphedema after breast cancer surgery. A prospective, randomized controlled trial with two years follow-up. Acta Oncol 2009; 48:1102–1110.

30. Devoogdt N, Christiaens MR, Geraerts I, Truijen S,Smeets A, Leunen K, Neven P, Van Kampen M: Effectof manual lymph drainage in addition to guidelinesand exercise therapy on arm lymphoedema related tobreast cancer: randomised controlled trial. BMJ 2011;

343:d5326.

31. Shaw C, Mortimer P, Judd PA: A randomized controlled trail of weight reduction as a treatment for breast cancer-related lymphedema. Cancer 2007; 110:1868–1874.

32. Ochalek K: Prevention of lymphoedema. Wspolczesna Onkol 2011; 15: 354–356.

33. Hull MM: Lymphedema in women treated for breast cancer. Semin Oncol Nurs 2000; 16: 226–237.

34. Cavanaugh KM: Effects of early exercise on the development of lymphedema in patients with breast cancer treated with axillary lymph node dissection. J Oncol Pract 2011; 7: 89–93.

35. Torres Lacomba M, Yuste Sanchez MJ, Zapico Goni A,Prieto Merino D, Mayoral del Moral O, Cerezo Tellez E, Minayo Mogollon E: Effectiveness of early physiotherapy to prevent lymphoedema after surgery for breast cancer: randomised, single blinded, clinical trial.BMJ 2010; 340:b5396

36. Zimmermann A, Wozniewski M, Szklarska A, Lipoxicz A, Szuba A: Efficacy of manual lymphatic drainage in preventing secondary lymphedema after breast cancer surgery. Lymphology 2012; 45: 103–112.

37. Zhang L, Fan A, Yan J, He Y, Zhang H, Zhang H,Zhong Q, Liu F, Luo Q, Zhang L, Tang H, Xin M:Combining manual lymph drainage with physical exercise after modified radical mastectomy effectively prevents upper limb lymphedema. Lymphat Res Biol 2016; 4: 104–108.

38. Stuiver MM, ten Tusscher MR, Agasi-Idenburg CS,Lucas C, Aaronson NK, Bossuyt PM: Conservative interventions for preventing clinically detectable upperlimb lymphoedema in patients who are at risk of developing lymphoedema after breast cancer therapy.

Cochrane Database Syst Rev 2015;CD009765.

39. Schmitz KH, Ahmed RL, Hannan PJ, Yee D: Safety and efficacy of weight training in recent breast cancer survivorsto alter body composition, insulin, and insulin like growth factor axis proteins. Cancer Epidemiol Biomarkers Prev 2005; 14: 1672–1680.

40. Schmitz KH, Ahmed RL, Troxel AB, Cheville A, Lewis-Grant L, Smith R, Bryan CJ, Williams-Smith T, Chittams J: Weight lifting for women at risk for breast cancer-related lymphedema. JAMA 2010; 304: 2699–2705.

**A comparative study to evaluate hemodynamic changes in response to Pilates exercises in mechanical low back pain patients and healthy individuals.**

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**BACKGROUND:**

Pilates exercises for the lumbar spine, which are done repeatedly, have been used in the management of low back pain for over three decades. The cardiovascular effects of exercises that involve postural stabilization, core strengthening, arm exercises and of exercises performed in lying are well known, but there are seldom studies performed to assess the cardiovascular effects of these commonly used Pilates exercises. Therefore the study focused on evaluating the effects of 6 commonly used Pilates exercises on the cardiovascular system.

**METHODOLOGY:**

This study includes 60 subjects both male and female of age 30-50 years who were eligible as per the inclusion criteria were divided into two groups- Group A (Low Back Pain individuals=30 subjects) and Group B (Healthy individuals= 30 subjects). Pre- participation questionnaire along with consent form and PARQ (Physical Activity Readiness Questionnaire) was given to subjects to fulfill criteria for selection. Each subject performed six Pilates exercises such as- Knee fold, Single leg stretch, Spine twist, Flight, Single leg stretch in standing and Hip extension for six weeks ; four days in a week. With each week repetitions and bouts were increased from 5and3 to 15and 13 respectively. Heart Rate and Blood Pressure (Systolic and Diastolic BP) were recorded pre and post intervention each day every week. Heart Rate was measured by manual palpatory method and Blood Pressure by Sphygmomanometer.

**RESULTS:**

Results showed that there was a significant difference in HR (p<0.05 in wk.4, p<0.05 in wk.5); SBP (p<0.01 in wk.1, p<0.01 in wk.2, p<0.05 in week 4); DBP (p<0.05 in wk.4, p<0.01 in wk.5, p<0.01 in wk.6) during pre exercise session and HR, SBP and DBP were significantly higher almost in all weeks during post exercise session of LBP and healthy individuals. Although, LBP individuals experienced more cardiovascular demand as number of repetitions increased but the intervention has cardiovascular effects on healthy individuals too.

**CONCLUSION:**

Pilates exercises have cardiovascular effects on low back pain patients. This effect was increased as the number of repetitions increase. Adequate cautions need to be taken while prescribing Pilates exercises complaining of low back pain with symptomatic or asymptomatic cardiovascular diseases. Proper cardiovascular monitoring will be required for low back pain as well as healthy individuals while prescribing Pilates exercises**.**

**KEY WORDS:** low back pain, pilates, heart rate, blood pressure.

**INTRODUCTION**

Since the time of acquiring erect two-legged posture from the ancient quadruped state, the lumbosacral junction has remained weak due to its structural and biomechanical inadequecies.**1**

Fortunately, this has resulted into the presence of mechanical LBP (low back pain) in the majority of patients, whereas, LBP due to prolapsed intervertebral disc (PIVD) and other causes needing extensive treatment occurs only in about 1-2% cases of all the patients of LBP.**1**

The lifetime prevalence of low back pain is estimated at 60-85%, while the annual prevalence in the general population is ranging from 15-45%.The annual incidence of back pain in the general population is estimated between 10%-15%In the vast majority of patients low back pain is a self limiting condition, from which 90% are expected to recover in about six weeks.However, high recurrence rates of 40-70%, including annual recurrence rates of 60% have been reported.**8**

The daily activity puts tremendous repetitive, compressive, and shearing stresses on the bony components of the back and tensile stresses on the muscular and ligamentous components.**1**

Active trunk flexion increases intradiscal pressure tremendously. Intradiscal pressure of 100 kg during standing is raised to 280 kg. Shearing force increases if the anterior tilt is increased and diminishes when the back is flattened.**1**

Pilates is a physical fitness system developed in the early 20th century by Joseph Pilates. Pilates called his method "Contrology." It is practiced worldwide, and especially in western countries.**11**

Pilates puts emphasis on alignment, breathing, developing a strong core, and improving coordination and balance. The core, consisting of the muscles of the abdomen, low back, and hips, is often called the "powerhouse" and is thought to be the key to a person's stability.

Pilates focuses largely on correct breathing, spinal, and pelvic alignment, and a concentration of smooth flowing movements. By connecting all of these aspects, the pilates exercise becomes a mind-body workout. Pilates creates a strong core and strong back with exercises concentrating on the deep abdominal muscles and muscles lining the spine. The moves incorporated in Pilates workouts elongate the muscles and make them leaner, improving joint mobility and flexibility. This decreases risk of muscle injury. Due to the even development of the muscles, Pilates improves posture due to a strong core and back muscles for support.**13**

Inhalation can facilitate spine extension and resist forces of spinal flexion. Exhalation can facilitate spine flexion and resist forces of spine extension.**15**

This study is to examine the cardiovascular effects of Pilates so that when these exercises are incorporated in treatment of individuals with low back pain who are prone to cardiovascular diseases, proper monitoring can be done.

**METHODOLOGY:**

60 samples were divided into two groups. Group A consists 30 samples with mechanical low back pain and 30 samples of normal healthy individuals.

Subjects were given detailed information about the study and its importance and were requested to fill the questionnaires voluntarily. Informed Consent was taken from all the subjects. Subjects were selected by convenient sampling method based on inclusion and exclusion criteria along with a written consent signed by them for participation in this study. First the pre-participation data was collected from the subjects, which included personal details name, age, sex, occupation, medications etc were collected and documented. Approval for this study was obtained from the ethical committee of the Geetanjali University, Udaipur.

All the respondents completed the questionnaires anonymously. No expenditure was inflicted on the cases, and all the personal records were considered confidential.

Exercise intervention program consists of:- Pilates exercises (knee fold, single leg stretch, spine twist, flight, single leg stretch in standing, hip extension); four days in a week. With each week repetitions and bouts were increased from 5and3 to 15and 13 respectively. Heart Rate and Blood Pressure (Systolic and Diastolic BP) were recorded pre and post intervention each day every week. Heart Rate was measured by manual palpatory method and Blood Pressure by Sphygmomanometer.

|  |  |
| --- | --- |
| **Week 1** | **5 repetitions and 3 bouts of each exercise pattern /day** |
| Week 2 | 5 repetitions and 5 bouts of each exercise pattern/day |
| Week 3 | 10 repetitions and 7 bouts of each exercise pattern /day |
| Week 4 | 10 repetitions and 9 bouts of each exercise pattern/day |
| Week 5 | 15 repetitions and 11 bouts of each exercise pattern/day |
| Week 6 | 15 repetitions and 13 bouts sets of each exercise pattern/day |

The resting HR and BP were recorded in a relaxed sitting position in an armchair.

The client should rest 5 to 10 minutes in seated position before assessing the resting heart rate.

Heart rate was measured by palpatory method; left side radial artery. Use the middle and index finger, palpate radial artery. Start stop watch simultaneously with the pulse beat, count the first beat as zero. Count HR for 15 seconds, count time 4, multiply to convert the count to beats per minute (bpm). (15\*4=60 bpm).**44**

Blood Pressure was measured by Gold Standards. Guide the patient to the desired position. The sitting position is recommended with the back supported, legs uncrossed and feet flat on floor midpoint of the arm should be at heart level with the elbow slightly flexed and the palm up.**45**

Wrap the deflated cuff snugly and evenly around the patient's bare arm approximately one inch above the antecubital fossa ; the center of cuff should be in the line with the brachial artery. Place the bell of the stethoscope firmly over the brachial pulse point at the lower border of the BP cuff. Close the valve of the BP cuff and rapidly inflate the cuff to approximately 30 mm Hg above the estimated SBP. Release the thumb valve, air should be released at a rate of 2 mm Hg per heart beat. Note the point at which the first rhythmic tapping sound is heard represents the systolic pressure. Note when the sounds become muffled there after the sound will disappear represents the diastolic pressure. **45**

**Warm up exercises:-** for (5-10 minutes)

Include brisk walking, jumping, stretching of upper and lower limbs like neck stretch, hamstring stretch etc. repetitive motions at slow speeds, gradually increasing the effort.

**Cool down period:-** for (5-10 minutes)

Include slow total body repetitive motions and stretching for exercised muscle group same as warm up period.

**RESULTS:**

**Table 6.1 : Descriptive statistics of mean between pre and post exercise scores of all subjects**

|  | **Group** | **Mean** | **SD** | **Difference** | **SEd** | **t** | **df** | **P** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HR pre exercise in first week | M | 73.27 | 8.145 | 4.067 | 1.901 | 2.139 | 58 | 0.037 |
| F | 69.20 | 6.488 |  |  |  |  |  |
| SBP pre exercise in first week | M | 113.87 | 4.265 | -3.667 | 1.104 | -3.320 | 58 | 0.002 |
| F | 117.53 | 4.289 |  |  |  |  |  |
| DBP pre exercise in first week | M | 68.93 | 5.192 | 1.800 | 1.252 | 1.438 | 58 | 0.156 |
| F | 67.13 | 4.478 |  |  |  |  |  |
| HR pre exercise in second week | M | 71.40 | 6.563 | 1.500 | 1.515 | 0.990 | 58 | 0.326 |
| F | 69.90 | 5.081 |  |  |  |  |  |
| SBP pre exercise in second week | M | 114.00 | 4.983 | -3.000 | 1.109 | -2.705 | 58 | 0.009 |
| F | 117.00 | 3.474 |  |  |  |  |  |
| DBP pre exercise in second week | M | 67.73 | 4.891 | -2.133 | 1.348 | -1.582 | 58 | 0.119 |
| F | 69.87 | 5.532 |  |  |  |  |  |
| HR pre exercise in third week | M | 72.13 | 6.827 | 1.133 | 1.643 | 0.690 | 58 | 0.493 |
| F | 71.00 | 5.866 |  |  |  |  |  |
| SBP pre exercise in third week | M | 116.60 | 4.583 | -0.067 | 1.048 | -0.064 | 58 | 0.950 |
| F | 116.67 | 3.457 |  |  |  |  |  |
| DBP pre exercise in third week | M | 68.33 | 4.334 | -1.333 | 1.410 | -0.946 | 58 | 0.348 |
| F | 69.67 | 6.391 |  |  |  |  |  |
| HR pre exercise in fourth week | M | 70.73 | 5.953 | 2.667 | 1.403 | 1.901 | 58 | 0.062 |
| F | 68.07 | 4.856 |  |  |  |  |  |
| SBP pre exercise in fourth week | M | 113.87 | 4.754 | -2.467 | 1.085 | -2.273 | 58 | 0.027 |
| F | 116.33 | 3.565 |  |  |  |  |  |
| DBP pre exercise in fourth week | M | 68.40 | 4.116 | -3.000 | 1.285 | -2.335 | 58 | 0.023 |
| F | 71.40 | 5.709 |  |  |  |  |  |
| HR pre exercise in fifth week | M | 68.07 | 4.941 | -3.000 | 1.374 | -2.184 | 58 | 0.033 |
| F | 71.07 | 5.675 |  |  |  |  |  |
| SBP pre exercise in fifth week | M | 115.67 | 4.205 | -0.933 | 0.970 | -0.963 | 58 | 0.340 |
| F | 116.60 | 3.244 |  |  |  |  |  |
| DBP pre exercise in fifth week | M | 68.73 | 5.265 | -5.067 | 1.321 | -3.835 | 58 | 0.000 |
| F | 73.80 | 4.965 |  |  |  |  |  |
| HR pre exercise in sixth week | M | 70.53 | 5.482 | -1.733 | 1.533 | -1.130 | 58 | 0.263 |
| F | 72.27 | 6.362 |  |  |  |  |  |
| SBP pre exercise in sixth week | M | 115.20 | 4.916 | -1.800 | 1.065 | -1.690 | 58 | 0.096 |
| F | 117.00 | 3.140 |  |  |  |  |  |
| DBP pre exercise in sixth week | M | 68.67 | 5.287 | -5.267 | 1.457 | -3.615 | 58 | 0.001 |
| F | 73.93 | 5.977 |  |  |  |  |  |
| HR post exercise in first week | M | 81.63 | 11.693 | -12.433 | 2.398 | -5.186 | 58 | 0.000 |
| F | 94.07 | 5.977 |  |  |  |  |  |
| SBP post exercise in first week | M | 126.13 | 4.066 | -4.800 | 1.285 | -3.734 | 58 | 0.000 |
| F | 130.93 | 5.747 |  |  |  |  |  |
| DBP post exercise in first week | M | 80.80 | 3.916 | -3.333 | 1.112 | -2.997 | 58 | 0.004 |
| F | 84.13 | 4.666 |  |  |  |  |  |
| HR post exercise in second week | M | 91.33 | 4.936 | -4.267 | 1.246 | -3.425 | 58 | 0.001 |
| F | 95.60 | 4.709 |  |  |  |  |  |
| SBP post exercise in second week | M | 125.80 | 5.416 | -6.333 | 1.291 | -4.905 | 58 | 0.000 |
| F | 132.13 | 4.547 |  |  |  |  |  |
| DBP post exercise in second week | M | 80.80 | 4.859 | -4.067 | 1.240 | -3.279 | 58 | 0.002 |
| F | 84.87 | 4.747 |  |  |  |  |  |
| HR post exercise in third week | M | 88.33 | 9.189 | -6.400 | 1.780 | -3.595 | 58 | 0.001 |
| F | 94.73 | 3.258 |  |  |  |  |  |
| SBP post exercise in third week | M | 126.87 | 4.416 | -4.733 | 1.251 | -3.785 | 58 | 0.000 |
| F | 131.60 | 5.236 |  |  |  |  |  |
| DBP post exercise in third week | M | 78.20 | 4.278 | -6.667 | 0.983 | -6.784 | 58 | 0.000 |
| F | 84.87 | 3.267 |  |  |  |  |  |
| HR post exercise in fourth week | M | 84.60 | 7.775 | -10.067 | 1.562 | -6.443 | 58 | 0.000 |
| F | 94.67 | 3.575 |  |  |  |  |  |
| SBP post exercise in fourth week | M | 125.07 | 4.571 | -7.867 | 1.199 | -6.558 | 58 | 0.000 |
| F | 132.93 | 4.719 |  |  |  |  |  |
| DBP post exercise in fourth week | M | 79.20 | 4.859 | -6.533 | 1.078 | -6.062 | 58 | 0.000 |
| F | 85.73 | 3.352 |  |  |  |  |  |
| HR post exercise in fifth week | M | 83.13 | 7.785 | -10.800 | 1.705 | -6.334 | 58 | 0.000 |
| F | 93.93 | 5.159 |  |  |  |  |  |
| SBP post exercise in fifth week | M | 122.13 | 3.521 | -4.267 | 0.896 | -4.761 | 58 | 0.000 |
| F | 126.40 | 3.420 |  |  |  |  |  |
| DBP post exercise in fifth week | M | 74.80 | 4.318 | -8.267 | 1.195 | -6.917 | 58 | 0.000 |
| F | 83.07 | 4.920 |  |  |  |  |  |
| HR post exercise in sixth week | M | 82.60 | 7.468 | -11.267 | 1.535 | -7.342 | 58 | 0.000 |
| F | 93.87 | 3.857 |  |  |  |  |  |
| SBP post exercise in sixth week | M | 125.27 | 4.653 | -1.133 | 1.105 | -1.025 | 58 | 0.309 |
| F | 126.40 | 3.874 |  |  |  |  |  |
| DBP post exercise in sixth week | M | 75.13 | 5.056 | -9.533 | 1.178 | -8.090 | 58 | 0.000 |
| F | 84.67 | 4.011 |  |  |  |  |  |

Table1 shows that there is a significant difference between HR of healthy and LBP patients in week 1 (p<0.05) and week 5 (p<0.05) pre exercise whereas post exercise HR was significantly higher in case of LBP patients in comparison to healthy individuals. The SBP was significantly higher in LBP patients pre exercise in week1 (p<0.01), week2 (p<0.01) and week4 (p<0.05). in case of post exercise, SBP was higher in LBP patients in week 1-5. The DBP of LBP patients was significantly higher in week4 (p<0.05), week5 (p<0.01) and week6 (p<0.01) whereas post exercise DBP was higher in all weeks in LBP patients.

