

Comparative Study between Pilates Exercises and Yoga in Young Adults with Non Specific Low Back Pain.

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CHAPTER - 1

INTRODUCTION

Low back pain is strongly associated with disability, absence from work, and mood changes such as depression and anxiety¹. It was reports that 70-85% of all people have back pain at some time in life that back pain is the most common cause of limitation in activity in those younger than 45 years of age, and that prevalence rates are shown to be from 12% to 35 %².

Low back pain can arise from a wide variety of causes, such as unaccustomed activity, trauma, stress or injury to the structural elements of the spine. Acute LBP occurs suddenly, either as a completely new presentation (first time ever) or, after a period of at least 6 months without LBP. Acute LBP is usually defined as pain that is present for less than 6 weeks after onset³.

Approximately 90% of LBP (both acute and chronic) is considered non-specific. Non-specific LBP, also known as ordinary or "simple backache", and "common" or "garden variety low back pain", is mechanical low back pain of musculoskeletal origin in which symptoms vary with physical activities⁴. Non-specific LBP may be related to mechanical strain or dysfunction, although it often develops spontaneously, and can be painful and disabling, however the severity or intensity of the pain tells the clinician very little about the source of pain⁵. Nonspecific Low Back Pain is often further subdivided based on duration of symptoms to acute LBP if it lasts up to 6 weeks; or sub-acute pain is identified as lasting 6 weeks to 3 months; or chronic low back pain if it lasts for longer than 12 weeks⁶.

Pilates is an exercise method that was first taught as "Contrology" by Joseph Pilates at his studio in New York during the late 1920s. The exercise system that Joseph Pilates developed

merged the theories and movement styles of gymnastics, martial arts, yoga and dance. Modern Pilates focuses on maintaining a 'neutral spine', pelvic and spinal stability, along with activation of transversus abdominis and pelvic floor muscles in combination with controlled breathing².

The primary goal of the Pilates exercises is alignment as well as core control. This is taught by incorporating five principles of alignment to be addressed for each exercise performed. This includes breathing patterns to more deeply engage the deep local musculature, rib placement, scapular girdle placement and engagement, and cervical spine and pelvic alignment. An important element of the Pilates method is being able to expand the ribs laterally, which helps you to draw in your abdomen, at the same time relaxing the upper body. While accentuating the axial arrangement of the body, the method ensures the optimum conditions for the respiratory system and helps to stabilize the backbone. Unlike other exercises based on passive breathing, the Pilates breathing method involves active respiration. It activates outer intercostal muscles and abdominal muscles. The most efficient muscle participating in breathing out, and thus in increasing the pressure in the abdominal cavity is the transverse abdominal muscle⁷.

Pilates exercises mainly involve isometric contractions (i.e. contraction without joint movement) of the core muscles, which make up the muscular center responsible for the stabilization of the body, both while it is moving or at rest. Pilates became popular as a treatment for low back pain long after Joseph Pilates died. Traditional Pilates exercises follow six basic principles: centering (i.e. tightening the 'powerhouse' (trunk muscles), concentration (i.e. cognitive attention while performing the exercises), control (i.e. postural management while performing the

exercises), precision (i.e. accuracy of exercise technique), flow (i.e. smooth transition of movements within the exercise sequence) and breathing in co-ordination with the exercises⁸.

The reported benefits of Pilates exercises include improvements in strength, range of motion, co-ordination, balance, muscle symmetry, flexibility, proprioception (awareness of posture), body definition and general health. The exercises are adapted to the condition of the patient and difficulty is gradually increased while respecting individual abilities and characteristics⁹.

The word “yoga” literally means “yoking”, or “joining together” for a harmonious relationship between body, mind and emotions to unite individual human spirit with divine spirit or the True Self^{10,11}. Yoga involves a process of physical and mental training towards self-realization, the practice of which has eight component limbs. The eight components guide conduct within society, personal discipline, postures/poses (“asanas”), breathing, concentration, contemplation, meditation and absorption/stillness. As classically described, yoga poses comprise just one of the eight components of a broader discipline of physical, mental, and spiritual health. Modern Hatha yoga usually combines elements of postural positioning, breathing, concentration, and meditation. A typical Hatha yoga program involves a group led by an instructor for a ~ 60–90 minute session. The instructor provides guidance for correct postures, breathing and focus. They often encourage positive self-images. Iyengar yoga has a focus on holding postures, and the use of modifications (such as blocks, belts, chairs, blankets) to accommodate individual physical abilities. Other yoga styles exist and the experience in one style or class can be very different. The intensity can range from gentle to strenuous, with some types of yoga providing a cardiovascular workout, and others focused on relaxation and calmness. Another experiential factor comes from the yoga center itself, which can provide a sense of social and spiritual community.

Yoga popularity has grown tremendously in the past several years. National Health Interview Survey data conducted by the Centers for Disease Control and Prevention (CDC) show increased usage for complementary and alternative medicine (CAM) treatments¹². In 2007, yoga was the 7th most commonly used CAM therapy. CAM therapies are used mostly to treat musculoskeletal conditions, in particular back pain and to a lesser degree neck pain.

The goals of treatment for nonspecific acute low back pain are to relieve pain, improve function, reduce time away from work, and develop coping strategies through education. Exercise plays a role in the management of LBP with recent systematic reviews showing that exercise is effective in improving pain and function and is more beneficial than passive therapies. However, the most effective type of exercise remains to be clarified. Optimizing treatment may minimize the development of chronic pain, which accounts for most of the health care costs related to low back pain¹³.

In addition, 2017, did not find any studies that investigated the effectiveness of Pilates for acute and sub-acute LBP. That why our study has to be done, to try to investigate the effective exercises in treatment of nonspecific acute low back pain⁹.

