

**COMPARATIVE STUDY OF STATIC YOGA VERSUS PILATES IN THE TREATMENT OF CHRONIC LOW BACK PAIN.****JAIMINI B. PATEL¹, Dr. SOUMIK BASU^{2*} AND PROF. TUSHAR J. PALEKAR³**^{1,2,3}*Dr. D.Y. Patil College of Physiotherapy, Pimpri, Pune, India.***ABSTRACT**

Study was done to compare the effectiveness of static yoga versus pilates in the treatment of Chronic Low Back Pain. Subjects fulfilling inclusion, exclusion criteria were taken. Subjects were randomly allotted to the groups by lottery method. Initial evaluation of pain intensity was done using the Numerical Pain Rating Scale for pain, flexibility was measured by modified-modified schobers test, functional activity was recorded by ODI and core strength was measured using a pressure-biofeedback. Then participants were randomly allocated into 2 groups: Group A: Pilates Group B: Static Yoga. Group A were given Pilates as an intervention and group B were given Static Yoga as an intervention. It was given for 5 days/week for 4 weeks, 35 min /session. Outcomes were assessed post treatment. We concluded that Pilates is more effective in reducing pain and functional disability and increasing the range of motion and core-strength than Static Yoga.

KEYWORDS- Chronic low back pain, pilates, static yoga.**Dr. SOUMIK BASU**

Dr. D.Y. Patil College of Physiotherapy, Pimpri, Pune, In.i.a.

INTRODUCTION

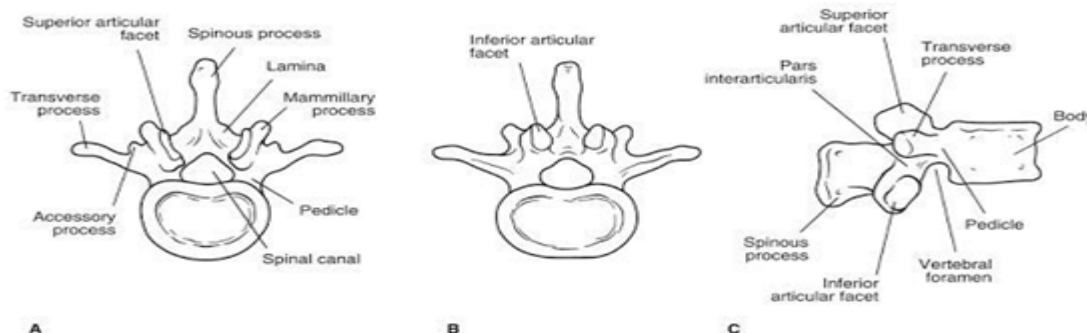
The spine is one of the most complex structures in the body. It is a structure that includes bones, muscles, ligaments, nerves and blood vessels as well as diarthrodial joints. In addition, the structures that make up the spine include the intervertebral discs, the nerve roots and dorsal root ganglia, the spinal cord and the

Each of these structures has unique responses to trauma, aging and activity.

STRUCTURE OF THE LUMBAR REGION

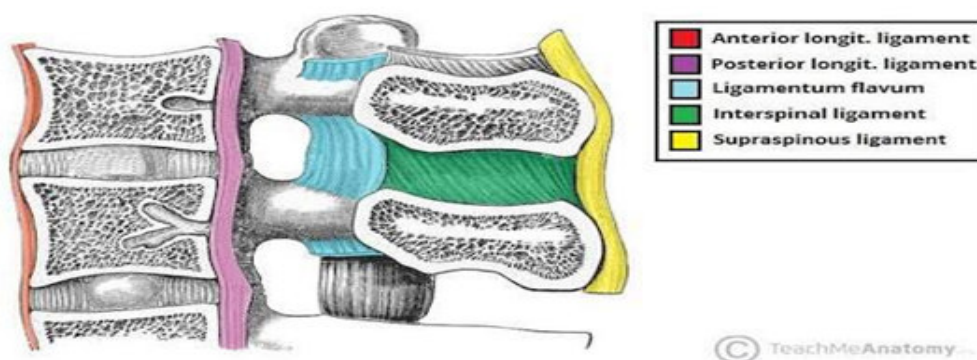
The first four lumbar vertebrae are similar in structure. The fifth lumbar vertebra has structural adaptations for articulation with the sacrum.

TYPICAL LUMBAR VERTEBRAE



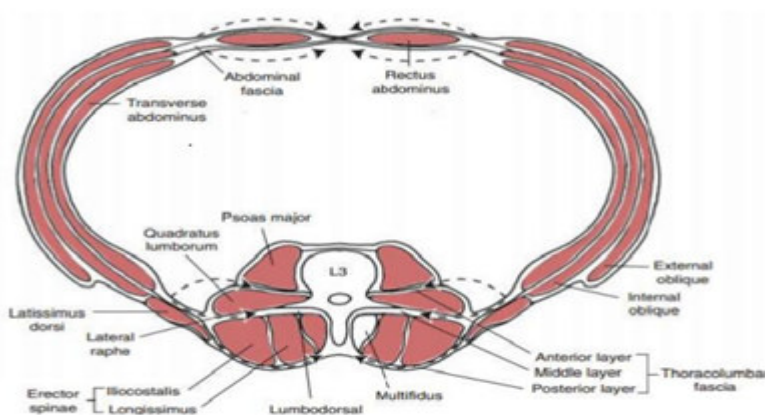
Diane Dalton: Joint structure and function- A comprehensive analysis; The vertebral column (ed:3) - pg 165