As a result of data analysis repetitive Pilates exercises for the lumbar spine elicit significant hemodynamic stress in healthy and low back pain individuals. These exercises increase the work of the heart in people with no known spinal impairments and no cardiovascular or cardiopulmonary insufficiencies. It was found that the cardiovascular demand increased as the number of repetitions for a given type of exercise increased. Richardson D, stated that the magnitude and frequency of active muscular contractions also affect the blood flow. The muscle metabolism increases in response to voluntary contractions, and therefore blood flow to the active musculature.

Christensen EH, Astrand PO, in their work concluded that volume of oxygen consumed during physical exercise is necessarily dependent upon the load on the muscles and also on the mass of the muscles at work. Work with legs can bring the metabolism to a higher level than can exercise performed by the arms. All these researches confirm that there is increased oxygen demand by the contracting muscles which in turn increases the HR, BP, cardiac output and stroke volume.

**DISCUSSION:**

The study indicates that before administering Pilates exercises to any patient having spinal problem cardiovascular status should be examined. This study recommends that, ruling out cardiovascular and pulmonary disease by history taking alone is not sufficient and cardiac and pulmonary risk factor assessment should be done before prescribing Pilates exercises. The results of the study suggest that baseline heart rate and blood pressure should be recorded routinely. Cardiovascular monitoring should also be taught to the patient themselves so that cardiovascular monitoring can be performed when Pilates exercises for the lumbar spine are performed as a home exercise program.

**CONCLUSION:**

Pilates exercises have cardiovascular effects on low back pain patients. This effect was increased as the number of repetitions increase. Adequate cautions need to be taken while prescribing Pilates exercises complaining of low back pain with symptomatic or asymptomatic cardiovascular diseases. Proper cardiovascular monitoring will be required for low back pain as well as healthy individuals while prescribing Pilates exercises. Pilates exercises should be incorporated into cardiac rehabilitation program.

**REFERENCES:**

1. Essentials of orthopaedics and applied physiotherapy .Jayant Joshi and Prakash Kotwal second edition 2011.
2. Susan B O'Sullivan, Thomas J Schmitz, Chapter 2 Examination of Vital Signs Physical Rehabilitation 6th edition.

3. NFMCPA(National fibromyalgia and chronic pain association)

4. Clinical Orthopedic Rehab. S.Brent Brotzman and Kevin E.Wilk second edition 2005

5. Campbell’s Operative Orthopedics S.Terry Canale and James H.Beaty twelfth edition vol.two.

6. U. Albert Anand et al. A study to analyse the efficacy of modified Pilates based exercises and therapeutic exercises in individual with chronic non specific low back pain: a randomized clinical trial. International Journal of Phy and Research 2014 vol 2(3): 525-29. ISSN 2321- 1822.

7. Benjamin A.I., Surpreet bindra, Sinha A.G.k. Epidemiology of low back pain in Indian population: a review. International Journal of Basic and Applied Medical Sciences 2015. January- April, vol 5(1) pp:166-179

8. www.spine- healthy .com / piates\_exercise\_and\_back\_pain prevalence, incidence and recurrence of low back pain http:// repub.eur.nl/pub/1110/02, pdf

9. Saeid Alemo, Amirali Sayadipour. Chronic mechanical low back pain J Neurolog Orthop Med Surg (2008) 28(1): 5-11

10. Menzes costa et al. The progress of acute and persistent low back pain: a meta anaysis. Canadian Medical Association 184(11): E 613-24

11. https:// en.wikipedia.org/wiki/pilates

12. Philip Friedman and Gail Eisen. The pilates method of physical and mental conditioning pp.13-16

13. Campos RR, Cardoso JR. The effect of the pilates method on the physical conditioning of healthy subjects : a systemic review with meta-analysis J Sports Med Phy Fitness PMID- 26004043

14. Anna Owsley. An introduction to clinical Pilates. 2005 Human Kinetics-ATT 10(4), pp.19-25

15. Brent D. Anderson. Randomized clinical trial comparing active versus passive approaches to the treatment of chronic and recurrent low back pain (2005) http://scholarlyrepository. miami. Edu/dissertations/2258.

16. Astrand J.Stenberg et al. Cardiac output during submaximal and maximal work J. App. Physio 19:268-274

17. Healthy living.az central.Com/normal\_hemodynamic\_response\_exercise

18. Valenza MC et al. Results of a pilates exercise program in patients with chronic non- specific low back pain: a randomized controlled trial, 2016.

19. Stieqlitz DD, Vinson DR, Hampton C. Equipment-based pilates reduces work-related chronic LBP and disability: a pilot study. J Body W Mov. Ther. 20(1): 74-82.

20. De Oliveira et al. Muscle activation during pilates exercise in participants with chronic non-specific LBP. A cross-sectional case control study. S0003-9993: 31097-8, 2016.

21. Patti A, Bianco A et al. Pain perception and stabilometric paramters in people with chronic LBP after a pilates exercise program: a randomized controlled trial. Medicine (Battimore). 95(2): e2414.

22. Cruz- Diaz D, Martinez- Amat A et al. Short -and long-term effects of a six week clinical pilates program in addition to physical therapy on post-menopausal women with chronic LBP: a randomized controlled trial. Disabil .Rehabil. 38(13): 1300-1308, 2016.

23. Tinoco- Fernandez, Jimenez-Martin et al. The pilates method and cardiorespiratory adaptation to training. Res. Sports Med. 24(3): 281-286, 2016.

24. Kellis E, Gouitas I et al. Effects of pilates and trunk strengthening exercises on health-related quality of life in women with chronic LBP. Journal of Back and Musculoskeletal Rehabilitation. 29(4): 649-659, 2016.

25. Daniele Tavares et al. Mat pilates training reduced clinical and ambulatory blood pressure in hypertensive women using antihypertensive medications. International Journal of Cardiology. 179: 262-268, 2015.

**effects of pre operative education and ventilatory exercise training in reducing anxiety and improvement in recovery among cardiac patients**

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**OBJECTIVE:**

To evaluate the effects of pre operative education and ventilatory exercise training in reducing anxiety and improvement in recovery among cardiac patients.

**BACKGROUND:**

Patients awaiting cardiac surgery typically experience physical and psychological stress. Although there is evidence that preoperative education can improve postoperative outcomes among general surgical patients, less is known about preoperative education for patients undergoing cardiac surgery. Physiotherapists play an important role in the preparation and rehabilitation of patients who had undergone surgical procedures. In the present study, the effects of pre operative education and ventilatory exercise training were observed to know the effectiveness in reducing anxiety and improvement in recovery among patients undergoing cardiac surgery.

**METHODOLOGY:**

This study includes 100 subjects both male and female undergoing elective cardiac surgery of age 18-60 years who were eligible as per the inclusion criteria. Pre- participation questionnaire along with the consent form was given to the subjects to fulfill criteria for selection. Subjects were allocated physiotherapy instructions and ventilatory exercise training pre operatively. The primary outcome was change in anxiety which was measured by BAI (Beck Anxiety Inventory) pre operatively before and after education and training and 4 days post operatively. Secondary outcomes were pain and SPO2 which were measured by VAS (Visual Analogue Scale) and pulse oxymetry respectively.

**RESULTS:**

Results showed that anxiety score after pre operative instructions and ventilatory exercise training exercise was significantly higher (p<0.01) in males as compared to females. There was a significant decrease in score of anxiety pre and post operatively after physiotherapy instructions and ventilatory exercise training (p<0.01) and there was also a significant reduction in VAS score (p<0.01) whereas SPO2 was increased significantly (p<0.01). Thus it showed that pre operative education and ventilatory exercise training is effective in reducing anxiety and improves recovery among patients undergoing cardiac surgery.

**CONCLUSION:**

This study provides empirical support for the hypothesis that a pre operative education intervention involving counseling, verbal explanation and ventilatory training are effective in reducing anxiety and pain among patients undergoing cardiac surgery. This study not only have important implications for effective strategies to control patient’s elevated anxiety in anticipation of cardiac surgery, but also help make recommendations for quality improvement of pre operative education in practice.

**KEY WORDS:** Pre operative education, cardiac surgery, anxiety, ventilatory training.

**INTRODUCTION**

Coronary artery disease is the leading cause of morbidity and mortality worldwide. For more than 15 years, WHO has been sounding an alarm on the rapidly rising burden of cardiovascular disorders. The reported prevalence of coronary artery disease (CAD) in adult surveys has risen 4-fold over the last 40 years to a present level of around 10%.**8**

The burden of CVD is projected to be the highest in India by the year 2020, as compared to other countries.**9** In the WHO-PREMISE study, the proportion of CHD among patients less than 50 years of age, was highest in India (22.6% in males and 3% in females).**10** In the Million Death Study(2009), the authors determined that CVD are the leading cause of death (20.3% in males and 16.9% in females) among Indian adults (age 25-69 years). **11**

Cardiovascular diseases, especially coronary heart disease (CHD), are epidemic in India. The Registrar General of India reported that CHD led to 17% of total deaths and 26% of adult deaths in 2001-2003, which increased to 23% of total and 32% of adult deaths in 2010-2013.**8**

Cardiovascular disease is the leading global cause of death, accounting for more than 17.3 million deaths per year, a number that is expected to grow to more than 23.6 million by 2030.**12**

In 2013, cardiovascular deaths represented 31 percent of all global deaths, with 80 percent of those deaths taking place in lower and middle income countries. Nearly 801,000 people in the U.S. died from heart disease, and other cardiovascular diseases in 2013. That’s about one of every three deaths in America. About 2,200 Americans die each day from these diseases, one every 40 seconds.**12**

Cardiac surgery is a procedure performed in patients with cardiovascular disease. After cardiac surgery, various complications that will require specific care, especially in the respiratory system, can be observed. These complications can lengthen the hospital stay of patients, causing increased hospital costs and becoming an important cause of morbidity and mortality.**14**

The coronary artery bypass grafting presents satisfactory results, however, is has the pain caused by the nociceptive stimulus from sternotomy as an important cause of mortality and morbidity in the postoperative period, which leads less effectiveness of cough, by adopting a rapid and superficial breathing, and can cause pulmonary complications such as atelectasis.**15**

Nevertheless, patients who had undergone heart surgery may suffer psychological disorders such as anxiety, which is hardly noticeable in the pre-operative, and it may go unnoticed by the medical team, since often such disorder is related to physical illnesses.**16** These can exacerbate symptoms of existing cardiovascular disease, adversely affect physiological parameters before and during anaesthesia, and can result in prolonged recovery .**25,26**

Cardiac patients with a high level of anxiety can experience physical symptoms including headache, dizziness, nausea, muscle weakness, fatigue, sweating, and difficulty falling asleep, or even more intense symptoms such as chest pain, palpitations, shortness of breath. Chest pain is a common symptom of anxiety and may take form of a sharp pain or a feeling of visceral tightness.**29**

Decreases in essential parameters of vital capacity, functional residual capacity, and forced expiratory volume may directly contribute to atelectasis, which can contribute to postoperative pulmonary complications. Pulmonary function is further compromised by hypoventilation, decreased mucous clearance, decreased respiratory muscle function, increased work of breathing, and hypoxia—all ramifications of the surgical procedure. **36**Additionally, walking ability is limited after CABG surgery.**37**

Breathing exercises and ventilatory training are fundamental interventions for the prevention and management of post operative complications (PPC’S). Breathing exercises and ventilatory training includes diaphragmatic breathing, segmental breathing, inspiratory resistance training, glossopharyngeal breathing, breathing techniques for the relief of dyspnea during exertion.**39**

Chest mobilization exercises combine active movements of the trunk or extremities with deep breathing. They are designed to maintain or improve mobility of the chest wall, trunk and shoulder girdles when it affects ventilation or postural alignment.**39**

Airway clearance is an important part of management of patients. An effective cough is necessary to eliminate respiratory obstructions and keep the lungs clear. ACBT (active cycle of breathing technique) can be used to stimulate a stronger cough, improving clearance of secretions. Postural drainage, another intervention for airway clearance, is a means of mobilizing secretions in one or more lung segments to the central airways and cleared by coughing or endotracheal suctioning.**39,40**

Incentive spirometry is a form of ventilatory training that emphasizes sustained maximum inspirations.**39**

Pre-operative education is defined as providing the patient with health related information, psychosocial support and the opportunity to learn specific skills in preparation for surgery. Pre-operative program might include a number of components and inclusion of family members, teaching of specific skills.**4**

Physiotherapists play an important role in the preparation and rehabilitation of patients who had undergone surgical procedures. In addition to having a large arsenal of techniques, the, physiotherapist has been one of the professionals that more time is next to the patients. As such, it is suggested that time spent is better spent, by favoring professionals to clarify the doubts of the patients and guide them to the new situations that they will have to face.**5**

Early mobilization, positioning, breathing exercises and techniques for bronchial hygiene are the usual techniques utilized.**1**

**METHODOLOGY:**

A total 100 number of both males and females were selected or this study undergoing cardiac surgery was taken from CTVS ICU Geetanjali Medical College and Hospital (GMCH). Based on assessment, interview and questionnaire subjects were excluded of Acute and Chronic Asthma, Previous Cardiac Surgical history, Unstable vitals, Cardiac pacemaker, Shortness of breath more than grade 3or 4, Pregnancy, Unstable angina pectoris, Psychosomatic disorders. information and demonstrations of ventilatory exercises was performed to the patients individually, for the improvement of pulmonary ventilation and bronchial hygiene. Explanation to the patients was given regarding sternotomy and the importance of maintaining an appropriate pulmonary ventilation and cough, so avoiding possible pulmonary complications**.** Each patient received on written, physiotherapeutic guidelines on ventilatory exercise and ventilatory exercise training that could be performed after surgery. After guidance, anxiety was evaluated pre and post operatively by Beck Anxiety Inventory. When it was necessary, the ventilatory exercises were reminded to patients. The primary outcome was change in anxiety which was measured by BAI (Beck Anxiety Inventory) pre operatively before and after education and training and 4 days post operatively. Secondary outcomes were pain and SPO2 which were measured by VAS (Visual Analogue Scale) and pulse oxymetry respectively.

**RESULTS:-**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Pair** | **Variables** | **Mean** | **SD** | **SEm** | **T** | **Df** | **P** |
| 1 | Pre operatively BAI at the time of admission and BAI after physiotherapy instructions | 19.887 | 2.753 | 0.350 | 56.887 | 61 | 0.000 |
| 2 | Pre operatively BAI after physiotherapy instructions and BAI post operatively | 12.387 | 2.836 | 0.360 | 34.389 | 61 | 0.000 |
| 3 | Pre operative VAS and post operative VAS | 3.790 | 0.813 | 0.103 | 36.730 | 61 | 0.000 |
| 4 | Pre operative SPO2 and post operative SPO2 | -5.597 | 2.854 | 0.362 | -5.440 | 61 | 0.000 |

**DISCUSSION:-**

According to the results of the study, preoperative education reduced the anxiety of patients undergoing cardiac surgery and had an effect on postoperative complications. This finding is consistent with that reached by Guo Ping, who found a significant reduction in post operative anxiety after pre operative education of patients who underwent CABG. Only one study by Deyirmenjian M showed that pre operative education increased the post operative anxiety of patients. This is probably due to the difference in the timing and the manner of education delivery. . Heather et al. applied a protocol of preoperative intervention in patients undergoing coronary artery bypass grafting by a multidisciplinary team of cardiologists, surgeons and physiotherapists. There was a reduction of one week in hospital stay in the group receiving the intervention, as well as improvement in quality of life of these patients, which lasted for 6 months. However, mortality rates and levels of anxiety both preoperatively and postoperatively did not differ between groups.

Physiotherapists play an important role in the preparation and rehabilitation of patients who had undergone surgical procedures. In addition to having a large arsenal of techniques, the physiotherapist, notoriously, has been one of the professionals that more time is next to the patients. As such, it is suggested that time spent is better spent, by favoring professionals to clarify the doubts of the patients and guide them to the new situations that they will have to face. Some symptoms reported by anxious patients, such as tachycardia, tachypnea, and high systemic blood pressure, may be mistaken as part of the presentation developed by coronary artery disease. Conceição et al. reported that the measurement of blood pressure and heart rate are not good parameters to measure the patient's anxiety level, requiring the assessment of the disorder by means of validated scales such as the Beck anxiety Inventory. According Trame et al. , the Inventory is widely used because of its cost-effectiveness, ease of application and interpretation.

In our study, results showed that except anxiety score after counseling which was significantly higher in males as compared to females (p<0.01) , there was no difference for rest of the parameters. Score of anxiety and pain has been reduced after pre operative education and ventilatory training significantly (p<0.01). Score of SPO2 increased significantly. The correlation was significantly positive for anxiety and pain pre and post operatively.

**CONCLUSION:-**

This study provides empirical support for the hypothesis that a pre operative education intervention involving counseling, verbal explanation and ventilatory training are effective in reducing anxiety and pain among patients undergoing cardiac surgery. This study not only have important implications for effective strategies to control patient’s elevated anxiety in anticipation of cardiac surgery, but also help make recommendations for quality improvement of pre operative education in practice.

**REFERENCES:-**

1. Julia Alencar Renault, Ricardo Costa-Val, Marcia Braz Rosetti, Miguel Houri Neto. Comparison between deep breathing exercises and incentive spirometry after CABG surgery. Rev Bras Cir Cardiovasc; 24(2): 165-172,2009.

2. WesterdahlE, LindmarkB, Eriksson FribergO, TenlingA. Deep breathing exercises reduce atelectasis and improve pulmonary function after CABG. CHEST; 128(5): 3482-8, 2005.

3. Sumeet Kour Isher. Does pre operative education reduces anxiety in patients undergoing CABG. University of Chester,2010.

4. Lee, Quinnie. A systemic review of the effectiveness of pre operative education to reduce pre operative anxiety among adults undergoing cardiac surgeries[http://hdl](http://hdl/). Handle. Net/10722/145742,2011.

5. Aline Garbossa, Emilia Maldaner, Daiana Moreira Mortari; Effects of physiotherapeutic instructions on anxiety of CABG patients. A randomized control trial. Brazilian Journal of Cardiovascular surgery; vol.24 issn.0102-7636:359-366, 2009.

6. Aaron T Beck, Gary Brown et al. An inventory for measuring clinical anxiety: psychosomatic properties. Journal of Consulting and Clinical Psychology ;56 (6):893-897,1988.

7. By Villalobos J. A. Silva, Aguirre J. Sanchez, Martinez J. Sanchez, Franco J. Granillo and Garcia T. Zenón,2012; "Special Topics in Cardiac Surgery", chapter-1, Intensive Care Management of Patients in the First 24 Hours After Cardiac Surgery.

8. M.Rao, D. Xavier, P.devi et al. Prevalence and outcomes of CAD in Indians: a systematic review. Indian Heart Journal; 67(4): 302-310, 2015.