NEED OF STUDY

To evaluate the effectiveness of Pilates exercises and Yoga in young adults with non specific low back pain.

CHAPTER - 2

OBJECTIVES

To compare the effectiveness of Pilates and yoga on reducing pain and disability in subjects with non specific low backpain.

CHAPTER-3

HYPOTHESIS

NULL HYPOTHESIS:

There is no significance between the effectiveness of Pilates and yoga exercises on reducing pain and disability in non specific low back pain.

ALTERNATIVE HYPOTHESIS:

There is significance between the effectiveness of Pilates and yoga exercises on reducing pain and disability in non specific low back pain.

CHAPTER - 4

OPERATIONAL DEFINITION

OPERATIONAL DEFINITION

LOW BACK PAIN

Pain in the lower back area that can relate to problems with the lumbar spine, the discs between the vertebrae, the ligaments around the spine and discs, the spinal cord and nerves, muscles

of the low back, internal organs of the pelvis and abdomen, or the skin covering the lumbar area.

NON SPECIFIC LOW BACK PAIN

Non-specific low back pain means that the pain is not due to any specific or underlying disease that can be found. It is thought that in some cases the cause may be a sprain (an over-stretch) of a ligament or muscle.

PILATES EXERCISE

Pilates is a method of exercise that consists of low-impact flexibility and muscular strength and endurance movements.

YOGA

Relaxing form of exercise that was developed in India and involves assuming and holding postures that stretch the limbs and muscles.

ISOMETRIC CONTRACTION

Isometric muscle contraction, is one in which the muscle is activated, but instead of being allowed to lengthen or shorten, it is held at a constant length.

CHAPTER-5

REVIEW OF LITERATURE

Miyamoto GC, Costa LOP, Galvanin T, Cabral CMN (2013), The addition of modified Pilates exercises to an educational book-let provides small benefits compared with education alone in patients with chronic nonspecific low back pain; however, these effects were not sustained over time.¹

O'Brien C. (2010), Low back pain is very common. Chronic low back pain and its associated disability are a major health problem and pose an economic burden to society. The majority of chronic low back pain (CLBP) is referred to as non-specific, and does not have a specific pathoanatomical diagnosis. There are many factors that contribute to the maintenance and persistence of LBP, and classification under the biopsychosocial model is necessary to acknowledge all contributing factors of the condition. Research on the effectiveness of various treatments for non-specific chronic low back pain indicates that there are few effective treatments available. This is, at least in part, due to patients with non-specific CLBP being part of a large heterogeneous group. Active therapies are recommended for the treatment of low back pain and the prevention of disability.²

Henchoz Y and Kai-LikSA(2008), The scant data in the literature suggest a higher risk of herpes zoster with anti-TNF α antibodies than with the soluble receptor. The role for concomitant treatments (glucocorticoids and methotrexate) should be taken into account.⁴

Weiner SS and Nordin M.(2010), The societal burden of LBP keeps increasing despite, or perhaps because of, the ever increasing number of diagnostic and therapeutic procedures performed for this very common alignment.⁶

Wells 2012 Wells C, Kolt GS, Bialocerkowski, There is a general consensus in the literature of the definition of Pilates exercise. A greater emphasis may be placed on posture in people with low back pain, whilst traditional principles, apart from breathing, may be less relevant.⁸

Yamato TP, Maher CG, Saragiotto BT, Hancock MJ, Ostelo RWJG, Cabral CMN, Menezes Costa LC, Costa LOP.(2017), We did not find any high quality evidence for any of the treatment comparisons, outcomes or follow-up periods investigated. However, there is low to moderate quality evidence that Pilates is more effective than minimal intervention for pain and disability. When Pilates was compared with other exercises we found a small effect for function at intermediate-term follow-up.⁹

Becker A, Held H, Redaelli M, et al.(2013), Interventions designed to reduce high health care costs for LBP should focus on patients with severe LBP and depressive comorbidity. Our results add to the economic understanding of LBP care and may give guidance for future actions on health care improvement and cost reduction.¹³

Hides JA, Jull GA, Richardson CA.(2001), Long-term results suggest that specific exercise therapy in addition to medical management and resumption of normal activity may be more effective in reducing low back pain recurrences than medical management and normal activity alone.¹⁴

Vasseljen O, Fladmark AM.(2010), Abdominal muscle onset was largely unaffected by 8 weeks of exercises in chronic LBP patients. There was no association between change in onset and LBP. Large individual variations in activation pattern of the deep abdominal muscles may justify exploration of differential effects in subgroups of LBP.¹⁷

Phrompaet S, Paungmali A, Pirunsan U, Sitalertpisan P(2011), Pilates can be used as an adjunctive exercise program to improve flexibility, enhance control-mobility of trunk and pelvic

segments. It may also prevent and attenuate the predisposition to axial musculoskeletal injury.¹⁹

Lena Nordeman, Lena Thorselius, Ronny Gunnarsson,(2017), Lower physical performance, more severe clinical stress symptoms and more severe activity limitation predicted activity limitation after 2 years in women with CLBP within PHC. The results can give guidance for interventional trials aiming to improve physical capacity and decrease stress. The impact of the interaction between prognostic factors and interventions on activity limitation needs further investigation.²²

Emery K, De Serres SJ, McMillan A, JN(2014), The Pilates training program was effective in

improving abdominal strength and upper spine posture as well as in stabilizing core posture as shoulder flexion movements were performed. Since deficits in these functional aspects have previously been associated with symptoms in the neck-shoulder region, our results support the use of Pilates in the prevention of neck-shoulder disorders.²⁴

BetilSekendiz, FezaKorusuz(2007), The backward leaners propel themselves with a strong hip flexor activity at push-off while the forward leaners use their hip muscles throughout stance. These results support the idea that trunk inclinations and moment variations are associated with the type of walking patterns.²⁵



CHAPTER-6

METHODOLOGY

Study design: Experimental study

Sampling method: Random sampling

Sample size: 30 subjects ranging from 18 – 40 years satisfying the inclusion criteria were divided into two groups – 15 subjects in each group.

1) GROUP – A : Pilates Exercises Group (15 subjects).

2) GROUP – B : Yoga Group (15 subjects).
Source of data: Non specific low back pain subjects from gym, clinic and around agartala.

Inclusion criteria:

- A. Non specific low back pain of less than 12 weeks duration.
- B. Age limit 18-40.
- C. Both male and female subjects.

Exclusion criteria:

- A. Major surgery within past year.
- B. Pregnant women.
- C. Non- cooperative subjects.

PROCEDURE:

The subjects were invited to participate in the studies. The study was explained to the subject in detail. Patients were placed into either Pilates group or Yoga group upon entering the study.

All patients were randomly divided into two groups. Group A received Pilates exercises and

Group B received yoga exercises for two weeks. Both groups intervention began with 20 minutes of moist heat with patient in supine position.

The subjects were assessed for Numeric Pain Rating Scale and SF 36 questionnaire prior to treatment (1st day) and then reassessed after 2 weeks.

Group A- Pilates exercises

Side kick kneeling:-

1. **Start position.** Kneel and bend the trunk to the side. Place one palm on the mat, with the fingers pointing away from the knee. Place the other hand behind the head, with the elbow bent and pointing toward the ceiling. Lift the top leg (the leg farthest from the support arm) to about hip height.
2. **Inhale.** Bring the raised leg forward. See the main muscle illustration.
3. **Exhale.** Bring the raised leg backward as shown. Repeat the sequence five times. Do the same on the opposite leg.



FIGURE.1.5. SIDE KICK KNEELING PILATES EXERCISE

Hundred Pilates exercises:-

INSTRUCTION

- I. Lie faceup and bring knees in toward chest.
- II. Lift head, neck, and shoulders off the mat.
- III. Stretch hands out by sides with palms facing down.
- IV. Extend legs to a 45-degree angle with heels together and toes apart (called the Pilates stance).
- V. Pump arms up and down while breathing in and out through nose for 5 counts each.
- VI. Repeat for 10 sets.

Single leg stretch:-

INSTRUCTION

- I. Lie faceup on the mat with knees drawn toward chest and shins parallel to the floor in a tabletop position.
- II. Exhale to lift head, neck, and shoulders off the mat.
- III. At the same time, extend left leg straight to a 45-degree angle and draw right knee in toward chest.
- IV. Grab right knee with left hand and right ankle with right hand.
- V. Switch legs on the inhale, pulse for 1 beat, then switch legs again on the exhale, keeping shoulders off the mat and core engaged throughout.

Saw

INSTRUCTION

- I. Sit tall, with legs extended.
- II. Open them slightly wider than hips; feet flexed.
- III. Reach arms out to the side (T position).
- IV. Imagine reaching to touch both sides of the room.
- V. Inhale, pull navel up and into spine.
- VI. Twist from waist to the left carrying arms.
- VII. Keep pelvis anchored to the mat.
- VIII. Exhale and round forward toward left leg.
- IX. Aim baby finger (right hand) to the outside of baby toe.
- X. Back arm (left arm) reaches back; turning the palm in.
- XI. Feel the oppositional pull of the arms.
- XII. Inhale; continue to reach forward to accentuate the hamstring stretch.
- XIII. Keep the opposite hip pressed down into the mat.
- XIV. Then, exhale, and continue to reach forward, bringing the top of head toward the baby toe.
- XV. Inhale, bring body up, sit tall as return to the starting position.
- XVI. Begin the exercise on the other side.
- XVII. Alternate sides, completing 3-5 sets.

Group B- YOGA

LOCUST POSE:

INSTRUCTION

1. Lie on belly with legs straight. Place arms at sides with palms up, chin gently resting on the floor.
2. Without lifting legs or head, begin reaching forward through the top of head and back through toes. As body lengthens, patients'll activate major back muscles, including erector spinae muscles—creating a stable base of support.
3. Continue reaching forward with the top of head and backward with toes, slowly lifting head, shoulders, and legs off the ground. Pull your legs together. As patients gain height, should feel elongation and elevation—this will help strengthen back while keeping it safe and stable. Lift until begin to feel a natural resistance— should feel activated from head to toe and without strain. Breath should be flowing easily. Now imagine that drawing a line up the wall in front of with the top of head and one behind with toes—all while maintaining an elongation of entire body.
4. Keep the backs of hands rooted to the earth with a gentle, downward pushing action as patients extend arms. Imagine that fingers are growing in length, reaching and sliding along the floor toward the back of the mat while being pulled down to the earth. Hold for about 5 breaths (patients can increase this amount over time).
5. To exit the pose, maintain elongation as simultaneously lower head, shoulders, and legs to the floor

BENEFITS

Strengthens lower back muscles; tones abdominal muscles while stimulating organs; improves posture



FIGURE. 1.6. LOCUST POSE YOGA

Child's pose:-

INSTRUCTION

1. Sit back on heels with knees together.
2. Patients can use a bolster or blanket under thighs, torso, or forehead for support.
3. Bend forward and walk hands in front of patients.
4. Rest forehead gently on the floor.
5. Keep arms extended in front of patients or bring arms alongside body with palms facing up.
6. Focus on releasing tension in back as upper body falls heavy into knees.
7. Remain in this pose for up to 5 minutes.