9. Murray CJ, Lopez AD. Global patterns of cause of death and burden of disease in 1990, with projections to 2020, IN:Committee on Health Research Relating to Future Intervention options; Geneva, Switzerland, WHO 1996; 133-186.

10. Mendis S et al. Prevention of recurrence of myocardial infarction and stroke, Bull World Health Organ 2005; 83: 820-829.

11. Office of Registrar General, India. Ministry of Home Affairs, New Delhi. Report on causes of death in India. 2001-2003; 16 april, 2013.

12. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ,et al on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2016 update: a report from the American Heart Association.

13. Gaziano TA, Gaziano JM. Epidemiology of cardiovascular disease. In: Harrison’s Principles of Internal Medicine. 19th ed.266:e1-5,2016.

14. Laizo A, Delgado FE, Rocha GM. Complications that increase the time of hospitalization at ICU of patients submitted to cardiac surgery. Rev Bras Cir Cardiovasc. 2010;25(2):166–171.

15. Magnano D, Montalbano R, Lamarra M, Ferri F, Lorini L, Clarizia S, et al. Ineffectiveness of local wound anesthesia to reduce postoperative pain after median sternotomy. J Card Surg. 2005;20(4):314-8.

16. Bergmann P, Huber S, Machler H, Liebl E, Hinghofer-Szalkay H, Rehak P, et al. The influence of medical information on the perioperative course of stress in cardiac surgery patients. Anesth Analg. 2001;93(5):1093-9.

17. El Bardissi AW, Aranki SF, Sheng S, et al. Trends in isolated coronary artery bypass grafting: an analysis of the Society of Thoracic Surgeons adult cardiac surgery database. J Thorac Cardiovasc Surg 2012; 143(2): 273–281.

18. Fitzsimons D, Parahoo K, Richardson SG, et al. Patient anxiety while on a waiting list for coronary artery bypass surgery: a qualitative and quantitative analysis. Heart Lung 2003; 32(1): 23–31.

19. McKenzie LH, Simpson J and Stewart M. A systematic review of pre-operative predictors of post-operative depression and anxiety in individuals who have undergone coronary artery bypass graft surgery. Psychol, Health & Med 2010; 15(1): 74–93.

20. Koivula M, Tarkka MT, Tarkka M, et al. Fear and anxiety in patients at different time-points in the coronary artery bypass process. Int J Nurs Stud 2002; 39(8): 811–822.

21. Williams JB, Alexander KP, Morin JF, et al. Preoperative anxiety as a predictor of mortality and major morbidity in patients aged >70 years undergoing cardiac surgery. Am J Cardiol 2013; 111(1): 137–142.

22. Cserép Z, Losoncz E, Balog P, et al. The impact of preoperative anxiety and education level on long-term mortality after cardiac surgery. J Cardiothorac Surg 2012; 7: 86.

23. Fitzsimons D, Parahoo K, Stringer M. Waiting for coronary artery bypass surgery: a qualitative analysis. Journal of Advanced Nursing 2000;32(5): 1243-1252.

24. Gallagher R, Mckinley S. Stressors and anxiety in patients undergoing coronary artery bypass surgery. American Journal of Critical care 2007; 16(3): 248-257.

25. Andrew MJ, Baker RA, Kneebone AC, Knight JL. Mood state as a predictor of neuropsychological deficits following cardiac surgery. Journal of Psychosomatic Research 2000; 48(6): 537-546.

**Effect of high-velocity low amplitude thrust spinal manipulation alters segmental instability, pain intensity, and health-related quality of life among patients with chronic non-specific low back pain: A randomized control trial.**

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**Effect of high-velocity low amplitude thrust spinal manipulation alters segmental instability, pain intensity, and health-related quality of life among patients with chronic non-specific low back pain: A randomized control trial.**

**ABSTRACT**

**BACKGROUND-**Chronic non-specific low back pain (NSCLBP) is the single largest, common, complex musculoskeletal condition in the world and it’s estimated that 80% of the population have experienced almost in every adult individual’s life**.** The purpose of this study was to investigate the effectiveness of spinal manipulation therapy- high-velocity low amplitude thrust (SMT-HVLA thrust) changes in pain intensity and segmental instability and quality of life in patients with CNSLBP.

**Materials and Methods:** Randomized controlled trial conducted on 105 patients with CNSLBP (with duration of pain more than 3 months) distributed in three groups with 35 participants in each group and an average age of the participants was 25.66 (SD=6.74) years.Participants receiving the SMT-HVLA thrust with ergonomic advice (Study Group-1), core stability exercise with ergonomic advice (Study Group-2), and supervised exercise with ergonomic advice (Control Group) were assigned in three groups for intervention for 4 weeks.Primary outcomes werepain intensity measured by a 0 to 10 numeric pain rating scale and postural sway (center of foot pressure) measured by Win track Platform and quality of life measured by EuroQoL questionnaire at 2 weeks and 4 weeks. Univariate analysis of variance (ANOVA) with post-hoc Tukey's multiple comparison tests was carried out to examine treatment effects and the relationship between groups changes across outcome measures.

**Results:** For all three treatment groups, outcomes checked after 2 weeks of treatment. Those who received spinal manipulation therapy with ergonomic advice had slightly better outcomes than the supervised exercise and advice group at 2 weeks (between-group difference, pain intensity (P=0.001), segmental instability (P=0.001) and quality of life (P=0.001) as compared to core stability exercise with ergonomic advice and supervised exercise and ergonomic advice group at 2 weeks (between-group difference, pain intensity (P=0.03), segmental instability (P=0.04) and quality of life (P=0.05) as well as at 4 weeks (between-group difference) in pain intensity (P=0.05), segmental instability (P=0.03), quality of life (P=0.04).

**CONCLUSION:** The SMT-HVLA thrust with ergonomic advice providing substantial pain reduction in patients with CNSLBP of high severity was associated with clinically significant improvement in segmental instability and health-related quality of life. Thus spinal manipulation therapy may be an attractive option in such patients before proceeding for more invasive and costly treatments.

**Keywords:** High-velocity low amplitude thrust, core stability exercise, supervises exercise.

**INTRODUCTION**

Chronic low back pain is a common health problem in many develop and developing countries. Individuals suffering from chronic low back pain experience major physical, social, mental, and occupational disruptions. [1] It is not only one of the leading causes of pain but also of a costly burden on the healthcare budget as chronic low back pain leads to a frequent demand for medical services.[2] In the case of low back pain, epidemiological data give more information to assist in seeking and solving the various problems related to low back pain. Moreover, these data can prevent low back pain by avoiding or decreasing risk factors for individuals. The prevalence of low back pain has been inspected in some systematic reviews. According to the World Health Organization, low back pain is most common among the ages of 25 to 62 years [3] peaks between ages 35 and 55 years [4], workforce and high prevalence in the age between 30 to 50 years is reported by Eurofound. [5] Reported lifetime prevalence ranges widely, from 56% to 70%, as does 1-year ranges from 15% to 45%, and point prevalence from 12% to 30%.[6]

Low back pain is generally explicated as pain, muscle tension or stiffness confined under the costal margin and above the inferior gluteal folds, with or without leg pain (sciatica). Low back pain is predictably categorized as being "specific" or "non-specific." Specific low back pain makes mention of symptoms as an effect of a specific pathophysiologic mechanism, for example, hernia nucleus pulposus (HNP), infection, inflammation, osteoporosis, rheumatoid arthritis, fracture or tumor. Approximately 10% of the patients might specific underlying conditions be diagnosed.[7] The majority of patients (up to 90%) are categorized as having non-specific low back pain, which is described as symptoms lack of clear particular reasons, i.e. beginning of low back pain is not know. Non-specific low back pain is generally categorized according to duration as acute (less than 6 weeks), sub-acute (between 6 weeks and 12 weeks) or chronic (longer than 12 weeks). [8]

According to the Punjabi concept, the spinal stabilization system depends on the three subsystems which are interdependent components with one capable of compensating for deficits in another.[9] In low back pain can occur as a consequence of deficits in control of the spinal segment when abnormally large segmental motions cause compression or stretch on neural structures or sensitive structure.[10] These deficits may potentially be caused by a dysfunction in any of the three systems which late a loss of joint stiffness, abnormal spinal motions, excessive neutral zone, and changes in the ration of segmental rotations and translation and increasing the segmental instability.[11]

Pain is, therefore, not only a clinical sensory experience (duration, severity, and quality of pain), but is also something that adversely affects the individual’s everyday life and health-related quality of life.[12] Pain affects health-related quality of life and health-related quality of life may affect the pain experience, expression, and behavior. A relatively small amount of nociception and physical pain can start a vicious circle of more pain, suffering, disability and poorer health-related quality of life.[13] In studies on the relationships between chronic pain and interference with daily life as well as HRQoL, different factors have been shown to be important. Some studies have reported interference with daily life and impaired HRQoL to be related to pain severity and the number of pain locations (spread).[14,15,16] However, the relationship between HRQoL impairment and pain severity alone has been shown to be weak. [24] Some authors have found pain severity to be insignificant as a predictor for life interference, HRQoL impairment, and disability.[17]

Spinal manipulative therapy includes all procedures of mobilizing or adjusting the spine by means of the hands. A manipulation usually implies a single thrust of high velocity performed at the end of a passive movement after the 'slack' has been taken up, and over small amplitude. It goes beyond the physiological limit but remains within the anatomical range. The precision of the movement and control of the applied force are required.[18] Spinal manipulative therapy is a valuable method in the treatment of mechanical spinal disorders to reduce pain and improve segmental instability. Although it has not been scientifically validated, some studies have shown a beneficial effect.[19,20] The objective of Cyriax's spinal manipulative techniques is to alter the discodural or discoradicular interaction by moving a displaced cartilaginous fragment away from the sensitive dura mater and dural nerve sleeve and ruptured of ligamentous adhesion, reduced a bony sub-luxation. Spinal rotation manipulations apply torsion stress throughout a whole part of the spine, not only at just one level. With an intact posterior longitudinal ligament and annulus fibrosus, some of this torsion force exerts a centripetal force by suction on the protruding disc material.[21] This effect is not confined to one level and full reduction is not absolutely necessary for pain relief, in that when contact between dura and disc has ceased the problem is frequently solved and improve the segmental instability and health-related quality of life.

Exercises for low back pain have developed more than the era of time with specific stress on the sustaining the spinal stability.[22] These types of core stabilization exercises are aimed at improving the neuromuscular control, endurance, strength of muscles central to sustaining dynamic segmental stability. Transversusabdominis (TrA), lumbar multifidi, and other paraspinal, abdominal, diaphragmatic, and pelvic musculature are targeted in core stabilization exercises. Different studies have reported delayed activation of TrA with respect to erector spinae with significant atrophy of multifidus in subjects with chronic low back pain. The European Guidelines for Management of CNSLBP recommends supervised exercise therapy as a first-line treatment.[23] Different systematic reviews conducted in the past decade have raised a significant concern over the role of exercise in the management of low back pain, with the scarcity of concrete evidence supporting any specific type of exercise; e.g. flexion / extension biased, strengthening of abdominals.

This paper presents a pragmatic clinical study conducted on patients with non-specific chronic low back pain. An objective of the study was to evaluate the efficacy of spinal manipulation therapy on pain intensity, health-related quality of life and segmental instability among patients with NSCLBP.

**MATERIALS AND METHODS**

This randomized trial was conducted from August 2015 to January 2017 at Out Patient Department (OPD), Department of Physiotherapy, Lovely Professional University (LPU), Chaheru, Phagwara, Punjab, India. Ethical approval has been granted by the Institutional Ethical Committee (No-LPU/IEC/PTY/004).

**Patients’ enrollment:**

105 participants have been recruited in this study according to inclusion criteria and distributed in three groups of 35 patients each; Control Group (CG:18 males and 17 females), Study Study-1(SG-1: 16 males and 19 females), and Study Group-2 (SG-2: 19 males and 16 females). Patients had the opportunity to participate in the trial if they suffered for more than 3 months with a history of chronic non-specific low back pain, were aged between 18-60 years, and pain intensity (PI) ≥ 3 on 0 to 10 Numeric pain rating scale (NPRS). Participants were excluded if they have a baseline pain score of fewer than 3 points,[24] pain referred from the lumbar to lower extremities, serious spinal disorder, including malignancy, osteoporosis, ankylosing spondylitis, cauda equine compression and infection, previous spinal surgery, fracture of vertebrae, administered epidural injection.

**Randomization**

All patients met the inclusion/exclusion criteria and enrolled in the study. Patients who agreed to participate signed the consent document approved by the Institutional Ethical Committee. Sample size calculation was made taking into account a one-tailed hypothesis (subjects in three groups were expected to improve), an allocation ratio between groups of 1:1:1, a large effect size (d=0.8), an alpha value of 0.05 and z value of 1.96 for a 95% confidence level. And margin of error 5%. Thirty-five patients per group were necessary to complete the study. Restricted randomization with a 1:1:1: allocation ratio has been applied using randomly block size. All participants fulfilled the remainder of the self-report and a physical examination. Each participant received general information about research (possible risks and benefits) and the ethical aspects related to it. The following self-report questionnaires were fulfilled by patients at the baseline examination: demographic data (age, height, and weight), numerical rating scale for pain intensity, Win Track platform **(**center of foot pressure) for segmental instability, and EuroQol questionnaire (EuroQoL questionnaire-5D-5L has 5 dimensions and 5 levels) for quality of life. For self-report measures, the patients have undergone a standardized historical and physical examination (manual palpation of the lumbar and sacral to assess local tenderness of segmental dysfunction/hypomobility) which was replicated following achievement of 2 weeks treatment.

**Intervention**

The participants were assigned into three groups by consecutive convenient sampling, each group with 35 patients. All participants in the study received 2 weeks of treatment. The control group received supervised exercise with ergonomic advice (SE+EA) alone, study group-1 received spinal manipulation therapy (SMT) with ergonomic advice (SMT+EA), and the Study Group-2 received core stability exercise with ergonomic advice (CSE+EA) 45 minutes per day for 2 weeks.

**Supervised exercise and ergonomic advice (SE+EA)**

The Control Group (CG) had received supervised exercise with ergonomic advice (SE+EA) of 45 minutes sessions. Individualized sessions included advice and instruction on self-care measures, such as the use of ice and heat, ergonomic recommendations for home and work, and a demonstration of good lifting techniques. Simple stretching and strengthening exercises, including lumbar extension, bridging, and abdominal crunches, were demonstrated and practiced. Study participants were given a book and laminated cards describing these exercises and were encouraged to perform them at home on a daily basis.[25]The patients were followed up in person 2 weeks later and then instructed to continue with the exercises for the remainder of the intervention phase. We considered the program to be of low dose because of the simplicity of the exercises, the time required to perform them (2–3 minutes per series), and the low number of provider visits.

**Spinal manipulation therapy plus ergonomic advice (SMT+EA)**

The participants allocated to this group (Study Group-1) have received spinal manipulation therapy in addition to ergonomic advice (as described above). Spinal manipulation was delivered after a systematic physical examination that included manual palpation of the lumbar and sacral areas to assess local tenderness areas of segmental dysfunction/hypomobility. Spinal manipulation technique for CNSLBP was generally performed on patients in a side-lying position on a treatment couch with the affected side upward. The therapist was to stand at the ventral aspect of the patient and holds the upper spinous process of the affected segment with the pulp of the thumb and the index finger as well as holds the spinous process of the lower vertebra of the affected segment with pulp and index finger of the other hand. The therapist hold the arm of the patient and pulls it to create rotation and stops as soon as the movement was perceived at the affected facet joints than therapist applied the spinal manipulation therapy-high velocity low amplitude [HVLA] thrust while applying the force to the upper vertebra towards the couch and the lower vertebra away from the couch.[26]This thrust was often accompanied by an audible cracking or popping sound, which represents the creation and suspension of small gas bubbles within the joint cavity resulting from pressure, alters as the articular surfaces shortly split in response to the HVLA thrust.[27]

**Core stability exercises plus ergonomic advice (CSE+EA)**

The patients received core stability exercise in addition to ergonomic advice (as described above). The protocol has been delivered for the duration of 45 minutes to perform exercises emphasizing a high number of repetitions (two to three sets of 15 to 30 repetitions for each exercise) and progressive increase in muscle load. For each exercise, the patients started at a level of difficulty that allowed them to complete a minimum of 15 repetitions at the session. They then progressed to the next level of difficulty when they were able to perform the maximum number of repetitions 30.[28] Core stability exercises were a plank, oblique plank, and Superman. Plank procedure was i) presupposed a frontage sustain situation resting on subjects forearms with shoulders straight over subjects elbows, ii) set straight subject’s legs out behind subjects and it was raised up hips to form a dead-straight line from shoulders to ankles. Subjects were balanced on forearms and toes, with lower abdomen and back working to keep the body straight. Holding was 1 minute and 15 to 30 repetitions. 2) Oblique Plank-i) patients position were the side laying, balance on the right forearm with shoulder beyond the elbow, ii) with legs was out directly to the left pelvis so that balance on forearm and feet. The patient’s body was appearance a direct line and feel the oblique muscles down the side trunk working to maintain the position, iii) hold times were 1 minute then replicate on another side, 15 to 30 repetitions. 3) hanuman-i) Position of the patients was put the balance on the floor on hands and knees. The back was flat and hips equivalent to the floor, ii) elevated right arm out in front of subjects and elevated left leg out after patients, maintenance it directly, iii) hold times was 1 minute and the replicate on the other side, 15 to 30 repetitions.

**Numeric pain rating scale (NPRS)**

The NPRS is a line marked with the numbers 0–10 at equal intervals where 0 is ‘no pain’ and 10 is ‘worst pain imaginable.’ Patients circle the number that represents their current pain intensity. There is evidence to support the validity and reliability of the NPRS in younger [29] and older [30] patients. Psychometric analyses suggested that the NPRS was the preferred pain intensity scale. It had low error rates, and higher face, convergent, divergent and criterion validity than the other scales. Most importantly, its properties were not age-related.[31] Pain intensity was measured before and after treatment.

**Measurement of the center of foot pressure (COFP)**

The capability to maintain balance in an upright standing posture was supervised using a Win Track platform (Win-Track, company-Medicapteurs, n0-12k0022, Made in France), which measures the segmental instability (i.e., the movement of the center of foot pressure) in the anterior-posterior (X) and side-to-side (Y) directions. The participant stood quietly on either a solid platform (i.e., directly on the force plate) for a period of 30 seconds while blindfolded and wearing socks without shoes. The first 30 seconds of data were recorded at a sample rate of 1200 Hz using monitor data acquisition software (WinTrack Software).[32,33] Stance Positions: Each participant has achieved stance positions with eyes open to allow for assessment of postural sway with and without visual input. The order of stance position testing was the bipedal stance. For the eyes-open testing participants were instructed to fix their vision on a large red dot placed at eye level about four meters in front of the force platform. All stance positions were assessed among participants in bare feet.