Cat cow pose:-

INSTRUCTION

1. Get on all fours.
2. Place wrists underneath shoulders and knees underneath hips.
3. Balance weight evenly between all four points.
4. Inhale as look up and let stomach drop down toward the mat.

5. Exhale as tuck chin into chest, draw navel toward spine, and arch spine toward the ceiling.
6. Maintain awareness of body as do this movement.
7. Focus on noting and releasing tension in body.
8. Continue this fluid movement for at least 1 minute.

Bridge pose:-

INSTRUCTION

1. Lie on back with knees bent and heels drawn into sitting bones.
2. Rest arms alongside body.
3. Press feet and arms into the floor as lift tailbone up.
4. Continue lifting until thighs are parallel to the floor.
5. Leave arms as they are, bringing palms together with interlaced fingers under hips, or placing hands under hips for support.
6. Hold this pose for up to 1 minute.

7. Release by slowly rolling spine back down to the floor, vertebra by vertebra.
8. Drop knees in together.
9. Relax and breathe deeply in this position.

CHAPTER - 7

DATA ANALYSIS

Total 30 participants were included in this study & they all underwent 2 weeks of treatment session including Pilates and yoga. Demographic characteristics of all participants with age group between 18 to 40 years were listed in table 1.1 & between groups comparisons of demographic characteristics were shown in 1.2. For within group comparisons Wilcoxon signed rank test was applied at 95% of CI, which showed statistically significant improvement in both the groups, but more in yoga Group rather than Pilates Group. Between group comparisons was done by the use of Mann-Whitney U test as the data was not normally distributed, in both groups found to be significant at the end of second week session.

Statistics analysis was conducted by using IBM SPSS for windows, version 22. The current test involved two independent variables. The first one was the group A received Pilates exercises and second one was the group B received yoga exercises. Shapiro-Wilk test and descriptive analysis using boxplot with the normal distribution curve showed revealed the data was not normally distributed for ordinal variables (pain scale, SF 36 questionnaire). Therefore, nonparametric statistical tests in the form of Wilcoxon signed Rank test was used to compare between pre and post treatment of each group and Mann-Whitney U test was used to compare between both groups. The alpha level was set at 0.05.

The preliminary data obtained from the study thus shows that there is significant difference with the Pilates exercises and yoga exercises in reducing non specific low back pain and improving functional disability. Yoga (Group B) showed a more significant difference in reducing pain and improving functional disability in patients with non specific low back pain as compared to Pilates exercises.

CHAPTER-8

RESULTS

Table 1.1: Overall Demographic characteristics of study participants

<u>Dependent variables</u>	<u>Mean ± SD</u>
Age	27.0±4.8
Height	158.5±8.2
Weight	64.0±12.9
BMI	25.3±3.9

Table 1.1 showed demographic data view of study participants, mean and standard deviation for continuous variable age, BMI, weight, height.

SD= standard deviation.

Groups		Median (Interquartile range)	Z value	P value
Pilates	NPRS pre	4.0(2.0)	-1.36	0.173
	NPRS after 2wks	3.0(1.0)	-.94	0.346
	SF 36 pre	91.0(10.0)	-.22	0.819
	Sf 36 after 2 wks	96.0(2.0)	-4.7	0.000
Yoga	NPRS pre	5.0(2.0)	-1.36	0.173
	NPRS after 2 wks	3.0(0.00)	-.94	0.346
	SF 36 pre	94.0(15.0)	-.22	0.819
	SF 36 after 2 wks	99.0(2.0)	-4.7	0.000

Table 1.2: Between group comparison of NPRS and SF 36 in baseline and after two weeks

Table 1.2 showed baseline and 2nd week comparison of NPRS and SF 36 in Pilates and yoga group as median, Interquartile range, by the end of 2nd week both groups there was significant difference. P value was set at 0.05.

Table 1.3 Within group comparison of NPRS and SF 36 values at baseline and after two weeks in Pilates

Groups	Variables	Median(Min to Max)	P value
Pilates	NPRS pre	4.0(2-6)	0.026
	NPRS after 2 wks	3.0(2-5)	
	SF 36 pre	91.0(82-103)	0.347
	SF 36 after 2 wks	96.0(92-97)	

Table 1.3 showed within group comparison of NPRS and SF 36 at baseline and after 2 weeks in Pilates. Values of Pilates group expressed as median and min to max range. There is significant difference in Pilates NPRS variables.

Groups	Variables	Median (Min to Max)	P value
Yoga	NPRS pre	5.0(3-7)	0.001
	NPRS after 2 wks	3.0(2-4)	
	SF 36 pre	94.0(82-106)	0.031
	SF 36 after 2 wks	99.0(99-102)	

Table 1.4: Within group comparison of NPRS and SF 36 values at baseline and after two weeks in yoga.

Table 1.4 showed within group comparisons of NPRS and SF 36 values at baseline and after two weeks in yoga. Values of yoga expressed as median and min to Max range. There is significant difference in both variables of yoga group.

Box plot showing difference in score of median and Interquartile range of NPRS pre in both group.