**Health-related quality of life**

Health-related quality of life measured by EuroQol questionnaire (EQ-5D-5L) which was tested before, after 2 weeks of intervention and after 4 weeks of follow-up. It’s a spacious established questionnaire for health-related QoL. The EQ-5D-5L has 5 dimensions and 5 levels. The EQ-5D-5L evocative system comprises the following 5 dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has 3 levels: no problems-1; slight problems-2; moderate problems-3; severe problems-4; extreme problems-5. [34]

**Statistical analysis**

All statistical analysis was performed using SPSS software for Windows version 16. Significance was set at P≤0.05 for all analyses because we were attempting to confirm an observation made in prior studies. Descriptive statistics were generated for continuous and categorical measures. Univariate analysis of variance (ANOVA) was performed followed by post-hoc Tukey’s multiple comparison tests (SPSS version-16.0) to determine significant differences in center of foot pressure(COFP) scores, numeric pain rating scale (NPRS), and EuroQoL questionnaire scores between groups.

**RESULTS**

A total of 130 individuals were assessed for this study, of which 105 were randomized. A summary of patient recruitment, participation, and attrition during the study is shown in Figure 1. Among the participants, 53 males and 52 females with a mean age of 26.70 years (Control group=SEA), 24.30 years (Study group1=SM+EA), and 25.98 years (Study group 2=CSE+EA) with an extensive period of symptoms of CNSLBP (mean duration of symptoms of pain more than 3 months). The demographic characteristics and outcomes were alike at baseline (Table 1). The study changeable followed a normal distribution (p< 0.05). The statistical analysis of data of comparisons of center of foot pressure score, numerical pain rating scale score, and EuroQoL questionnaire score for within the group and between groups was shown in Table 2.

Assessed for eligibility (n=130)

Excluded (n=25)

Did not meet inclusion criteria (n=15)

Refused to participate (n=6)

Other reasons (n=4)

Enrollment

Randomization (n=105)

Allocation

Study Group 2:

Core stability with ergonomic advice (n=35)

Received intervention (n=35)

Did not received intervention (n=0)

Refused to participate (n=0)

Control Group:

Supervised exercise therapy with ergonomic advice (n=35)

Received intervention (n=35)

Did not received the intervention (n=0)

Study Group 1:

Spinal manipulation therapy with ergonomic advice (n=35)

Received intervention (n=35)

Did not received the intervention (n=0)

Refused to participate (n=0)

Follow-up

Lost to follow-up (n=0)

Discontinued intervention (n=0)

Lost to follow-up (n=0)

Discontinued intervention (n=0)

Lost to follow-up (n=0)

Discontinued intervention (n=0)

Analyzed (n=35)

Excluded from the analysis (n=0)

Analyzed (n=35)

Excluded from analysis (n=0)

Analyzed (n=35)

Excluded from analysis (n=0)

Figure 1: Participants flowchart

**Table 1: Baseline measures of demographic with segmental instability, quality of life, and pain intensity variables**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | SE+EA (n=35) | SMT+EA (n=35) | CSE+EA (n=35) | p-value |
| Age | 26.70±6.19 | 24.30±7.04 | 25.98±7.15 | 0.721 |
| Height (cm) | 174.38±7.93 | 175.97±8.14. | 175.61±9.51 | 0.179 |
| Weight (kg) | 69.58±9.27 | 73.19±10.57 | 70.87±9.08 | 0.151 |
| Pain intensity (NPRS score) | 8.75±1.19 | 9.11±0.81 | 8.91±1.09 | 0.295 |
| Segmental instability (COFP score) | 656.54±37.52 | 671.34±53.71 | 669.32±71.39 | 0.377 |
| Health-related quality of life (EuroQoL questionnaire score) | 21.81±1.05 | 22.59±1.12 | 21.92±0.99 | 0.516 |

COFP=Center of foot pressure, NPRS= Numeric pain rating scale, SE+EA (supervised exercise with ergonomic advice) = Control Group; SMT+EA (spinal manipulation therapy with ergonomic advice) = Study Group-1; CSE+EA (core stability exercise plus with ergonomic advice) = Study Group-2.

**Table 2: Outcomes (Means and SDs) and effects of intervention (mean between-group differences, adjusted for baseline values, with 95% confidence intervals)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outcome | SE+EA (Control Group) | SMT+EA (Study Group-1) | CSE+EA (Study Group -2) | Control group vs Study Group-1 | Control group vs Study Group-2 | Study Group-1 vs Study Group-2 |
| Pain intensity (NPRS score) | | | | | | |
| Baseline | 8.75±1.19 | 9.11±0.81 | 8.91±1.09 |  |  |  |
| 2 weeks | 5.73±0.78 | 1.57±0.64 | 3.88±0.74 | 4.16 (2.22, 3.11), p=0.001 | 1.85(.55, 1.45), p=0.03 | 2.31 (1.22,2.11),p=0.01 |
| 4 weeks | 5.89±0.74 | 1.07±0.53 | 3.20±0.61 | 4.82(3.18,3.96)  p=0.001 | 2.69(1.14,1.92),p=0.05 | 2.13(1.64,2.42),p=0.03 |
| Segmental instability (COFP score) | | | | | | |
| Baseline | 656.54±37.52 | 671.34±53.71 | 669.32±71.39 |  |  |  |
| 2 weeks | 645.82±41.05 | 445.38±48.93 | 537.08±45.78 | 200.44(146.83,189.56)p=0.001 | 108.74(52.87,57.48),p=0.04 | 91.70(56.93, 87.36),p=0.05 |
| 4 weeks | 649.59±38.21 | 431.74±46.87 | 534.79±44.83 | 217.85(143.79,179.47),P=0.001 | 114.8(54.72,78.04),p=0.03 | 103.05(66.53,107.41),p=0.05 |
| Health-related quality of life (EuroQoL Questionnaire score) | | | | | | |
| Baseline | 21.81±1.05 | 22.59±1.12 | 21.92±0.99 |  |  |  |
| 2 weeks | 19.94±0.83 | 8.17±0.99 | 15.22±1.06 | 11.77(7.62,7.09)  p=0.001 | 4.72(2.24,3.93),p=0.05 | 7.05(6.17,7.28),p=0.05 |
| 4 weeks | 19.11±0.74 | 4.58±1.04 | 12.97±1.07 | 14.53(6.96,8.55)  p=0.001 | 6.14(1.59,4.01),  p=0.04 | 8.39(4.47, 5.86),p=0.05 |

NPRS=Numeric Pain Rating Scale; COFP=Center o Foot Pressure; Control Group=SE + EA (Supervised exercise with ergonomic advice); Study Group 1= SMT+EA (spinal manipulation therapy with Ergonomic Advice); Study Group 2=CSE+EA (Core Stability Exercise with Ergonomic Advice); p<0.05 for differences among groups.

According to post hoc Tukey’s comparison analysis within control group, study group-1, and study group-2 of baseline, after 2 weeks of intervention and after 4 weeks of follow up was no statistically significant improvement for the variable center of foot pressure, numeric pain rating scale, and EuroQoL questionnaire, but Study group-1 (spinal manipulation with ergonomic advice) shows significant better improvement than another two groups (p=0.001). While comparing mean difference of baseline, after 2 weeks of intervention, and after 4 weeks of follow-up of center of foot pressure score, numeric pain rating scale score, and EuroQoL questionnaire score between the groups, all groups noticed with significant improvement but spinal manipulation with ergonomic advice group showed highly significant improvement (p=0.01) than other groups.[Table-2].

**DISCUSSION**

The spinal manipulation therapy plus ergonomic advice group showed a greater improvement in segmental instability (center of foot pressure), pain intensity (numeric pain rating scale), and quality of life (EuroQoL questionnaire) at the end of 2 weeks treatment compared to both the core stability exercise therapy plus ergonomic advice, and supervised exercise plus ergonomic advice alone groups. There were small, non-significant differences between the core stability exercises plus ergonomic advice and supervised exercise with ergonomic advice group alone at all time. The spinal manipulation therapy plus ergonomic group rated their improvement higher than supervised exercise-alone group both at the end of treatment. The combined treatment groups reported greater satisfaction than those in supervised exercise plus ergonomic advice-alone group all the time.[35]

This was the first trial to compare the efficacy of spinal manipulation in subjects with CNSLBP, by means of objective (Centre of foot pressure-Win Track Platform), and subjective (NPRS) assessment tools, EuroQoL questionnaire. No earlier study has used the center of feet pressure as an outcome measure after spinal manipulation therapy in CNSLBP.

There was high-class procedural evidence to sustain the use of spinal manipulation in the management of patients with CNSLBP. The intervention was also recommended by clinical practice guidelines for the management of low back pain [36] and additional musculoskeletal disorders. [37] In this study, both groups had better improvement of postural sway and reduction pain intensity from baseline after treatment. Thus, these results contest that a biomechanical approach would clarify the reduction in segmental instability and pain intensity that was practiced by participants. According to most systematic reviews and evidence-based clinical guidelines, both spinal manipulation therapy plus ergonomic advice and core stability are effective treatment options for CNSLBP.[38] There is evidence to recommend, nevertheless, that the type, dose, and mode of delivery of both types of interventions can persuade the outcome.[39]Regarding spinal manipulation, little is known about optimal dose and, to date, provider type (e.g., chiropractor, osteopath, or physical therapist) has not been related to any differential effect.[40]

The quality of life of patients with chronic non-specific low back pain in Slovenia has also not been evaluated. But in one study about the quality of life of patients in general practice in Slovenia 73% of patients reported a moderate problem on at least on EQ-5D dimension and 15% of patients reported no problems at all.[41] In our study, only 6.85 % of patients reported no problems at all and as many as 93.3% of patients reported a moderate problem on at least one dimension of EQ-5D. This indicates that patients with non-specific chronic low back pain have a lower quality of life than the general population that visits family doctors in Slovenia, which is also in concordance with other studies.[42] Our study confirmed the findings of other studies that the parameter defining the quality of life of patients with non-specific chronic low back pain is a combination of physical is physical and psychological ones.

No differences in body inclination were observed when visual information was available between the groups. However, the significant forward inclination was seen in the persons with NSCLBP when vision was occluded (+9.3%) and in anticipation of postural sway (+17%) compared to the healthy individuals. The results suggest that young persons with NSCLBP have an altered body inclination that might be caused by the anticipation of segmental instability. The adopted forward inclined posture may potentially be a factor in the non-specific chronic of LBP.[43] Spinal manipulation when applied to the spinal joints and surrounding musculature may alter afferent feedback to the central nervous system to increase proprioception, improve motor control and improve postural sway. Individually applied, manual therapy techniques have been shown to alter short-term motor neuron activity, enhance performance in proprioception dependant activities, increase the range of motion;[38,44] alter markers of autonomic nervous system activity, and facilitate an immediate increase in mean voluntary contraction of the paraspinal muscles. It has been hypothesized that through these mechanisms spinal manipulation may influence postural sway. [45, 46]

The reduction in postural sway and pain intensity detected in this study were more expected to be explaining by spinal, supra-spinal, or still nonspecific mechanisms that can mediate pain, as recommended by a theoretical model progressed. This model advocates that a mechanical force from an SM begin a cascade of neurophysiological reply from both the peripheral and central nervous systems that would give upgrade explanation of clinical outcomes, such as postural away and pain intensity. [47]

Only a limited number of interventions for CNSLBP have been assessed in clinical trials; as a result, there is no recognized ‘gold-standard’ treatment. We chose supervised exercise therapy an intervention because of the support of efficiency for adults with low back pain.[41]Regarding supervised exercise therapy met regression analysis conducted to identify exercise characteristics that would most successfully decrease pain and progress function for CNSLBP. They classified exercise therapy according to program design (individual or standardized), delivery type (with or without supervision), and dose (high or low). Supervised exercise therapy, which focuses on individually designed and supervised programs of stretching and strengthening, seems to be most effective. [16] High-intensity regimens, whether low or high tech, accompanied by motivational strategies, seemed to further increase the effectiveness. [38]

**Limitations and strengths of this study**

The study was limited to 105 subjects of 18-60 years of age. All prospective care was taken to make sure that the present study with a low risk of bias by including sufficient randomized trial, secret allotment, lacking perception of evaluators, the comparison at baseline, calculation of sample size and purpose-to-treat analysis. Lacking perception of the evaluators was established by the truth that the evaluators were unable to estimate which patient was devoted to ergonomic advice. In differentiation, it was unobtainable to blind the clinician or the patients because of the nature of the interventions, which does not remove the risk of bias. Therefore, the lack of blinding of the clinicians or patients could be elucidating as a limitation of this study. There has been no achievable impact of long term follow-up as an additional limitation.

**Conclusions**

We observed that spinal manipulation therapy has been effective on chronic non-specific low back pain. Awareness of this low-cost therapeutic needs time to become popular among clinicians as well as clients.

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**Conflicts of interests**

There are no conflicts of interest.

**References**

1. Tavafian SS, Jamshidi A, Mohammad K, Montazeri A. Low back pain education and short term quality of life: a randomized trial. BMC Musculoskeletal disord. 2007; 8:21.
2. Schaller A, Dejonghe L, Haastert B, Froboese I. Physical activity and health-related quality of life in chronic low back pain patients: a cross-sectional study. BMC Musculoskelet Disord. 2015; 16:62.
3. World Health Organization. Occupational and other work-related diseases, In: Occupational health, 39-69, WHO, Cairo 2001.
4. Andersson GB. Factors important in the genesis and prevention of occupational back pain and disability. J manipulative physical ther. 1992; 15(1):43-46.
5. European Foundation for the Improvement of Living and Working Conditions. Managing musculoskeletal disorders, Eurofound, Dublin 2007.
6. Andersson GB. Epidemiological features of chronic low-back pain. The Lancet. 1999; 354(9178):581-585.
7. Deyo RA, Rainville J, Kent DL. What can the history and physical examination tell us about low back pain? JAMA. 1992; 268(6): 760-765.
8. Frymoyer JW. Back pain and sciatica. N Engl J Med. 1988; 318(5): 291-300.
9. Panjabi MM. The stabiliSing system of the spine. Part 1. Function, dysfunction, adaption, and enhancement. J Spinal Disord. 1992; 5(4):383-389.
10. Panjabi MM. The stabilizing system of the spine. Part 11. Neutral zone and stability hypothesis. J Spinal Disord. 1992; 5(4):390-397.
11. Weiler PJ, King GJ, Gertzbein SD. Analysis of sagittal plane instability of the lumbar spine in vivo. Spine. 1990;15(12):1300-1306.
12. Turk DC, Okifuji A. Assessment of patients' reporting of pain: An integrated perspective. Lancet. 1999; 353(9166):1784-1788.
13. Baliki MN, Geha PY, Apkarian AV, Chialvo DR. Beyond feeling: Chronic pain hurts the brain, disrupting the default-mode network dynamics. J Neurosci. 2008; 28(6):1398-1403.
14. Jamison RN, Fanciullo GJ, McHugo GJ, Baird JC. Validation of the short-form interactive computerized quality of life scale (ICQOL-SF). Pain Med. 2007; 8(3): 243-250.
15. Lame IE, Peters ML, Vlaeyen JW, Kleef M, Patijn J. Quality of life in chronic pain is more associated with beliefs about pain than with pain intensity. Eur J Pain. 2005; 9(1):15-24.
16. Laursen BS, Bajaj P, Olesen AS, Delmar C, Arendt-Nielsen L. Health-related quality of life and quantitative pain measurement in females with chronic nonmalignant pain. Eur J Pain. 2005; 9(3), 267-275.
17. Kolotylo CJ, Broome ME. Predicting disability and quality of life in a community-based sample of women with a migraine headache. Pain Management Nursing. 2000; 1(4): 139-151.
18. Grieve GP. Contra-indications to spinal manipulation and allied treatments. Physiotherapy. 1989; 75(8):445-453.
19. Hoehler FK, Tobis JS, Buerger AA. Spinal manipulation for low back pain. JAMA 1981; 245(18):1835-1838.
20. Haldeman S, Rubinstein SM. Cauda equina syndrome in patients undergoing manipulation of the lumbar spine. Spine. 1992; 17(12):1469-1473.
21. Sandoz R. Some physical mechanisms and effects of spinal adjustments. Anll Swiss Chil'o Assoc 1 976; 6:91-141.
22. Richardson CA, Jull GA. Muscle control–pain control. What exercises would you prescribe? Man Ther. 1995; 1(1):2-10.
23. Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-Moffett J, Kovacs F, Mannion AF, Reis S, Staal JB, Ursin H, Zanoli G. Chapter 4 European guidelines for the management of chronic nonspecific low back pain. Eur Spine J. 2006; 15(2):192-300.
24. Schulz C, Leininger B, Evans Roni, Vavrek D, Peterson D, Haas M, Bronfort G. Spinal manipulation and exercise for low back pain in adolescents: study protocol for a randomized controlled trial. Chropr Man Therap. 2014; 22:21.
25. McKenzie R. Treat Your Own Back. Waikanae, New Zealand: Spinal Publications New Zealand Ltd. 1997.
26. Mohanty: Manual therapy of the pelvic complex. 1st ed. MTFI Healthcare Publications.Mangalore. 2010.
27. Unsworth A, Dowson D, Wright V. ‘Cracking joints’. A bioengineering study of cavitation in the metacarpophalangeal joint. Ann Rheum Dis. 1971; 30(4):348-358.
28. Bronfort G, Maiers MJ, Evans RL, Schulz CA, Bracha Y, Svendsen KH, Grimm RH Jr, Owens EF Jr, Garvey TA, Transfeldt EE. Supervised exercise, spinal manipulation, and home exercise for chronic low back pain: A randomized clinical trial. Spine. 2011; 11(7):585-598.
29. Jensen MP, Paul K. Self-report scales and procedures for assessing pain in adults. In: Turk DC, Melzack R (Eds). Handbook of pain assessment. New York: Guilford Press. 2011; 19-44.
30. Gagliese L. Assessment of pain in the elderly. In: Turk DC, Melzack R (Eds). Handbook of pain assessment. New York: Guilford Press.2001; 119-133.
31. Gagliese L, Weizblit N, Ellis W, Chan VW. The measurement of postoperative pain A comparison of intensity scales in younger and older surgical patients. 2005; 117(3):412-420.
32. Win-Track-User’s-Manual-V1.3-UK. sav.medicapteurs.fr/Mc/Winpod\_Wintrack\_Fusyo/Manuals/Win...
33. Wilder DG, Vining RD, Pohlman KA, Meeker WC, Xia T, Devocht JW, Gudavalli RM, Long CR, Owens EF, Goertz CM. Effect of spinal manipulation on sensorimotor functions in back pain patients: study protocol foe a randomized controlled trial. Trials. 2011; 12:161.
34. The EuroQol Group: EuroQol-a new facility for the measurement of health-related quality of life. Health Policy. 1990; 16(3): 199-208.
35. Liu CJ, Latham N. Adverse events reported in progressive resistance strength training trials in older adults: 2 sides of a coin. Arch Phys Med Rehabil. 2010; 91(9):1471-1473.
36. Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-Moffett J, Kovacs F, Mannion AF, Reis S, Staal JB, Ursin H, Zanoli G; COST B13 Working Group on Guidelines for Low Back Pain. Chapter 4: European guidelines for the management of chronic nonspecific low back pain. Eur Spine J. 2006; 15(2):192-300.
37. Posadzki P, Ernst E. Osteopathy for musculoskeletal pain patients: a systematic review of randomized controlled trials. Clin Rheumatol. 2011; 30(2):285-291.
38. Bronfort G, Haas M, Evans R, Kawchuk G, Dagenais S. Evidence-informed management of chronic low back pain with spinal manipulation and mobilization. Spine J. 2008; 8(1):213-225.
39. Hayden JA, van Tulder MW, Tomlinson G. Systematic review: strategies for using exercise therapy to improve outcomes in chronic low back pain. Ann Intern Med. 2005; 142(9):776-785.
40. Haas M, Groupp E, Kraemer DF. Dose-response for chiropractic care of chronic low back pain. Spine J. 2004; 4(4):574-583.
41. Kersnik J, Vodopivec-Jamsek V. Health status of family practice patients in Slovenia. Zdrav Vestn. 2001; 70: 203-205.
42. Antonopoulou MD, Alegakis AK, Hadjipavlou AG, Lionis CD. Studying the association between musculoskeletal disorders, quality of life and mental health. A primary care pilot study in rural Crete, Greece. BMC Musculoskeletal Disord. 2009; 10: 143.
43. Brumagne S, Janssens L, Janseens E, Goddyn L. Altered postural control in anticipation of postural instability in persons with recurrent low back pain. Gait Posture. 2008; 28(4): 657-662.
44. Slade SC, Keating JL. Trunk-strengthening exercises for chronic low back pain: a systematic review. J Manipulative Physiol Ther. 2006; 29(2):163-173.
45. Fryer G. Intervertebral dysfunction: a discussion of the manipulable spinal lesion. Journal of Osteopathic Medicine. 2003; 6(2): 64-73.
46. Dishman JD, Cunningham BM, Murke J. Comparison of tibial nerve H-reflex excitability after cervical and lumbar spine manipulation. J Manipulative Physiol Ther. 2002; 25(5): 318-325.
47. Delitto A, George SZ, Van Dillen LR, Whitman JM, Sowa G, Shekelle P, Denninger TR, Godges JJ; Orthopaedic section of the American Physical Therapy Association. Low back pain. J Orthop Sports Phys Ther. 2012; 42(4):1-57.