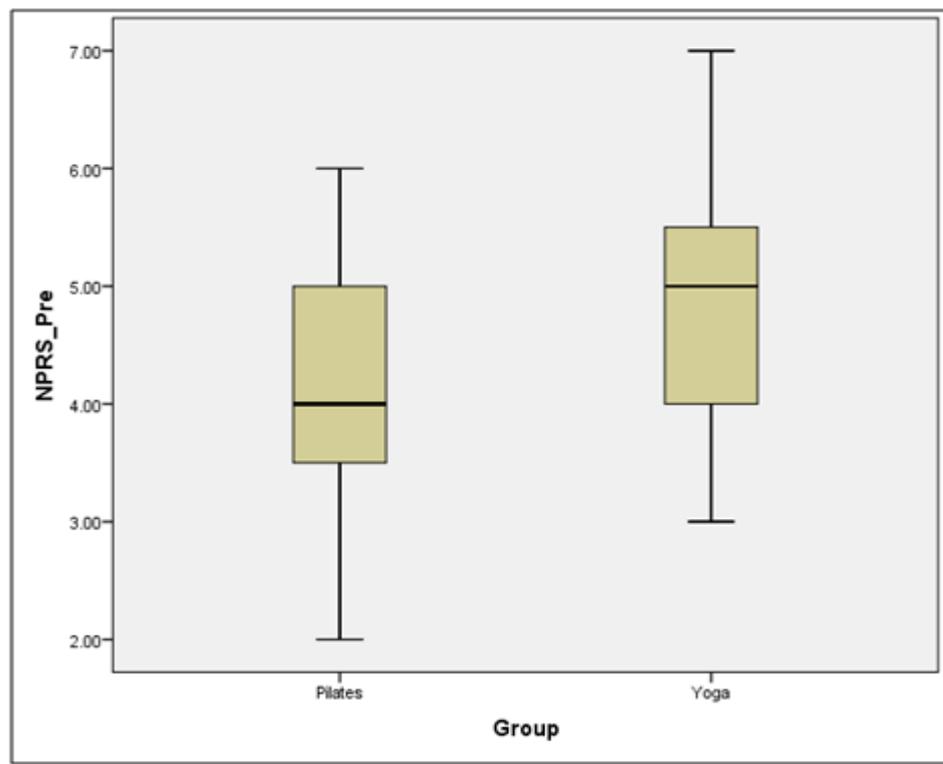


Figure 1.1: Box plot for changes in NPRS pre between Pilates and yoga group.

Box plot showing the changes in yoga NPRS baseline value is more than Pilates group.

Box plot showing difference in score of median and Interquartile range of NPRS after 2 weeks in both group.

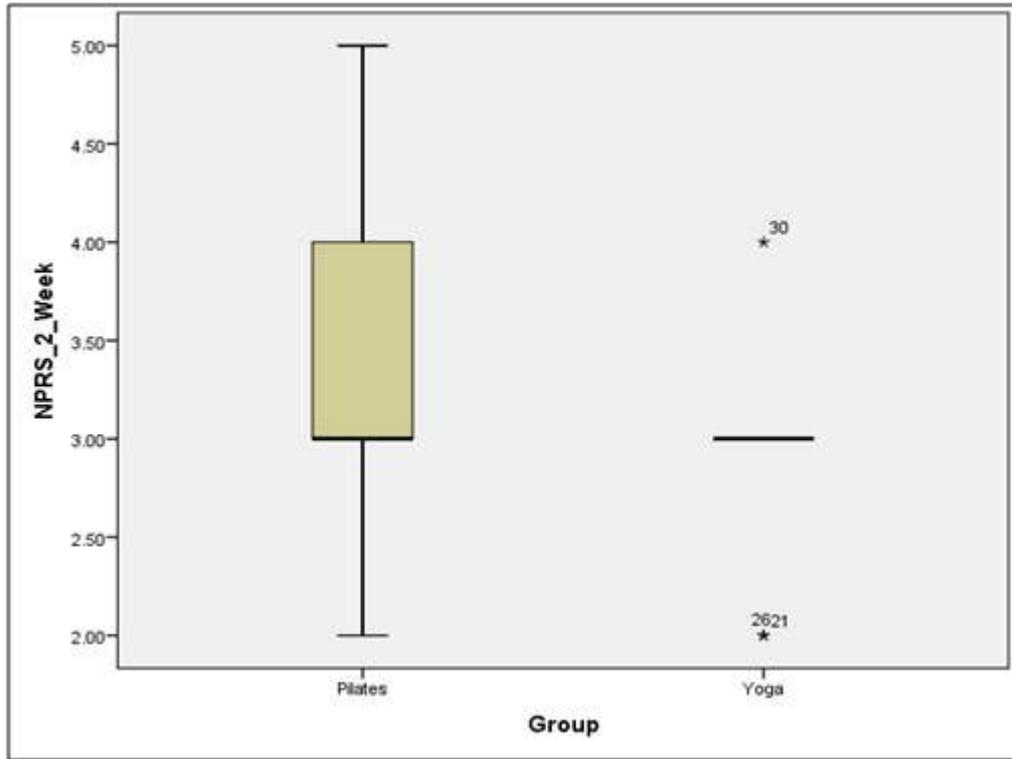


Figure 1.2: Box plot for changes in NPRS after 2 weeks between Pilates and yoga group. Box plot showing the changes in Pilates NPRS after 2 weeks value is more than yoga group.

Box plot showing difference in score of median and Interquartile range of SF 36 pre in both group.

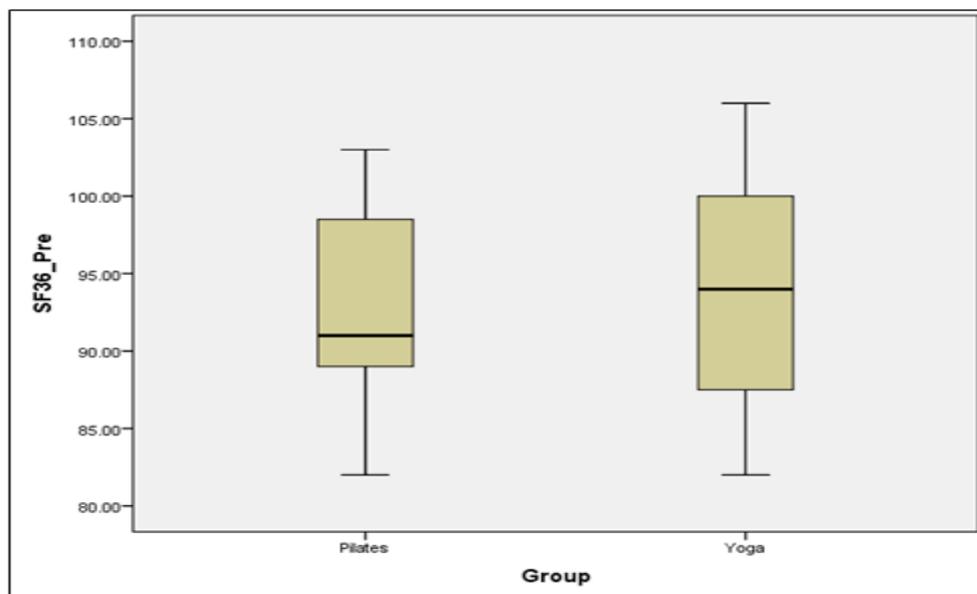


Figure 1.3: Box plot for changes in SF 36 between Pilates and yoga group. Box plot showing the changes in yoga SF 36 pre value is more than Pilates group.

Box plot showing difference in score of median and Interquartile range of SF 36 after 2 weeks in both group.

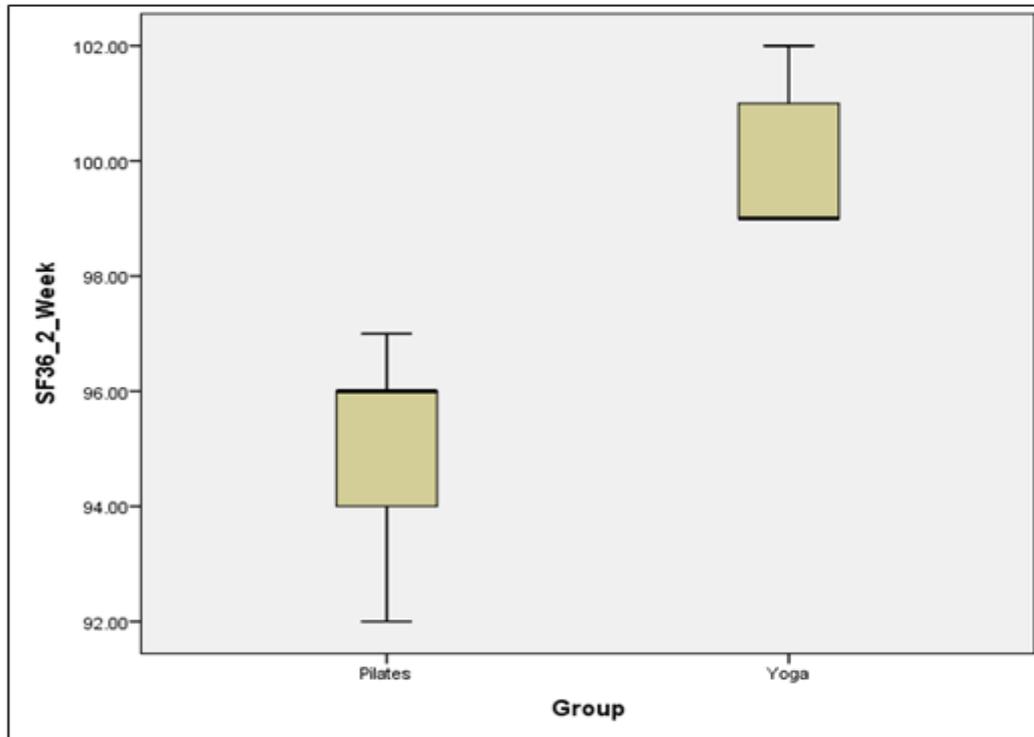


Figure 1.4: Box plot for changes in SF 36 between Pilates and yoga group. Box plot showing the changes in yoga SF 36 after 2 weeks value is more than Pilates group.

Figure 1.4: Box plot for changes in SF 36 between Pilates and yoga group. Box plot showing the changes in yoga SF 36 after 2 weeks value is more than Pilates group.

CHAPTER - 9

DISCUSSION

The study is a comparative study between two groups group A(Pilates) and group B(yoga). The scale used in the study were numeric pain rating scale(NPRS) for pain and SF 36 questionnaire. In this study; a total 30 subjects have been taken and were divided into two groups randomly for the respective group A(Pilates) and group B(yoga). Yoga was administered for 1hr once a day for daily and in Pilates was administered for 1hr once a day for daily. This study has been conducted for 2weeks continually. The data's were collected before and after intervention for NPRS and SF 36 questionnaire.

The wilcoxon signed Rank test was administered to find the significant effect within group for NPRS and SF 36. The Mann Whitney u test used to find the significant between the two groups, Group A (Pilates) and group B (yoga) . The

mean was calculated and statistical analysis of the values showed significant difference in improving the mean of NPRS and SF 36 questionnaire for the patients. This is proved that both Pilates and yoga have a positive effect on reducing pain and change lifestyle in subjects with chronic postural low back pain.

This study was detailed and tailored to compare the effectiveness of yoga exercises and Pilates on non specific low back pain subjects by analyzing the pre and post values of NPRS and SF 36. The analysis of mean by nonparametric test showed that yoga and Pilates both are effective therapeutic interventions for non specific low back pain patients and has also shown better results for pain and lifestyle modification for group B (yoga) as compared to group A (Pilates).