**THE EFFICACY OF SELF SNAG-SUSTAINED NATURAL APOPHYSEAL GLIDES VERSES – SNAGS APPLIED BY THERAPIST IN SUBACUTE MECHANICAL NECK PAIN AMONG DIAMOND WORKERS - A COMPARITIVE STUDY**

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**ABSTRACTS**

**OBJECTIVES**  **–** randomized clinical trial

**STUDY** **DESIGN –**  evaluate the effectiveness of the Self –Snag Versus Snag applied by therapist.

**BACKGROUND-**Neck painis common .More than half of the people develop  neck pain some times in their life .Subject were evaluated on the basis of inclusion and exclusion criteria. Mulligan has described Self-Snags and Snags given by the therapist effective in subacute mechanical neck pain but no comparative study has been done.

**METHOD-**A sample of 30 subject (Mean + SD age,29.67+6.76) with subacute mechanical neck pain among diamond worker were randomized into two groups, Self –Snag (group-A) given by the therapist(group-B). The treatment was taken for 3 months regularly and outcome measures (VAS,ROM,NDI) were taken on day 0, day 45, day 90. Postural advice are also given to the subjects.

**RESULTS-** VAS, ROM AND NDI were statistically significant for PAIN, ROM, and DISABILITY (p<0.01)indicating greater improvement in both groups for all the three outcome measure. On comparing the pre and post test score, the score showed greater improvement in PAIN, ROM, and NDI in group B receiving therapist SNAG than group A receiving SELF SNAG(p<0.01).

**CONCLUSION-**The result of this study suggest that SNAG given by the therapist in subacute mechanical neck pain provide superficial clinical benefits than SELF-SNAG.

***INTRODUCTION***

***Background of the problem:***

Neck pain is common more than half of people develop a bout of neck pain at some time in their life once survey done in the U.K. found that, of adults aged 45 to 75 years about one in for women and about one in 5 men had current neck pain,

***Mechanical neck pain*** - is the most common type, this is sometimes called 'simple or non-specific' neck pain cause include minor injuries or sprains to muscles or ligaments in the neck. Bad —posture is also a common cause. For example; neck pain is more common in people who spend much time at their working day at a desk with a 'bent-forward' posture.

***Symptoms -*** pain develops in the neck and may spread to the base of the skull and shoulders movement of the neck may make the pain worse, the pain may spread down an arm to hand or figures. This is due to irritation of a nerve going to the arm from the spinal cord in the neck.

***Outlook -*** is usually good in most cases of acute (sudden onset) neck pain. Symptoms commonly begins to improve after few days, and are usually gone within a few weeks, some people develop chronic neck pain.

***Mechanism of pain***- a forward head posture incurred from an increased dorsal spinal kyphosis places the head ahead of the center of gravity. This posture becomes pathologic when it is maintained persistently.

***MULLIGAN CONCEPT***- of mobilization with movements (mwms), first used in cervical spine ,carry the acronym SNAGS, stand for sustained natural epiphyseal glides, used to improve function, restriction or pain in flexion ,extension, rotation, side flexion of cervical. SELF-SNAGS with a small hand towel can also be beneficial.

***Need and significance of the study:***

Neck pain is common more than half of people develop a bout of neck pain at some time in their life once survey done in the UK found that, of adults aged 45 to 75 years about one in for women and about one in 5 men had current neck pain.

Study shows that both SELF-SNAGS with hot pack and SNAGS given by therapist with hot pack separately enable a patient to relief fast but no comparative study was being done that is why I took up this study ,to find out which will give faster and better result in mechanical neck pain.

***Statement of the problem:***

This study is done to find out the significance difference between SELF-SNAGS and SNAGS given by therapist in improving the Chronic Mechanical Neck Pain

## Neck disability index

As a service to those with neck pain, we are including the neck disability index as a self- administered test to determine their level of disability. Simply add the score from answer to the questions and check the sum against the table.

### *VISUAL ANALOGE SCALE-*

A simple assessment tool consisting of a 10 cm line with 0 one end, representing no pain and 10 on other, representing the worst pain ever experienced which a patient marks to indicate the severity of his or her pain.

## OBJECTIVE OF THE STUDY

## To see the effectiveness of Self- Snags versus Snags applied by therapist on range of motion via Goniometer.

* See the effectiveness of Self- Snags versus Snags applied by therapist on VAS.
* To see the effectiveness of Self- Snags versus Snags applied by therapist on Neck Disability Index.

***Research Design:***

It is a comparative study design; a sample of 30 patients will be included in the study with a pre-test and post-test study design. Convenient sampling is done on basis of baseline assessment and diagnosis of their condition, as per pediatrician .

***Study Settings:***

All the subjects were taken from Janak Hospital .Bardoli

***Sample Design:***

Thirty subjects with subacute mechanical neck pain of age group between 20-50 years are taken. Each subject is evaluated for the study. All the patients were referred by consultant orthopedician from the referred hospital and diagnosed as a subacute mechanical neck pain and who satisfy the inclusion criteria.

***Sampling Method:***

By using convenient sampling thirty subjects studied were divided into two group of fifteen each.

Group A—SELF SNAGS

Group B—SNAGS GIVEN BY THERAPIST

***Data Collection Process:***

Prior sanction was obtained for the study. The patients referred by the orthopedic surgeon of the hospital were taken for primary evaluation and if the patient fulfilled the inclusion criteria, they were selected for the study. The referred patient who satisfy the inclusion criteria were included in the study and were divided in two groups

Group A —Self- Snag

Group B- Snag given by therapist using random sampling

Assessment was taken of all the 30 patient using VAS scale for pain, Goniometer for measuring Rom and Neck Disability Index for disability at O day, 45th day and 90th day.



***Procedure: -*** After scoring for inclusion and exclusion criteria patient are tested for pain by VAS, Rom by Goniometer, and disability by NDI.

***Protocol***

Subjects were assigned to group I to group Il. 15 patients were in each group.

Group A: - Was in self-snags protocol. Subjects were taught carefully Self Snag for extension, rotation and lateral flexion of cervical spine with the help of small hand towel.

Group B- Received SNAGS by therapist. 1st hot pack was applied for 15 - 20 minute then snag was applied by therapist using 2 — 3 set of 4 — 6 repetition for each level of cervical spine, for improving extension, rotation, and side flexion.

***STATISTICAL TEST USED***

Independent ’t’ test and Paired 't' test were used to compare pain, ROM and neck Disability between the groups and within groups.

Both groups response to treatment was analyzed using t test.

***Demographic representation***

In these 30 subjects were randomly selected and were allocated in group A and B. There were 17 male 13 females. Mean age of 29.67± 6.76 ranging from 20 to 50 years with minimal age of 20 and maximal age of 40 in group A and the mean age of 30.33±7.72 with a minimal age of 20 and maximum age of 46 in group B.

**ANALYSIS AND INTERPRETATION:**

All the analysis were obtained using SPSS window version 10.Demographic data of patient including Sex , Age, Diseases Duration, VAS, Range of Motion ,Neck Disability Index were descriptive summarized. The dependent variables for statistical analysis were help to overcome Subacute Mechanical Neck pain, ROM, NDI .An alpha level of 0.05 was used to determine statistical significance. Statistical technique used for analysis was independent t test and paired test which is applicable to compare between two groups and within the group at significant level.

The result of the present study demonstrated that there was a significant improvement in subacute mechanical pain. When two samples were conducted after 45th day, 90th day using VAS scale , it was found that there was a significant improvement in neck pain after 45th days with p=0.022, and highly significant after 31 days in group B compare to group A, p=0.00.

**Table: Data analysis of VAS between group A and group B**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DAYS** | **Group A**  **(N=15)**  **M ± SD** | **Group B**  **(N=15)**  **M±SD** | **t** | **P** |
| 0 DAY | 6.33±.98 | 6.27±1.03 | 0.182 | 0.857 |
| 45 DAY | 4.40±.99 | 3.47±1.13 | 2.146 | .022 |
| 90 DAY | 2.67±1.11 | .73±.96 | 5.09 | .000 |

**Figure: Demographic presentation of VAS scale differences between group A and group B**

**Table: Data analysis of rotations on Goniometer between group A and group B**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DAYS** | **Group A**  **M±SD** | | **Group B**  **M±SD** | | **t** | | **p** | |
|  | **RtR** | **LtR** | **RtR** | **LtR** | **RtR** | **LtR** | **RtR** | **LtR** |
| 0 day | 27.53±4.70 | 29.27±5.23 | 27.73±4.65 | 30.20±5.39 | .117 | .481 | .908 | .634 |
| 45 day | 30±4.80 | 32.20±4.65 | 34.27±3.39 | 36.53±4.22 | -2.814 | -2.672 | .009 | .012 |
| 90 day | 33.80±4.18 | 35.73±4.23 | 40.00±1.51 | 41.33±2.09 | -5.404 | -4.59 | .000 | .000 |

**Right Rotation**

**Figure: Demographic presentation between group A and group B on Goniometer for rotations**

**Table: Data analysis of side flexion on Goniometer between group A and group B**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DAYS** | **Group A**  **M±SD** | | **Group B**  **M±SD** | | **t** | | **p** | |
|  | **RtR** | **LtR** | **RtR** | **LtR** | **RtR** | **LtR** | **RtR** | **LtR** |
| 0 day | 14.20±1.93 | 15.67±2.09 | 14.87±1.60 | 16.80±2.48 | -1.029 | .1.351 | .312 | .187 |
| 45 day | 15.87±1.64 | 17.13±1.92 | 17.67±1.45 | 19.0±1.56 | -3.18 | -2.921 | .004 | .007 |
| 90 day | 17.60±1.45 | 18.87±1.30 | 19.67±.90 | 20.47±1.13 | -4.68 | -3.60 | .000 | .000 |

**Right Side Flexion**

**Figure: demographic presentation between group A and group B on Goniometer for side flexions**

**Table : Data analysis of NDI between group A and group B**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DAYS** | **GroupA(n=15)**  **M±SD**  **NDI** | **GroupB(n=15)**  **M±SD**  **NDI** | **t** | **P** |
| 0 DAY | 9.47.±3.11 | 9.67±2.66 | -.189 | .851 |
| 45 DAY | 7.13±2.33 | 5.47|±1.60 | 2.28 | .030 |
| 90 DAY | 4.60±1.35 | 1.33±1.45 | 6.388 | .000 |

**Figure: Demographic presentation of NDI between group A and group B**

**Table: Data analysis of extension on Goniometer between group A and group B**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DAYS** | **GroupA(n=15)**  **M±SD**  **Extension** | **GroupB(n=15)**  **M±SD**  **Extension** | **t** | **P** |
| 0 DAY | 33.13±4.32 | 30.73±4.77 | 1.443 | 0.160 |
| 45 DAY | 37.07±4.13 | 36.53±2.53 | .426 | .673 |
| 90 DAY | 40.13±2.53 | 41.93±.1.28 | -2.45 | .020 |

**Figure: Demographic presentation between group A and group B on Goniometer for extension**

***Discussion***

The present study was under taken to determine the effectiveness of Self Snags versus snags applied by therapist in Subacute Mechanical Neck Pain among Diamond worker. The study of 3 month structured, snags had shown improvement in Subacute Mechanical neck pain

Data collection through the study showed more improvement in subacute Mechanical Neck pain patient in group B. Thus it can be concluded that snags applied by therapist are more beneficial in improving Subacute Mechanical Neck Pain.

The most objective of the study was to compare the improvement in Pain, Range of Motion and Neck Disability between group A and group B subjects. When analyzed the mean value for pre and post test on 0 day, 45 day and 90 day, it is found that the mean value of:-

* VAS scale is 6.33 and 6.27 for group A and group B subjects respectively for pre test. The values are found to be increased in post test on 45th day that are 4.40 and 3.47 and on 90th day that are 2.67 and .73 for group A group B respectively. It is found statistically that group B is more significant (p=.000).
* Range of motion on Goniometer for right and left rotation 27.53, 29.27 and 27.73, 30.20 for group A group B subjects respectively for pre test. The values are found to be increased in post test on 45th day that are 30, 32.20 and 34.27, 36.73 and on 90th day that are 33.80, 35.73 and 40 ,41.33 for group A group B respectively. It is found statistically that group B is more significant (p=.OOO).

Graphs of between the groups showed Self Snag and Snags given by therapist were similar and serve as homogeneity groups and there were no significant difference between these two groups,

Graphical presentations, which point to over all sense of the study depicts the same. All graphs show the significant difference for improvement in Subacute Mechanical Neck Pain in Group A and Group B separately. The level of mean difference in pre test and post test of both groups presented Subacute Mechanical Neck Pain improvement more in Group B than Group A.



***Results of study***

It has been recorded from the study that use of Self-Snags and Snags applied by therapist produces significant improvement in subacute mechanical neck pain among diamond worker. It can be seen that use of Self-Snags and Snags applied by therapist in patients with Subacute Mechanical Neck Pain is beneficial. But result shows that group B showed faster and better improvement than group A. Hence alternate hypothesis is accepted and the null hypothesis is rejected.

***Summary***

The present study was performed to note the efficacy of self –snags verses snags applied by the therapist subacute mechanical neck pain among diamond workers.

30 subjects were diagnosed to have subacute mechanical neck pain were selected and divided into two group with n=15 for each group. The group A was treated with self –snags, whereas group B was treated with snags applied by therapist for 3 month.

Subject in both the groups were assessed for pain, ROM and Neck Disability at a 0 day,45th day and 90th day and the result were statistically analyzed using independent t-test and paired t-test .Then it can be concluded that snags applied by the therapist group showed a marked improvement in sub-acute mechanical neck pain when compared self- snags.

***Limitation***

* Neck exercise program was not included
* The study was only done on diamond worker not on other

***Suggestion***

Further studies should be done on all the patient with sub-acute mechanical neck pain fulfilling the inclusion criteria and studies should also included neck strengthening program.

***conclusion***

It has been recorded from the study that use of self snags and snags applied by the therapist produces significant improvement in sub-acute mechanical neck pain among diamond worker. It can be seen that use of Self Snags and Snag applied by the therapist in patient with Sub-Acute Mechanical Neck Pain is beneficial. But Snag applied by the therapist give faster improvement in Sub-acute Mechanical Neck Pain than Self Snags .

***Book reference:***

**1. Neck and arm Pain ,jaypee;3rd edition,chap-1 page no.4**

**2. Effective management of musculoskeletal injury Andrew Wilsion, page no.182**

**3. Orthopedic physical assessment;David J Magee,4th edition,chapter3, page no.145 154**

**4. Measurement of joint motion ;Cynthia c.norkin,3rd edition ,chapter11,page no 295**

**5. Manual therapy ;Brain R mulligan,4th edition chapter-1,page 9**

**6. Basic biomechanics of the musculoskeletal system,Margareta nordin,chap-11 page no.**

**287**

**7. The physiology of the joints ;A.Kapandiji , 2ND edition,vol-3,chap-5,page 170**

**8 Therapeutic exercise ,Carolyn Kisner,5th edition,2002**

**JOURNAL REFERENCES:**

**9. ” A preliminary investigation into the relationship between cervical and sympathetic nervous system activity in the upper limbs of an asymptomatic population “ A moulsion , T watsion ;2009**

**10. “ the effedctveness of self snags over conventional physiotherapy management in chronic neck pain among computer professional” shilpi chhabra;vol.2,no.e3,2008-09**

**11. “mulligan & apos; s mobilization with movement positional faults and pain relief current concept from critical review of literature” B. vicenzion et.al.2009**

**12. “ Work station ergonomic tips; computer monitors and posture” Alan hedge:2009**

**13. “Reliability and validity of the visual analogue scale for disability in patients with chronic musculoskeletal pain” Anne m Boonstra,2008**

**14. “the effect of the mulligan sustained natural apophyseal glides (snags) in the lumber flexion range of motion of asymptomatic subjects as measured by the zebris cms20 3 –d motion analysis system” maria moutzouri; 2008**

**15. “ Relative therapeutic efficacy of some vertebral mobilization technics in the manegment of unilateral cervical spondylosis : A comparative study “ Michael ogbonnila Egwu; 2008**

**16. “Translation of neck disability index & validation of the greek version in a sample of neck pain patient” Marianna N Trouli 2008**

**17. Allan Binder,2008;BMJ; To recover acute episode within 4 weeks; to maintain acivities of daily and reduce absence from work;to prevent development of long –term symptoms ;to minimize adverse effect of the treatment k**

**18. Manual physical therapy may improve neck pain , disability” Laurie Barclay 2008**

**19. ”efficacy of a c1-c2 self snag in the management of cervicogenic headache ;Toby Hall et.al.2007**

**20. ”Chronic mechanical neck pain in adults treated by manual therapy :A systematic review of change scores in randomized clinical trials”Howard Vernon;2007;215-227**

**21. ”Chronic mechanical neck pain in adults treated by manual therapy :A systematic review of change scores in randomized clinical trials”;Frank M.Painter;D.c;2007**

**22. ”Efficacy of manupulation for non specific neck pain of recent onset:design of a randomized controlled trial ;Andrew M Leaver;2007**

**23. ”the reliability of the Vernon and the mior neck disability index and its validity compared with the short form -36 health survey questionnaire”2007**

**24. ”prospective research on musculoskeletal disorder in office workers” stefan IJmker et.al;2006**

**25. ”Immediate effects on neck pain and active range of motion after a single cervical high velocity low amplitude manipulation in subjects presenting with mechanical neck pain :A randomized controlled trial ; Requel martirnez segura;2006**

**26. ”Effectiveness of dynamic muscle training , relaxation or ordinary activity fir chronic neck pain :A Randomized controlled trial “Matt vilijanen;2003:475**

**27. ”Active neck muscle training in the treatment of chronic neck pain in women :randomized controlled trial” Jari Ylinen et.al.;2003**

**28. “Hypoalgesic and sympathoexitatory effect of mobilization with movement for lateral epicondylagia “Aatit Paungmali et Al.;2002**

**29. ”Reliability of the visual analogue scale for the measurement of acute pain “Polly Bijur;2001**

**30. ”Relaibility of measurement of cervical spine range of motion – comparison of three methods”Ridden,Danl;1991**

**31. ”The neck disability index; A study of reliability and validity” Vernon H, Miror S 1991;409**

**32. ”Manual therapy and general practitioner care for neck pain ,economic evaluation alongside a randomized controlled trail “Ingeborg BC Korthals De Bos et.al.**

**33. ”Chiropractic clinical practice guide line :evidence based treatment of adult neck pain not due to whiplash “Elizabeth Anderson**

**Net reference:**

**35. “Neck pain in adult”oct.2006;www patient co.uk**

**36. “Non specific neck pain”www.Chiro.org**

**37. “manipulation and mobilization after immediate effects” Bryan Cervantes,www.rehabinstitutekuwait.com**

**38. Cervical spondylosis;www.homeopath.com**

**39. Core concept**

**40. Manual medicine.com**

**41. www.qualitymetric.com**

**42. Vernon H and Hagino C,1991,WWW.chorgo.com**

Antioxidant Activities of Ethanol Extracts of Mangosteen Peel (Garcinia Mangostana L.) on Sheep Red Blood Cells Undergoing In Vitro Oxidative Stress

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**Abstract**

Mangosteen peel (Garcinia mangostana L.) has been used as a traditional medicine as an antioxidant for various diseases. The purpose of this study was to assess the ability of 50% mangosteen peel ethanol extract (EEMP) with a concentration of 0.195% to resist oxidative stress in sheep red blood cells (SRBC) which is given tBHP in vitro. The experiments were carried out in 4 groups, (I) controls, (II) SRBC + EEMP, (III) SRBC + t-BHP, (IV) SRBC + EEMP + t-BHP. The effect of protecting the mangosteen peel is determined by measuring the parameters of the activity of antioxidant enzymes superoxide dismutase (SOD), glutathione peroxidase (GPx) and catalase. The results showed that administration of EEMP was able to withstand oxidative stress in SRBC which is given TBHP. This is indicated by the decrease in SOD, GPx and catalase activities in the provision of ECD. The results of this study indicate that EEMP can protect SRBC from oxidative stress caused by the administration of t-BHP.

Keywords: Ethanol extract of mangosteen peel, Glutathione peroxidase, Catalase, Sheep red blood cell, Superoxide dismutase.

**Introduction**

Indonesia is rich in various kinds of plants that are useful for the various treatments of health condition. Serious health problems caused by lifestyle changes due to globalization are risk factors of degenerative diseases. This situation is exacerbated by pollution, lack of rest, rarely doing sports activities and high stress. According to the World Health Organization (WHO), Indonesia ranks fourth as the most diabetes mellitus patients in the world. Stroke is also one of the causes of vascular disease which according to WHO data is the third largest killer disease after heart and cancer. This disease has attacked the young generation and if not treated immediately can have fatal consequences such as death and disability. Various studies have shown that these degenerative diseases are associated with increased free radicals in the body that cause oxidative stress in cells (Handayani A, et al, 2007).]

Mangosteen (Garcinia mangostana L.) is a fruit plant originating from shady tropical forests in Southeast Asia, mostly in Indonesia and Malaysia (Bappenas, 2005). From Southeast Asia, this plant spreads to Central America and other tropical regions such as Sri Lanka, the Caribbean, Hawaii and Northern Australia. In Indonesia, mangosteen is called in different local names such as manggu (West Java), manggus (Lampung), manggusto (North Sulawesi), manggista (West Sumatra) (BAPPENAS, 2005). In other countries, t is also known as mangostanier (French), mangostán (Spain), mangostão (Portuguese), mangostane (German), mangkhut (Thailand), mang cutan (Vietnam), mongkhut (Kampuchea), mangostan (Philipines) and mangostin (India) (Osman & Milan, 2006). This plant belongs to the family Clusiaceae (Guttiferae synonym) which consists of 35 species and more than 800 species (Osman and Milan, 2006). In Southeast Asia, mangosteen peel has been used to treat skin wounds and infections for several centuries, amoebic dysentery. In Ayurvedic medicine it has been used to treat inflammation and diarrhea, cholera and dysentery (Laurance, 2011; Chaverri et al, 2008). In addition, it was found that the mangosteen peel contains several compounds that had pharmacological activities such as anti-inflammatory, antihistamine, antibacterial, antifungal and antiviral drugs and it was useful to treat heart disease.

Some of main compounds in the mangosteen peel which are reported to be responsible for some pharmacological activities are the xanton group. The xanthone compounds that have been identified include α-mangostin 1, 3, 6 - trihydroxy - 7 - methoxy - 2, 8 - bis (3- methyl -2 - butenyl) - 9 H - xanten - 9 - on and γ - magostin 1,3, 6,7 - tetrahidroxy - 2,8 - bis (3-methyl-2-butenyl) - 9 H xanten-9-on (Nugroho, AE). Some other pharmacological effects are as antihistamines, anti-inflammatory, antioxidants, anti-cancer, and anti-microorganisms. A study showed crude methanol extract from mangosteen peel has an effect as antiproliferative, apoptotic and antioxidant on human breast cancer cell line (SKBR3) as a model (Moongkarndi P et al, 2003). Various studies indicated that the mangosteen has potential antioxidant power that can reduce the risk of various diseases so-called “queen of fruits” or “superfruit”. The mangosteen peel contains 95% xanton, isoflavonoids, tannins and flavonoids (Vishnu Priya V, et.al, 2010). Activity tests on the isolation of mangosteen peel showed that most of active compounds were alpha-mangostin, gamma-mangostin and garsinon-E (Nugroho, 2007). These compounds belong to the xanton group. Further research shows that mangosteen peel extract and its active compounds have potent antioxidant activity, effective as antiaterosclerosis, and even anti HIV (Nugroho, 2007). In the toxicity test, the ethanol extract of mangosteen fruit containing xanton active compounds do not show toxicity both acutely and subchronically (Nugroho, 2007). A study conducted by Moongkarndi et al., 2004 shows that methanol extract from mangosteen peel has antiproliferation, antioxidant effects and induces apoptosis. Weecharangsan et al., 2006 followed up on the results of the study and proved that some mangosteen peel extracts or water extract that contains 50% ethanol and 95%, and ethyl acetate have antioxidant properties.

Recently, the use of mangosteen peel extract is increasingly widespread in Indonesian community, especially the efficacy of antioxidants. Studies on benefits of mangosteen peel as an antioxidant is also increasing in Indonesia. Some studies in Singapore and Malaysia show that the antioxidant properties of mangosteen peels are far more effective than antioxidants in the skin of rambutan or durian (Tan Tze Guan, Matthew Whiteman, 2005). The xanthone content and its derivatives can effectively fight in-vitro breast cancer and heart disease drugs (Tan Tze Guan, Matthew Whiteman, 2005). The efficacy of xanthone derivatives called garcinone E is considered to be more effective in inhibiting cancer when compared to cancer drugs such as fluorouracil, sisplatin, vincristine, methotrexate and mitochondantron (Tan Tze Guan, Matthew Whiteman, 2005).

Several in vivo studies have demonstrated that the antioxidant ability of mangosteen peel to resist membrane oxidation based on the results of lipid peroxidation test. But its ability is not yet well known to protect red blood cells from oxidative stress. For this reason, a study using SRBC induced by t-BHP as a model and its protective effect was examined by measuring the activity of endogenous enzyme SOD (superoxide dismutase), GPx (glutathione peroxidase) and catalase. The purpose of this study was to examine the effect of giving mangosteen peel ethanol extract (Garcinia mangostana L.) to sheep red blood cells made by oxidative stress with t-BHP in vitro. The specific objective of the study was to measure SOD, GPx and catalase activity in sheep red blood cells made with oxidative stress by t-BHP. Our hypothesis is that ethanol extract of mangosteen rind (EEMP) has efficacy as an antioxidant and is able to maintain sheep red blood cell membranes from oxidative stress conditions due to being given t-BHP.

**RESEARCH METHODOLOGY**

This research was conducted in the laboratory of the Department of Biochemistry and Bio molecular, Faculty of Medicine, University of Indonesia and in the Phytochemical Laboratory of the Faculty of Pharmacy, University of Indonesia, Depok, and Jakarta in Indonesia. The study was carried out experimentally — in vitro with a completely randomized design. In this study, parameters observed were measurements of superoxide dismutase (SOD) activity, glutathione peroxidase (GPx) activity and, catalase activity in red blood cells of sheep given oxidative stress with t-BHP.

**Tools and Materials**

In this study, tools used are analytical scales (OHAUSS), magnetic stirrers, desiccators, spectro-photometers (GENESIS), volume pipettes, Eppendorf pipettes, measuring flasks (PYREX), test tubes (PYREX), Erlenmeyer (PYREX), alarm glasses (PYREX), incubators (MEMMERT ), centrifuges (®Hettich), pH meters (HANNA), refrigerators, stopwatches, Pasteur pipettes, blood tubes EDTA Grainer 3cc, vortex (JULABO), Homogenezer (YAMATO), glass cuvettes, ovens, furnaces, filter paper and thermometers.

In addition, the chemicals used were reagents (Dragendorff, Mayer and Bouchardat), ammonium hydroxide, hexane, 10% sulfuric acid, gelatin, tea powder, ethyl acetate, concentrated hydrochloric acid (HCl) solution, standard quercetin, methanol solution, plate Thin layer chromatography (TLC), AlCl3 solution, potassium iodide powder, NH4OH solution, ether, distilled water, H2SO4 solution, NaCl, PBS 0.1 M pH 7.0 and pH 8, t-BHP (MERCK), H2O2 10 mM, Potassium dihydrogen phosphate / KH\_2 PO\_4 (MERCK), Dikalium hydrogen phosphate / K2HPO4 (MERCK), Sodium chloride / NaCl (MERCK), Potassium chloride /KCl (MERCK), Calcium chloride / CaCl2 (MERCK), Magnesium sulfate /MgSO4 (MERCK) , Natium dihydrogen phosphate / NaH2PO4 (MERCK), Sodium hydrogen phosphate / Na2HPO4 (MERCK), SOD Kit (RANDOX), GPx Kit (RANDOX).

In this study, test material used was the ethanol extract of mangosteen peel (Garcinia mangostana L.) made at the Laboratory of Spice and Medicinal Crops Research Institute (BALITTRO), Cimanggu Bogor Indonesia. In order to obtain the ethanol extract of mangosteen peel, the extraction process was carried out by maceration method using 50% ethanol solvent. The extraction results were examined using standard extract parameters at the Phytochemical Laboratory Faculty of Pharmacy, University of Indonesia. Examination of the standard extract parameters performed consists of both standard non-specific and specific standard extract parameters. The standard parameters of non-specific extracts include drying losses, water activity, ash activity, acid insoluble ash and residual solvent activity. Specific extract standard parameters include extract identity, organoleptic, ethanol-soluble compound activity, compound activity water soluble and phytochemical extract test. Sheep blood was taken from the Department of Microbiology FKUI. This SRBC was made a 50% suspension. Ethanol extract of mangosteen peel was carried out at the Laboratory of Spice and Medicines and Crops Research Institute (BALITTRO), Cimanggu Bogor. Saline Phosphate Buffer Solution (PBS) 0, 05 M pH 7, 4 was carefully weighed in potassium dihydrogen phosphate (KH\_2 PO\_4) 3.45 g, dialium hydrogen phosphate (K\_2 HPO\_4) 9.35 g, Sodium Chloride (NaCl) 4.5 g. Then, they were dissolved in distilled water to a volume of 1000 mL. Krebs-Ringer Phosphate (KRP) solution pH 7.4 was carefully weighed in sodium chloride (NaCl) 3.506 g, potassium chloride (KCl) 0.179 g, calcium chloride (CaCl\_2) 0.072 g, magnesium sulphate (MgSO\_4) 0.072 g, nartium dihydrogen phosphate (NaH\_2 PO\_4) 1,138 g, sodium hydrogen phosphate (Na\_2 HPO\_4) 1,171 g. Then, they were dissolved in distilled water to a volume of 500 mL. Dosing dilution of the ethanol extract of mangosteen peel: The dose used in this study was 0.195% (1.95 μg / mL) based on the results of the optimization of catalase activity test. T-BHP 4 mM solution (BJ: 0, 94 g / mL; BM: 90, 12): Starting with dissolving 27, 4 µL t-BHP in KRP to a volume of 50 mL.

Sheep blood obtained was centrifuged at a speed of 5000 rpm for ten minutes. After the plasma was removed, SRBC deposits were washed with phosphate buffered saline (PBS) five times the volume of SRBC deposits. Next, it was centrifuged again using a speed of 3000 rpm for five minutes. Then, the PBS liquid was removed. This process is repeated three times. SRBC that has been washed three times was put into a 50% SRBC suspension by taking 0.1 mL SRBC and adding 0.1 mL Krebs-Ringer Phosphate (KRP) pH 7.4. Further, it was grouped according to the research to be carried out:

Group I: SRBC without treatment (control)

The 50% SRBC suspension as much as 500 µL added 500 µL of KRP solution and then activity, GPx, SOD and Catalase were measured.

Group II: SRBC + EEMP (ethanol extract of mangosteen peel)

A 50 µL 50% SRBC suspension was added with 500 µL EEMP. It was incubated at c for 15 minutes. Then, they were centrifuged (3000 rpm) for 5 minutes. The supernatant was removed, then, activity GPx, SOD and catalase were measured.

Group III: SRBC + t-BHP

A 50 µL 50% SRBC suspension was added with 500 µL t-BHP, incubated at c for 15 minutes centrifuged (3000 rpm) for 5 minutes. The supernatant was removed then activity of GPx, SOD and catalase were measured.

Group IV: SRBC + EEMP + t-BHP

A 50% 50 µL SRBC suspension was added with 500 µL EEMP, incubated at c for 15 minutes. Then centrifuged (3000 rpm) for 5 minutes. The supernatant was removed, then the precipitate was added 250 µL KRP to return to 500 µL. in addition, it was added with 500 µL t-BHP, then re-incubated at c for 15 minutes. Then it was centrifuged (3000 rpm) for 5 minutes. The supernatant was removed then the activity of GPx, SOD and catalase were measured.

**Table 1. Test group**

|  |  |  |
| --- | --- | --- |
| **No** | **Trial group** | **Measurement** |
|  | SRBC normal | SOD, GPx and Catalase |
|  | SRBC + EEMP | SOD, GPx and Catalase |
|  | SRBC + t BHP | SOD, GPx and Catalase |
|  | SRBC + EEMP + tBHP | SOD, GPx and Catalase |

**SOD activity measurement**

The enzyme superoxide dismutase (SOD) will catalyze the dismutation of superoxide anion (O2-) into hydrogen peroxide and oxygen molecules, as an important form of cellular antioxidant defense mechanism. SOD activity is determined biochemically by using the RanSOD® kit, where xanthine and xanthine oxidase are converted into uric acid and produce superoxide radicals that will react with 2- (4-iodophenyl) -3- (4-nitrophenol) -5-phenyltetrazolium chloride ( INT) forms red formazan. Total SOD activity was determined from the degree of inhibition of formazan color formation as measured by a spectrophotometer at λ 505 nm. The reagents and some kit components must be reconstituted before they were used:

1. (R1a) containing Mixed substrate (R1a) was reconstituted with 20 mL buffer (R1b).
2. (R1b) is a buffer solution.
3. (R2) solution containing xanthine oxidase and reconstituted with 10 mL of distilled water.

The standard solution was reconstituted with 10 mL of distilled water.

**Table 2. Measurement of SOD activity**

|  |  |  |  |
| --- | --- | --- | --- |
| Reagent | Diluent (S1) | Standard S2-S6 | Sample |
| Sample | - | - | 0,05 mL |
| Standard | - | 0,05 mL | - |
| Buffer phosphate (PBS) | 0,05 mL | - | - |
| *Mixed substrate* (R1) | 1,7 mL | 1,7 mL | 1,7 mL |
| Mix very well | | | |
| Xanthine oxidase (R2) | 0,25 ml | 0,25 mL | 0,25 mL |
| Absorbance was measured at λ 505 nm in the first 30 seconds and 3 minutes later | | | |

**Measurement of glutathione peroxidase (GPx) activity**

The function of the GPx enzyme is to reduce H2O2 to H2O and glutathione disulfide (GSSG) with the help of reduced glutathione (GSH). Because H2O2 and other peroxides continue to form, GSSG must be returned to the reduced form (GSH). This requires glutathione reductase enzyme, which requires NADPH+H+ as a coenzyme. Measurement of GPx activity uptake was carried out at 340 nm wavelength, using the Randox® kit, which consists of:

1. (R1a) contains 6.5 ml of Reagent (R1a) reconstituted with 10 mL buffer (R1b).
2. (R1b) is a buffer solution.
3. (R2) solution containing Cumen Hydroperoxide (H2O2) 10 µl R2 + 10 aquabides and then vortexed.
4. (R3) is a diluting agent that is added with 200 ml of aquabidest.