Sherman et al conducted a randomized controlled trial to compare the effect of yoga classes to conventional exercises classes and advocated a self - care book in patients with low back pain. The yoga group showed statistically and clinically important improvement in pain and lifestyle at all the follow up points compared to the conventional group. The authors concluded that

yoga was more effective, safe intervention for patients with non specific low back pain.

Smith D et.al conducted a randomized controlled trial to investigate the efficacy of a Pilates based on the therapeutic exercises approach in a population with non specific low back pain. Treatment with a modified Pilates based approach was more efficacious than usual care in population with chronic, unresolved low back pain.

Thus from the evidences, it is clear that there is a significant difference between the effectiveness of yoga exercises and Pilates exercises on reducing pain and lifestyle modification in non specific low back pain. Hence, the present study showed that pain and lifestyle modification significantly improved within group B (Yoga) as compared to group A (Pilates).

CHAPTER-10

CONCLUSION

The results of this study revealed that both Pilates exercises program and yoga exercises program were effective in reducing pain severity and functional disability in nonspecific low back pain patients. Yoga exercises program was more effective than Pilates exercises program in increasing lumbar flexion range of motion. There was statistical difference between groups regarding NPRS and SF 36 questionnaire.

CHAPTER-11

LIMITATIONS OF STUDY

This study evaluated the effects of yoga and Pilates exercises on pain, disability and core stability in young adults with non specific low back pain. But in this study limited area for collection was considered and as the study duration was short long term effects of the intervention programmes couldn't be recorded.

Future scope of study

Further study can be done considering both genders with a longer study duration to evaluate the long term effects of both yoga and Pilates exercises.

CHAPTER-12

CLINICAL SIGNIFICANCE OF STUDY

In this study concluded that both Yoga and Pilates exercises have similar effects on pain, disability and core stability in young adults with Non specific Low back pain.

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CHAPTER - 14

APPENDIX

Appendix 1. Pilates group protocol

First week:-

Protocol :- Presentation of the method and apparatus of Pilates.

Basic principles: concentration, control, centring, flow, precision and breathing.

Fundamental movements: breathing, pelvic bowl, knee sway, spinal bridge, twist, flight and cat (10 reps).

Second week:-



Protocol:- Fundamental movements: breathing, pelvicbowl, knee sway, spinal bridge, twist, flightand cat (10 reps)
 Spine stretch (10 reps)
 Saw (10 reps)
 Hundred/dynamic with Swiss ball (10 reps).

Appendix 2. Yoga Exercise Group

First week

Protocol:- Stationary bike (10 min)
 Lower limb and trunk muscles stretching(30 s)
 Spinal mobility in the seated position and onall fours (8 reps)
 Bipedal bridge (8 reps)

Rectus abdominis strengthening (3 into 8 reps)
 Active stretching of the posterior chain(1 into 1 min).

Second week:-

Protocol:- Stationary bike (10 min)
 Lower limb and trunk muscles stretching(30 s)
 Spinal mobility in the seated position and onall fours (10 reps)
 Bipedal bridge (10 reps)
 Rectus abdominis strengthening (3 into 10reps)
 Active stretching of the posterior chain(2 into 1 min)

Certificate of Consent

I have read the forgoing information, and I understand that this research will not cause any risk to me. I can ask any question about it. I consent voluntary to participate this study as a participant in this study.

Print name of participant.....

Signature of participant.....

Date.....

If illiterate:

A literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participant who is illiterate should include their thumb print as well.

I have witnessed the accurate reading of the consent form to the participant and the individual has the opportunity to ask question. I confirm that the individual has given consent freely.

Print name of witness.....

Signature of witness.....