**Table 3. Measurement of GPx enzyme activity**

|  |  |  |
| --- | --- | --- |
|  | Blanco | Test |
| *Diluted sample* (uji) | - | 0,02 ml |
| Aquabides | 0,02 ml | - |
| Reagent R1 | 1 ml | 1 ml |
| Cumene H2O2 | 0,04 ml | 0,04 ml |
| Divortex, absorption is measured at a wavelength of 340 nm after 1 minute, then it starts at the start timer. Then, it was read again after 1 and 2 minutes | | |

**Catalase activity measurement**

This enzyme functions to catalyze the decomposition of hydrogen peroxide into H2O and O2 (Harahap, 2001). Examination of catalase enzyme activity was carried out by using the Mates method. Optimization is done before checking the sample, and measurements are carried out at a wavelength of 210 nm.

**Table 4. Measuring catalase enzyme activity**

|  |  |  |
| --- | --- | --- |
| Cuvette | Blanco | Test |
| Sample | - | 0,050 mL |
| Phosphate buffer | 0,050 mL | - |
| H2O2 | 0,0950 mL | 0,0950 mL |
| The reaction runs after adding H2O2 to the test tube and absorption is followed for 30 seconds (t0) and 2 minutes (t1) | | |
| Absorption is measured at a wavelength of 210 nm | | |

**RESULTS AND DISCUSSION**

**Table 5. Identification of organoleptic ethanol extract**

|  |  |
| --- | --- |
| **Extract Name** | **Description** |
| 50% ethanol extract of mangosteen pee | Consistency: thick, blackish brown color, distinctive smell, and chelate taste. |

Table 6. Test results for specific extract standard parameters

|  |  |  |
| --- | --- | --- |
| **Information** | **Extract** **Identity** | **Organoleptic Results** |
| Extract name | Extractum mangostana pericarpium |  |
| Latin name of plant | *Garcinia mangostana* L |  |
| Part of plant | Skin |  |
| Indonesian name of plant | Manggis |  |
| Consistency |  | Thick |
| Color |  | Blackish brown |
| Smell |  | Typical |
| Taste |  | Bitter |
| The compound dissolves in ethanol |  | 61,63-67,52% |
| The compound dissolves in water |  | 47,89-54,83% |

**Table 7. Spot colors on the flavonoid KLT results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No | **Without reagent** | | | **with AlCl3 reagent** | |
| Rays | UV  254 nm | UV  366 nm | Rays | UV 366 nm |
| 1. | --- | Dark | yellow green | weak yellow | Fluorescence yellow green |
| 2. | --- | Dark | --- | --- | Fluorescence yellow green |
| 3. | --- | Dark | Dark | weak yellow | Fluorescence weak yellow |
| 4. | --- | --- | yellow green | --- | Fluorescence yellow green |
| 5. | --- | Dark | Dark | weak yellow | Fluorescence bright yellow green |
| 6. | --- | --- | --- | --- | Fluorescence yellow green |

**Table 8. Alkaloids identification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Method** | **Test** | **Ethanol extract 50%** | |
| **Color change** | **Results** |
| Bouchardat | I | Brown deposits | Positive |
| II | Brown deposits | Positive |
| Mayer | I | White deposits | Positive |
| II | White deposits | Positive |
| Dragendorff | I | Orange deposits | Positive |
| II | Orange deposits | Positive |

**Table 9. Saponin identification**

|  |  |  |
| --- | --- | --- |
| **Comparison** | **Froth formed** | **Results** |
| Extract of mangosteen peel | Froth ± 6 cm,  not lost with the addition of HCl 2N | Positive |
| Black cumin seed | Froth ± 6 cm,  not lost with the addition of HCl 2N | Positive |

**Table 10. Tannin identification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Comparison** | **Gelatin** | **Fe Cl3** | **Results** |
| Mangosteen peel extract | White precipitate (deposit) | Green - violet | Positive |
| Tea leaves | White precipitate (deposit) | Green - violet | Positive |

**Identification of terpenoids**

Based on the extraction method using the Liebermann Burchard reaction, the reaction results are brownish red. The results of the identification of the ethanol extract of mangosteen rind compared to lime peel showed positive results containing terpen / sterols.

**Measurement of SOD, GPx and catalase activities**

**Determination of SOD activities**

SOD activity calculation is done by entering the absorption value that has been obtained into the SOD standard curve equation.

The standard curve created produces the line equation y = 0.02x - 0.98. The complete SOD standard curve can be seen in Figure.3 and the SOD measurement results can be seen in the Figure below.

**\*#Δ**

**Figure 3.** SOD activity

**\*#Δ**

**\*#Δ**

Note:

\* = indicates a significant difference towards control (I) (p <0.05).

# = indicates a significant difference towards group II (p <0.05)

Δ = indicates a significant difference towards group IV (p <0.05).

I: Control; II: EEMP; III: t-BHP; IV: EEMP + t-BHP.

In figure 3, it shows that the SRBC SOD activity in the control group (I) is 121.48 + 3.49 U/mL. In the group given EEMP (II), SOD activity increased slightly and is not significant (p≥0.05) compared to the control group that is equal to 123.73+0.00 U/mL. This is likely due to the absence of free radical formation same as control so that it does not increase SOD activity. In the group that was given t-BHP (III) there is a big increase in SOD activity and statistically different significantly (p≤0.05) compared to the control group that is 241.46 + 83.31. This shows that the SRBC given t-BHP only, allegedly experiencing oxidative stress. The same result was obtained by Erna (2012) in her study using t-BHP as an oxidizer in sheep red blood cells in vitro, which showed a significant increase in MDA. In SRBC, t-BHP will form t-butoxyl radicals (t-BUO\*) which directly react with poly unsaturated fatty acids (PUFA) in the SRBC membrane so that peroxidation occurs in the membrane lipids. Lipid peroxide which is formed can cause damage to the PUFA structure so that it will reduce membrane fluidity and damage the membrane. In addition, superoxide radicals can also be formed which will be neutralized by SOD. Therefore, an increase in SOD activity is seen as the first line of endogenous antioxidant enzymes which work to prevent oxidative stress on SRBC.

In group IV which has been given EEMP protection before, then gave t-BHP, it showed a decrease in SOD activity 140.78 + 28.11 U/mL so that it was not significantly different (p> 0.05) compared to the control group or group II who were only given an EEMP. It was a possibility that the decrease in SOD activity that occurs in group IV due to the presence of antioxidants in EEMP (scavenging) thus helped the work of SOD to neutralize free radicals.

**Determination of GPx activity**

The results of GPx measurement and the GPx activity curve can be seen in Figure 4. In group I, GPx activity was 1005.94 + 18.56 U/mL and group II was 1094.261 + 103.60 U/mL. GPx activity in group III was 1000.33 + 10.30 U/mL, and group IV was 883.96 + 36.54 U/mL.

**\*#Δ**

**Figure 4. GPx activity**

Note:

\* = indicates a significant difference towards control (I) (p <0.05).

# = indicates a significant difference towards group II (p <0.05)

Δ = indicates a significant difference towards group III (p <0.05).

I: Control; II: EEMP; III: t-BHP; IV: EEMP + t-BHP.

The results of statistical analysis on GPx activity showed no significant difference between the groups that were given EEMP only (II) and the control group (I). This is likely that GPx does not increase its activity because SRBC does not have oxidative stress as in control. In group that was only given t-BHP (III), GPx activity decreased and showed no significant difference (p> 0.05) compared to the control group. This is due to the increase in H2O2 formed from dismutation of superoxide molecules by SOD neutralized by catalase in advance (Halliwel G, 2007). GPx activity in group (IV) protected by EEMP was first given t-BHP, showed a decrease in GPx activity which is indicated by a statistically significant difference compared to groups I, II and III (p <0.05). This is because GPx requires GSH as a substrate and NADPH as a coenzyme to maintain GSH. Low NADPH level in SRBC affects the GPx activity.

**Determination of catalase activity**

Catalase activity can be seen in Figure 5. In group I catalase activity was obtained at 0.588 + 0.00 / mL, in group II 0.588 + 0.00 U/mL, group III 0.662 + 0.11 U/mL and in group IV 0.368 +0.00 U/mL.

**\*#Δ**

**Figure 5. Catalase activity**

Note:

\* = indicates a significant difference towards control (I) (p <.0, 05).

# = indicates a significant difference towards group II (p <.0.05).

Δ = indicates a significant difference towards group III (p <.0, 05).

I: Control; II: EEMP; III: t-BHP; IV: EEMP + t-BHP.

The results of the statistical analysis showed that the activity of SRBC catalase in the control group was 0.588 + 0.00 U/mL. In the group given EEMP (II), catalase activity was the same as the control group and does not differ significantly (p≥0.05) which was equal to 0.588 + 0.00 U/mL. This indicates that in this group catalase has not shown significant activity because there is no significant free radical formation due to the provision of EEMP. In the group given t-BHP (III), although there was an increase in catalase activity, it was not statistically significant (p> 0.05) compared to the control group, which was 0.662 + 0.11 U/mL and the group that was only given EEMP( II). This indicates that the catalase that functions to catalyze H2O2 which is the result of dismantling the superoxide anion by SOD has been greatly reduced. In addition, catalase activity is higher than GPx activity which indicates that the catalase will play a role first in excessive H2O2 conditions. In group IV, which was given EEMP protection which was given t-BHP first, showed a decrease in catalase activity was seen which was 0.368 + 0.00 U/mL. It was significantly different (p≤0.05) compared to the control group, as well as groups II and III which were given EEMP and t-BHP. This might be because the catalase does not overcome excessive free radicals due to the administration of t-BHP. It is possibly because EEMP can help neutralize H2O2 into H2O. This situation indicates that the administration of EEMP is believed to prevent oxidative stress in SRBC induced by t-BHP. The discussion of the activities of the three antioxidant enzymes is summarized in Figure 4.7.

**A comparison of SOD, GPx and catalase activities among groups**

**Figure 6. Comparison of enzyme activities among groups**

Figure 6 shows a comparison of the activity among three endogenous antioxidant enzymes in SRBC. The results of the study indicated that SOD activity in the group given t-BHP only (group III) showed the highest activity compared to groups I, II and IV. This is possible because the SOD in red blood cells performs its function to overcome the formation of excessive free radicals due to the administration of t-BHP. Catalase activity in group III showed a slight increase, although statistically there was no significant difference compared to catalase activity in groups I and II. It is believed that the catalase performs its function to catalyze formed H2O2 in SRBC as a result of the catalytic reaction of superoxide anions by SOD. Besides that it is seen that catalase activity is higher than GPx activity which indicates that the catalase will play a role in excessive H2O2 conditions.

SOD activity in group IV (EEMP + t-BHP) showed a decreased activity compared to group III. The possibility is that SOD activity has been reduced to carry out its function to overcome excessive free radicals due to the administration of t-BHP. In addition, the possibility of antioxidants contained in EEMP can neutralize free radicals due to the administration of t-BHP. This is shown by the lower activity of catalase in group IV when compared to group III.

The decrease in SOD, catalase and GPx activity can also be seen from the ability of EEMP content which contains high antioxidants. EEMP can help SOD to neutralize formed free radicals, thereby relieving the work of catalase and GPx to convert peroxide to H2O. This is in line with several previous studies (Yoshikawa 1997, Weecharangsan, et al, 2006) that the compounds α and β mangosteen have the ability to neutralize potential free radicals. A study conducted by Erna (2012) also showed that in SRBC protected with 1.95µg / mL EEMP then given t-BHP was able to reduce MDA levels in SRBC given t-BHP. This means that EEMP has antioxidant activity to overcome lipid peroxidation due to free radicals. In addition, Pius et al (2010) found that with the same dose of anthocyanin extract, it was able to maintain SRBC from the lipid peroxidation process as evidenced by SRBC remaining good. Overall, it can be said that EEMP 50% has antioxidant activity based on examination of SOD, GPx and catalase enzymes and it is able to withstand SRBC from damage caused by oxidative stress which may be due to its ability to neutralize free radicals.

**Conclusion**

EEMP with concentration (0.195%) is able to protect SRBC from oxidative stress due to tBHP in vitro. It is indicated by a decrease in GPx enzyme and catalase activity in group which is given EEMP protection before been given t-BHP.

**References**

Adhiyanto C, Kurniati V, Handayani S, 2001. Pelatihan Radikal Bebas dan Antioksidan dalam Kesehatan. Jakarta: Departemen Biokimia, Fakultas Kedokteran Universitas Indonesia, (pp.15-17).

Chaverri, J Pedraza, et al, 2008. Food and Chemical Toxicology.ed.46, (pp.3227-3239).

Ganong WF, 2002. Fisiologi Kedokteran. Jakarta: EGC, pp.533-561

H, Erna, (2012), Efek Extract Etanol Kulit Buah Manggis Terhadap Sel Darah Merah Domba Yan Diberi Stres Oksidatif Secara In Vitro, Fakultas Farmasi Universitas Indonesia, Jakarta.

Halliwell B, Gutteridge JMC, 2007, Antioxidant defences : Endogenous and Diet Oxford University Press,.Derived In : Free Radicals in Biology and Medicine, 4th ed. New York, (pp 79-166).

Halliwell, Barry and Gutteridge, John M. C. 2007. Reactive Species Can Pose Special Problems Needing Special Solutions: Some Examples, Oxford University Press, New York, Derived In : Free Radicals in Biology and Medicine (pp. 346-351).

Halliwell B, Gutteridge JMC, 2007, Reactive Species can be useful: Some more Example, Oxford University Press,.Derived. In Free Radicals in Biology and Medicine. 4th ed. New York, (pp. 395- 415)

Handayani A, Roosihermiati B, Maryani H, 2007, Faktor-faktor Yang Berhubungan Dengan Pola Kematian Pada Penyakit Degeneratif Di Indonesia, Surabaya: Pusat Penelitian dan Pengembangan Sistem dan Kebijakan Kesehatan, Badan Penelitian dan Pengembangan Kesehatan.

Harahap, I.P, 2001 Pemeriksaan aktivitas catalase, Pelatihan radikal bebas dan antioksidan dalam kesehatan dasar, aplikasi dan pemanfaatan bahan alam. Jakarta : Bagian Biokimia FKUI, (pp.21-22).

Heyne, K, 1987, Tumbuhan Berguna Indonesia. Jakarta : Badan Litbang Kehutanan.

Jung HA, et al, 2006, Antioxidant Xanthones From The Pericarp Of Garcinia mangostana (Mangosteen), J. Agric Food Chem, Mar 22, 54 (6): 2077-82.

Kosem, Han dan Moongkamdi, 2007, Antioxidant and Cytoprotective Activities of Methanolic Extract from Garcinia mangostana Hulls, Thailand: Department of Microbiology, Faculty of Pharmacy, Mahidol University Thailand.

Laurance S. Rockefeller Chair and Chief, 2011, Mangosteen (Garcinia mangos-tana L.), Complementary Therapies, Herbs, and Other OTC Agents,Integrative Medicine, Vol. 25 No. 9, Memorial Sloan-Kettering Cancer Center, New York, New York.

Mahabusarakam W Iriyachitra P, Taylor WC, 1987, Chemical Constituent of Garcinia mangostana, J Nat Prod., 50: 474-478.

Moongkarndi P, et al, 2008, Antiprolifera-tion, antioxidation and induction of apoptosis by Garcinia mangostana (mangosteen) on SKBR3 human breast cancer cell line. Thailand: Departemen Mikrobiologi, Fakultas Farmasi, Universitas Mahidol, Sri Ayudthaya Road, Rajdhevee.

Murray, Robert K, Granner, Daryl, K, dan Rodwell, Victor W, 2009, Biokimia Harper, (Brahm U. Pendit, Penerjemah). Jakarta: EGC, (pp.53-77)

Murray, Robert K, Granner, Daryl, K, dan Rodwell, Victor W, 2009, Biokimia Harper, (Brahm U. Pendit, Penerjemah). Jakarta: EGC, (pp.636-644)

Nisma, F, Situmorang, A dan Fajar, M, Uji Aktivitas Antioksidan Extract Etanol 70% Bunga Rosella (Hibiscus sabdariffaL.) Berdasarkan Aktivitas SOD Dan Kadar MDA Pada Sel Darah Merah Domba Yang Mengalami Stress Oksidatif In Vitro, Fakultas Farmasi, FMIPA, UHAMKA, Jakarta.

Nugroho, A.E. 2007, From discarded-fruit hull to be a Candidate for a a drug, Laboratorium Farmakologi dan Toksikologi, Bagian Farmakologi dan Farmasi Klinik, Fakultas Farmasi, Universitas Gadjah Mada.

Osman, M., Milan, A.R., 2006, Mangosteen : Garcinia mangostana L. England, UK: RPM Print and Design.

[Pius T, Mpiana](http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=search&db=PubMed&term=%20Mpiana%20PT%5Bauth%5D), et al, 2010, In Vitro Effects Of Anthocyanin Extracts From Justicia Secunda Vahl On The Solubility Of Haemoglobin S And Membrane Stability Of Sickle Erythrocyte, 8(4): 248–254.

Rahmawati R, Uji Ketidak Jenuhan Lemak, 2001, Pelatihan radikal bebas dan antioksidan dalam kesehatan dasar, aplikasi dan pemanfaatan bahan alam.Jakarta : Bagian Biokimia FKUI, (pp. 4-6).

Robert J Trotta, Stephen Gene Sullivan, Arnold Stern [Trotta RJ](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Trotta%20RJ%22%5BAuthor%5D), [Sullivan SG](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Sullivan%20SG%22%5BAuthor%5D), [Stern A](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Stern%20A%22%5BAuthor%5D). 1983, Lipid peroxidation and haemoglobin degradation in red blood cells exposed to t-butyl hydroperoxide, [Biochem Journal.](http://www.ncbi.nlm.nih.gov/pubmed/6882393), 15;212(3):759-772.

Sadikin M. 2001, Biokimia Darah. Jakarta: Widya Medika.

Sadikin M. 2002, Biokimia Enzim. Jakarta: Widya Medika.

Soewoto, Hafiz., et al. 2001, Biokimia Eksperimen Laboratorium. Jakarta: Widya Medika.

Tan Tze Guan, Matthew Whiteman - Antioxidant Activities of Some Tropical Fruits, 2005, Department of Biochemistry, Faculty of Medicine, National University of Singapore.

Vishnu Priya V, et.al, 2010, Toxicity Study of Garcinia Mangostana Linn., Pericarp Extract in Rats, Asian Journal Biol.SCI.Vol I.

Weecharangsan W, Opanasopit P, Sukma M, Ngawhirunpat T, Sotanaphun U, Siripong P., 2006, Antioxidative and neuroprotective activities of extracts from the fruit hull mangosteen (Garcinia mangostana Linn.), Med Princ Pract., 15(4):281-287.