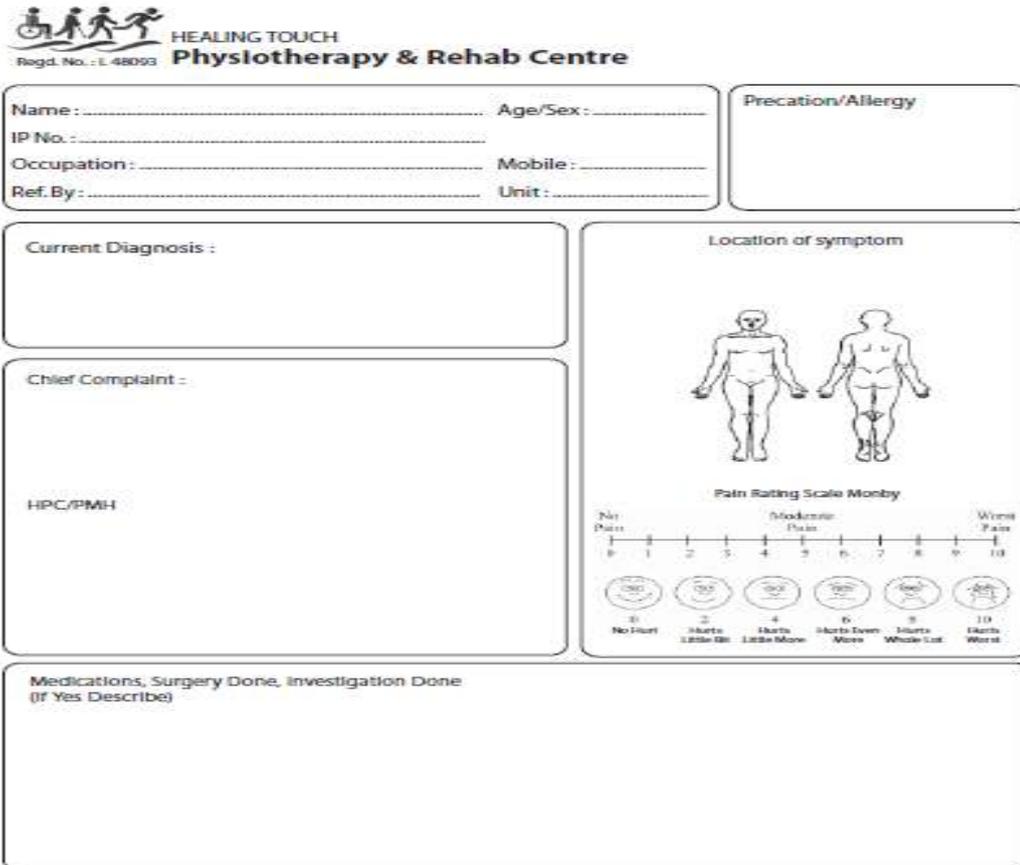
Thumb print of participant

DATA COLLECTION FORM
DEMOGRAPHIC PROFILE:-

Name	
Age	
Gender	
Height(cm)	
Weight (kg)	
BMI(kg/mt ²)	
Occupation	
Contact no	
Duration of pain	
Date of Assessment	

Outcomes:-

Variables	Baseline	After 2 weeks
Pain intensity (NPRS)		
Lumbar mobility (modified schober test)		
Quality of life(SF-36)		



HEALING TOUCH
 Regd. No. : E 48053 **Physiotherapy & Rehab Centre**

Name : Age/Sex :
 IP No. :
 Occupation : Mobile :
 Ref. By : Unit :

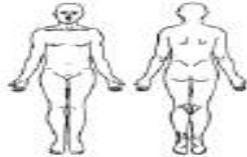
Precaution/Allergy

Current Diagnosis :

Chief Complaint :

HPC/PMH

Location of symptom



Pain Rating Scale Monby

No Pain 1 2 3 4 5 6 7 8 9 10 Worst Pain

0 No Pain 2 Starts Little Bit 4 Starts Little More 6 Starts Down More 8 Starts Whole Lot 10 Starts Worst

Medications, Surgery Done, Investigation Done (If Yes Describe)

Contact No. : 9862643249 / 8257986692
 Bhattapukur, Near Apanjan Club, Agartala, Tripura (W).

Muscle Power (MMT) (Abnormal) Other Specific				Manual Muscle Testing				
Shoulder	Flexor		Wrist	Flexor		Hip	Flexor	
	Extensor			Extensor			Extensor	
	Abductor			Knee	Flexor			Abductor
	Abductor		Extensor				Abductor	
	IR		D. Flexor				IR	
		ER		Ankle	P Flexor			ER
Elbow	Flexor		Evertor			Other		
	Extensor		Invertor					

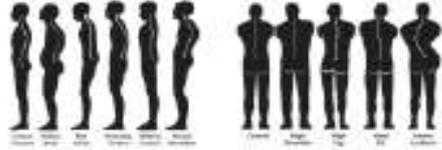
Special Test/Neurological Examination

Range of Motion Passive/Active

Current problem list

Current Goal

Posture



Treatment :

Home Advice/Progress Notes :

SF-36 QUESTIONNAIRE

Name: _____ Ref. Dr.: _____ Date: _____
ID#: _____ Age: _____ Gender: M / F

Please answer the 36 questions of the **Health Survey** completely, honestly, and without interruptions.

GENERAL HEALTH:

In general, would you say your health is:

- Excellent Very Good Good Fair Poor

Compared to one year ago, how would you rate your health in general now?

- Much better now than one year ago
 Somewhat better now than one year ago
 About the same
 Somewhat worse now than one year ago
 Much worse than one year ago

LIMITATIONS OF ACTIVITIES:

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.

- Yes, Limited a lot Yes, Limited a Little No, Not Limited at all

Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Lifting or carrying groceries

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Climbing several flights of stairs

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Climbing one flight of stairs

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Bending, kneeling, or stooping

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Walking more than a mile

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Walking several blocks

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Walking one block

- Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Bathing or dressing yourself

Yes, Limited a Lot

Yes, Limited a Little

No, Not Limited at all

PHYSICAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Cut down the amount of time you spent on work or other activities

Yes

No

Accomplished less than you would like

Yes

No

Were limited in the kind of work or other activities

Yes

No

Had difficulty performing the work or other activities (for example, it took extra effort)

Yes

No

EMOTIONAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Cut down the amount of time you spent on work or other activities

Yes

No

Accomplished less than you would like

Yes

No

Didn't do work or other activities as carefully as usual

Yes

No

SOCIAL ACTIVITIES:

Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all

Slightly

Moderately

Severe

Very Severe

PAIN:

How much bodily pain have you had during the past 4 weeks?

None

Very Mild

Mild

Moderate

Severe

Very Severe

During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all

A little bit

Moderately

Quite a bit

Extremely

ENERGY AND EMOTIONS:

These questions are about how you feel and how things have been with you during the last 4 weeks. For each question, please give the answer that comes closest to the way you have been feeling.

Did you feel full of pep?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Have you been a very nervous person?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Have you felt so down in the dumps that nothing could cheer you up?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Have you felt calm and peaceful?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Did you have a lot of energy?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Have you felt downhearted and blue?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Did you feel worn out?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Have you been a happy person?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Did you feel tired?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

SOCIAL ACTIVITIES:

During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- All of the time
- Most of the time
- Some of the time
- A little bit of the time
- None of the Time



GENERAL HEALTH:

How true or false is each of the following statements for you?

I seem to get sick a little easier than other people

Definitely true Mostly true Don't know Mostly false Definitely false

I am as healthy as anybody I know

Definitely true Mostly true Don't know Mostly false Definitely false

I expect my health to get worse

Definitely true Mostly true Don't know Mostly false Definitely false

My health is excellent

Definitely true Mostly true Don't know Mostly false Definitely false