**TO DETERMINE THE EFFECT OF DIAPHRAGM RELEASE ON THORACOLUMBAR PAIN IN FEMALES**

**Khushboo Koul , Prof Maneesh Arora**

**TO DETERMINE THE EFFECT OF DIAPHRAGM RELEASE ON THORACOLUMBAR PAIN IN FEMALES .**

**BACKGROUND:** The diaphragm muscle is the main breathing muscle as well as it provides good mechanical function of the spine and sacroiliac joint, as well as affect the working of the pelvic floor muscles. It is hypothesized that structures of diaphragm may become less motile because of various unknown factors which may hinder the function of diaphragm and eventually give rise to many secondary problems. The fascial system might be involved in diaphragm dysfunction as it maintains a balance of tension and elasticity which allows for smooth, unrestricted movement of each muscle group while holding everything in place. It can be found immediately beneath the skin, around muscles, groups of muscles, bones, nerves, blood vessels, organs and cells. Fascia is everywhere. As a result of this any tension in fascia causes imbalance of tension and elasticity and hampers normal functioning of other systems .Diaphragm releaseis a structure specific facial release to relax the tense, horizontally oriented diaphragm fibres as a facilitator in order to access other structural systems that are inhibited in performing their intended functionality which could adversely affect the health. It evaluates and treats the dynamics of motion and suspension in relation to organs, membranes, fascia, and ligaments and increases proprioceptive communication within the body, thereby revitalizing it, and relieving symptoms of pain, dysfunction, and poor posture.

**OBJECTIVE:** To evaluate thoraco-abdominal tranverse fascia mobility. After application of diaphragm release, find the effect on diaphragm mobility.

**METHODS:** An experimental (pre-post design) study involving 30 subjects. Using simple random sampling 30 subjects were used to treat thoracolumbar pain by the diaphragm release. Intensity of pain was evaluated by a 0-10 visual analog scale (VAS) .VAS was taken previous to the treatment followed by diaphragm release for three alternate days and then VAS taken again after the 3 alternate treatment sessions.

**RESULT:** The mean average of VAS before the treatment was 6.37±1.47 and after intervention the mean average of VAS was 2.60±1.14. There was reduction in VAS by 3.77, which was found to be statistically significant.(p<0.001)

**CONCLUSION:** It is concluded that diaphragm release significantly decreases thoracolumbar pain in females.

Keywords*: fascial imbalance, diaphragm release, thoracolumbar pain, diaphragm dysfunction*

Fascia forms a continuous tensional network throughout the human body, covering and connecting every single organ, every muscle, and even every nerve or tiny muscle fiber.Fascia is virtually inseparable from all structures in the body and acts to create continuity amongst tissues to enhance function and support.1

The diaphragm muscle is the main breathing muscle, influencing with its contractions the respiratory activity.2It provides good mechanical function of the spine and sacroiliac joint, as well as affect the working of the pelvic and buccal floor muscles.3 With regard to anatomic attachments, a costal, a lumbar, and a sternal portion can be identified.2

The sternal part arises with two small fiber bundles from the posterior aspect of the xiphoid process, near to the apex. The costal (or lateral) portion arises from the inner and superior aspect of the last six ribs, with interdigitation with the transverse muscle of the abdomen.The lumbar portions arises from the medial, intermediate, and lateral ligaments of the diaphragm.2 and it is important to emphasize the fact that the main pillars, i.e., the medial and lateral pillars, make contact with the retropericardial and the perinephric tract.4 It is in the form of two strong tendons or crura which are continuous with the anterior longitudinal ligament of the vertebral column. The large right crus arise from the anterior surfaces of the borders and intervertebral discs of the first three lumbar vertebrae, the left crus arises from the corresponding parts of the upper two lumbar vertebrae only.5

It is important to remember that the transversusabdominis muscle, along with the respiratory diaphragm and the pelvic floor, plays a significant role in the stability of the sacroiliac joint. Another important fascial system is the thoracolumbar fascia, which develops posteriorly from the sacral region through the thoracic region, and finally to the cervical region. The thoracolumbar fascia is essential for muscles that involve the column and diaphragmatic dysfunction will negatively affect this tissue, leading to central and peripheral symptoms4. . This is a bidirectional process, and this fascial bridge may explain pain related to the sacroiliac joint in the event of dysfunction between the diaphragm and the pelvic floor.1

There is also a close relationship between emotion, respiration, and the intervention of baroreceptors.6The intervention of the baroreceptors affects the muscle tone, as it decreases the activity of the sympathetic nervous system, reducing the contractile tone.7 Emotional experience influences the response to pain, because the pain response is not simply a neural process started by nociceptive afferents.7 Emotional states, such as anxiety or depression, and psychi­atric disorders are able to negatively alter the baroreceptor response.8 Diaphragm movement changes the body pressure, as it facilitates the venous return and lymphatic flow upward.9This modulation of pressure influences the redistribution of blood.10Studies have shown that vagal afferents respond to nociceptive mechani­cal and chemical stimulation from the visceral area and this leads to brain stem representation of nociceptive signals.11We know that the NTS stimulates the vagus nerve. We can assume that a physiological function of the diaphragm muscle can somehow reduce the afferent nociceptive stimulation from the vagus nerve, or through adequate visceral pressure and/or proper functions of the viscera at the lowering of the diaphragm.12 As such, diaphragm dysfunction is probably under diagnosed, but should not be neglected, as it can negatively impact quality of life, can be a marker of disease severity and, in some instances, such as inthe intensive care unit, be a prognostic marker. The aim of this review is in part to provide clinicians with an overview of the possible causes of diaphragm dysfunction, but also to explore the diagnostic methods available to investigate diaphragm function and to review current and future therapeutic strategies available to patients with diaphragm weakness.13

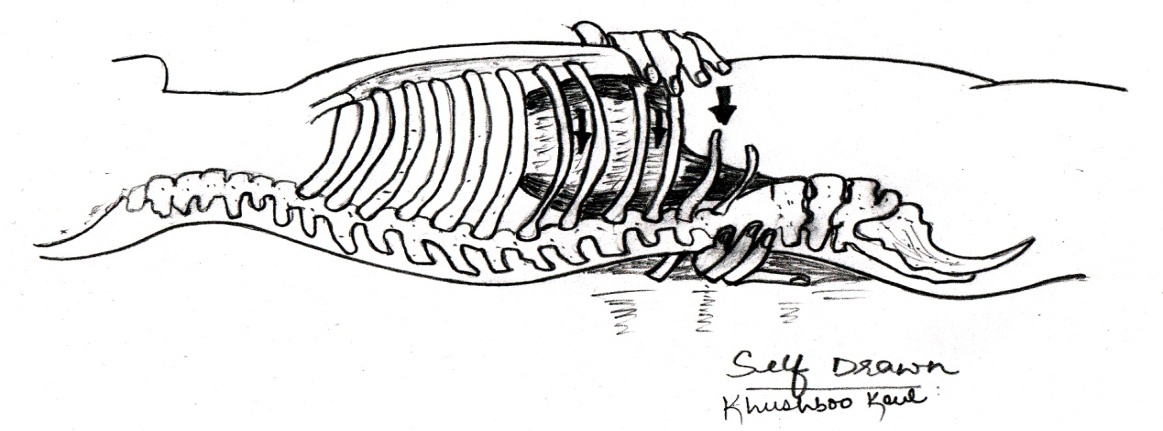
**METHODS**

The present study was experimental study. A sample of 30 subjects was included using simple random sampling. The subjects included in the analysis were those with age between 18 to 25 years. Females with thoracolumbar pain were selected. Excluded from analysis were subjects with pre-diagnosed PIVD, any trauma or surgery, pathology in the abdomen, Any inflammatory, infectious, malignant or metabolic disease of the spine, pregnancy.

**PROCEDURE**

The VAS evaluations and manual evaluations were performed before and just after treatment as the primary outcome. Subject was asked to lie in supine lying position. Therapist placed non dominant hand transversely under T12- L1 junction and dominant hand over the diaphragm area i.e. Contacting ribs borders/xiphoid processfor releasing the muscular tension and increasing the depth of the field which was palpated. It was begun by palpating on which side the tightness was present.While using one hand under the patient as a rather firm and immovable foundation ,pressure was applied from anterior to posterior with the anteriorly placed hand.

Initially the pressure applied was light ,then was increased slowly until the motion was felt within the patient.When the motion was perceived, then the fascia was stretched towards the free side for 1 minute and relaxed for 1 minute. This was done in all the directions – medial lateral, superior inferior, clockwise anticlockwise. Maintain the anterior-posterior compression with just enough force to cause this inherent motion to occur and continue.15The procedure was repeated 3 times in each direction per session for 3 days alternatively. Data was recorded and analysed.

****

**FIG 1: DIAGRAM SHOWING DIAPHRAGM RELEASE**

**DATA ANALYSIS AND RESULT**

The data was analysed using Graph Pad.Descriptive statistics were used to summarize the variables. Paired t-test was used to check the effect of diaphragm release in thoracolumbar pain in females. The mean average of VAS before the treatment was **6.37±1.47** and after the intervention the mean average of VAS was **2.60±1.14**. There was reduction in VAS by 3.77, which was found to be statistically significant.

|  |  |  |
| --- | --- | --- |
|  | **Mean ± SD** | **P value** |
| **Pre-intervention** | **6.37±1.47** | <0.001  (Significant) |
| **Post-intervention** | **2.60±1.14** |

Table showing **Comparison of Mean and SD between pre and post values.**

**Graph showing comparison of Mean and SD between pre and post values**

**DISCUSSION**

The primary findings of this study showed a significant improvement from pretest to posttest variability of VAS scores after intervention with diaphragm release (p<0.001) i.e. is statistically highly significant.

Research shows that fascia plays important roles in posture, circulation, force transfer, balance, coordination, and is one of the most common causes of musculoskeletal pain.

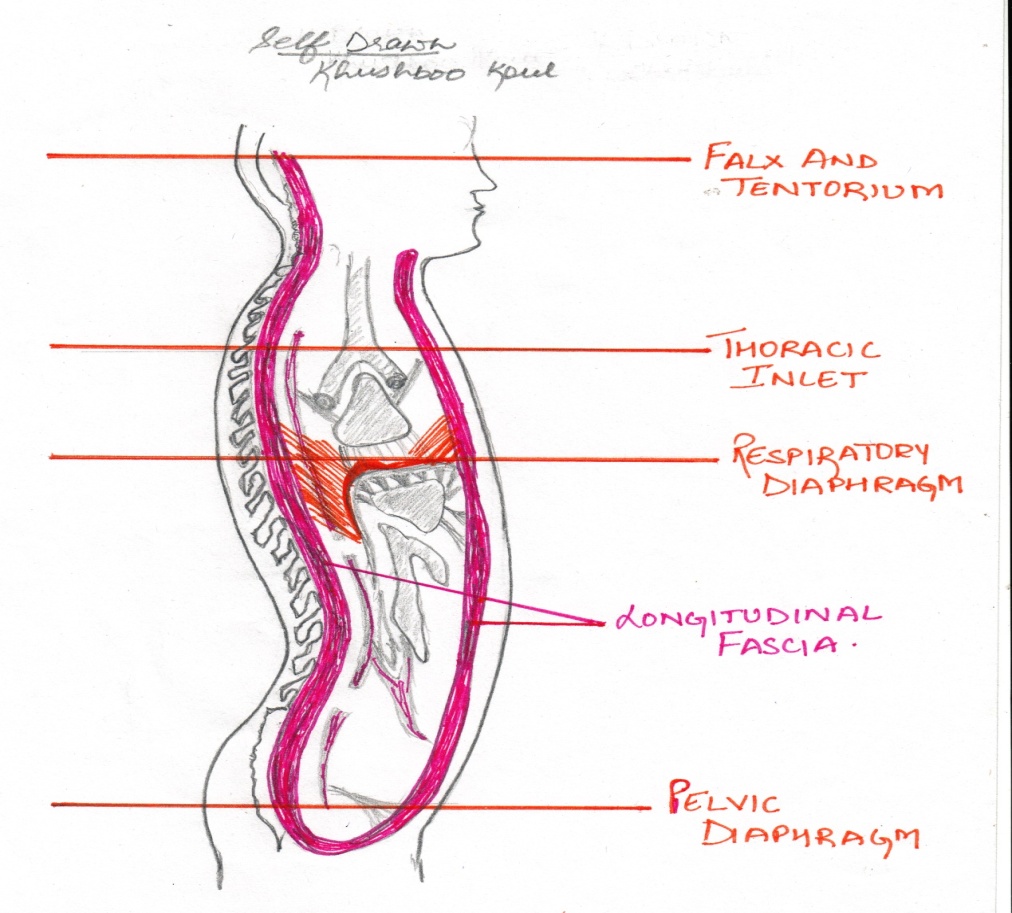
Fascia has elastic properties much like a plastic band; it provides load transfer from our bodyweight as we move.

These elastic properties are able to stretch and recoil when in an optimal state; far too often this is not the case. Restrictions such as adhesions, inflammation or scar tissue in fascia cause a pull in the fascial system, which restricts the recoil properties. These pulls , restrictions or imbalances are responsible for movement dysfunction in muscles and joints, which can lead to postural faults, pain and muscle imbalances.

Most of the fascial tissues are oriented longitudinally in our body ,only four fascias are oriented horizontally ,that are :

1. Falx and tentorium 2. Thoracic inlet 3. Respiratory diaphragm 4. Pelvic diaphragm

Any dysfunction in these transverse fascias will disturb the longitudinally placed fascias giving adverse repercussions.



**FIG 4 :DIAGRAM SHOWING FOUR HORIZONTAL FASCIA**

In the beginning of the intervention first the diaphragm of subjects were manually assessed which is stated by Bruno Bordoni at el (2016) in ‘Manual evaluation of the diaphragm muscle’ that A complete evaluation of the diaphragm is mandatory for several professional subjects. . It aims to describe a strategy of manual evaluation of the diaphragm, with particular attention to anatomical fundamentals, in order to stimulate further research on this less explored field.2

In the treatment diaphragm release was given which aimed to release the naturally occurring cross restrictions as diaphragm dysfunction could be a cause for several underlying problems.

It is also stated by John Upledger (1983) in ‘Craniosacral therapy’ that The significant point is that abnormal hypertonus of the diaphragm is a common secondary finding in a vast number of conditions. Frequently after the primary condition is cleared, the diaphragm autonomously maintains and continues the asymmetrical tension patterns and abnormal hypertonus created within it .The dysfunctioning diaphragm then interferes not only with proper breathing activity but also with craniosacral system function and freedom of fascial mobility accounting for recurrent illnesses ,vague complaints of fatigue, migratory pains, the accumulation of toxic wastes due to reduced fluid mobility and gaseous exchanges , depression and general malaise.14

In one study which was done by Taciano Roca et al (2015) he stated that the hyperinflation causes the diaphragm muscle fibres, which usually lie vertically in the zone of apposition, to become more transversely oriented. This makes the diaphragm’s contraction less effective at raising and expanding the lower rib cage, and may even lead to a decrease in the transverse diameter of the lower rib cage during inspiration. The diaphragm then undergoes a reduction in the number of sarcomeres to restore its pressure-generating capacity, however reducing the diaphragm mobility. Hence these restrictions need to break to get the diaphragm muscle fibres oriented back to normal and restore the functioning of diaphragm which was hampering other related parts of the body.15

Diaphragm being such an important muscle is being neglected which is stated by Carina Hagman (2011) in ‘Breathing retraining’ that diaphragm dysfunction is probably under diagnosed, but should not be neglected, as it can negatively impact quality of life ,hence treating diaphragm dysfunction can correct several underlying problems about which we are not aware of.13

**CONCLUSION**

It is concluded that diaphragm release significantly decreases thoracolumbar pain in females.

**REFERENCES**

1. Kumka M, Bonar J. Fascia: a morphological description andclassification system based on a literature review. *J Canadian Chiropractor Association*. 2012; 56(3):179-191.
2. Bordoni B, Marelli F, Morabito B, Sacconi B. Manual evaluation of the diaphragm muscle. *International Journal Of Chronic Obstructive Pulmonary Disease*.2016; 11: 1949-1956.
3. Bordoni B, Marelli F, Bordoni G. A review of analgesic and emotive breathing: a multidisciplinary approach. *Journal Of Multidisciplinary Healthcare*. 2016; 9: 97-102.
4. Zanier E, Bordoni B. Anatomic connections of the diaphragm: influence of respiration on the body system. *Journal Of Multidisciplinary Healthcare*.2013; 6: 281-291.
5. Stecco C, Stecco L. FascialManulation- Practical part. *FascialManuplation Association.*2009: 1-3.
6. Reyes Del Paso GA, Muñoz Ladrón de Guevara C, Montoro CI. Breath-holding during exhalation as a simple manipulation to reduce pain perception. *Pain Med. Epub*. 2015; 16(9): 1835-1841.
7. Gray MA, Minati L, Paoletti G, Critchley HD. Baroreceptor sactiva­tion attenuates attentional effects on pain-evoked potentials. *Pain.* 2010; 151(3): 853–861.
8. Duschek S, Werner NS, Reyes Del Paso GA. The behavioral impact of baroreflex function: a review*. Psychophysiology*. 2013; 50(12): 1183–1193.
9. Pierre Dubé B, Dres M. Diaphragm Dysfunction: Diagnostic Approaches and Management Strategies. *Journal of Clinical Medicine.* 2016; 5: 1-20.
10. Petersen LG, Carlsen JF, Nielsen MB, Damgaard M, Secher NH. The hydrostatic pressure indifference point underestimates ortho­static redistribution of blood in humans. *J ApplPhysiol*(1985). 2014; 116(7): 730–735.
11. Chen SL, Wu XY, Cao ZJ, et al. Sub diaphragmatic vagal afferent nerves modulate visceral pain. *Am J PhysiolGastrointest Liver Physiol.* 2008; 294(6): G1441–G1449.
12. Morton D, Callister R. Exercise-related transient abdominal pain (ETAP). *Sports Med*. 2015;45(1):23–35.
13. Hagman C, Janson C, Emtner M. Breathing retraining –a five- year follow-up of patients with dysfunctional breathing. *Respir Med*. 2011;105(8):1153–1159.
14. Upledger J at el. Craniosacral therapy. Berkeley California.1983. 58-61.
15. Rocha T, Souza H, Cunha Branda˜o D, Rattes C, Ribeiro L, Lima Campos S, Aliverti A, Dornelas de Andrade A. The Manual Diaphragm Release Technique improves diaphragmatic mobility, inspiratory capacity and exercise capacity in people with chronic obstructive pulmonary disease: a randomised trial. *Journal of Physiotherapy.* 2015; 61: 182–189.

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