LIGAMENTS OF LUMBAR SPINE



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MUSCLES OF LUMBAR SPINE



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LOW BACK PAIN

Low back pain which affects nearly every one of us at some stage of our active adult life is one of the most

common ailments affecting mankind. It interferes with the simple activities of daily living like moving about and getting a comfortable night's sleep.⁹LBP is the most

expensive, benign condition in industrialized countries⁷. The annual prevalence of LBP is 15-45% with a point prevalence of approximately 30%.⁸ Sixty percent of those who suffer from acute LBP recover in 6 weeks and up to 80-90% recover within 12 weeks; however, the recovery of the remaining patients with LBP is less certain.⁸ There are several predisposing and precipitating factors of low back pain. The factors like poor sitting posture, frequency of flexion, loss of extension range, unexpected and unguarded movements and faulty lifting techniques are important ones. Chronic low back pain is a common condition in industrialized countries and the most common cause of activity limitation in persons younger than 45 years. It is defined as pain that persists longer than 12 weeks and is often attributed to degenerative or traumatic conditions of the spine. Although acute LBP has a favorable prognosis, the effect of chronic LBP and its related disability on society is tremendous. It is a disorder that is influenced by endogenous and exogenous factors, and it alters the individual's productivity to an extent beyond what the initiating pathologic dysfunction would have. LBP is defined as chronic after 3 months because most normal connective tissues heal within 6-12 weeks unless patho-anatomic instability persists.¹⁰

PILATES

It is an exercise program that works on strengthening the core muscles which affect posture and provide support and strength of the spine. It teaches body awareness, good posture and easy movement. Pilates

improves flexibility, agility and economy of motion.¹¹ Pilates promotes greater trunk and pelvic stability, improving the movement and muscle control of and around the spine. Pilates exercises specifically aim to create muscle balance in the body, greater coordination of the movement and control of abdominals and breathing. These exercises encourages the use of the body as a whole unit, developing strong, lean musculature rather than allowing individual muscle groups to develop isolated strength and to become bulky. A typical Pilates mat work session will progress the exercises in particular order, so the muscles are prepared for subsequent exercises and full body workout is achieved.²⁰

YOGA

Yoga therapy has been shown as an effective intervention for treating chronic or recurrent low back pain.^{12,13,14} Yoga practice may increase muscle strength, endurance, proprioception, and balance while emphasizing movement through a full range of motion to increase in flexibility and mobility.¹⁵ For example, the rhythmic intervals of breath retention during yoga therapy could help rhythmic intervals of lumbar stability. The kinetics causing intra-abdominal pressure gradients may proceed independent of consciousness, neuromuscular control.¹⁶ A recent study indicated that yoga intervention decreases functional disability, pain intensity, and depression in subjects with LBP.¹³ Yoga is important to enhance both biomechanical and neuromuscular differences in subjects with LBP.

MATERIALS & METHODS

Study Design	: Comparative study
Study setting	: Dr. D. Y. Patil College of Physiotherapy, Pimpri, Pune
Target population	: 20-40 years individuals
Sample population	: Chronic Low Back Pain
Sampling method	: Simple Random Sampling
Sample size	: 30 subjects

INCLUSION CRITERIA

- Age between 20-40 years
- Both male and female
- Low Back Pain more than 3 months
- Low Back pain diagnosed by Orthopedician
- Localized back pain

EXCLUSION CRITERIA

- Inter vertebral disc prolapse
- Any surgical history within a year
- Spinal deformity
- Radiating pain
- Hip osteoarthritis
- Renal disease
- Abdominal hernia
- Patients having high B.P
- Patient mentally unstable
- Hamstring tightness > 70 degrees
- Cancer patients
- Pregnancy
- Menstruation

PROCEDURE

An ethical clearance for the study was obtained from ethical committee (Ethical clearance number- 21). 30 subjects were screened according to the inclusion and exclusion criteria and study was started.30 subjects were taken for study and procedure was explained to them and informed consent was taken. According to the lottery method allocation was done, the patients were asked to choose the chit and according to the chosen chit, they were allocated their respective group and their interventions. Group A received Pilates. Group B received Static Yoga After the allocation Pre-treatment readings of Numeric Pain Rating Scale , Range Of Motion, Oswestery Disability Index and Core Strength was taken on the first day. Post-treatment readings of NPRS, ROM, ODI and Core Strength were taken on the 20th day. The subjects were given intervention for 4-weeks, 5 days a week. GROUP A- (PILATES)Shoulder Bridge, One Leg Stretch, One Leg Circles, Side Kick, Swimming, Cat-Camel, Spine Stretch, Spine Twist10 repetitions with 10 seconds hold of a posture and progressing later on. GROUP-B (STATIC YOGA) Yogic Councelling, Savasana, Bhujangasana,

Paschimottasana, Tadasana, Trikonasana, Uttasana.All the poses should have a hold of 30 seconds initially and progressing to 60 seconds later on with 5 repetitions for each asana.

OUTCOME MEASURES

1. NPRS
2. ROM
3. ODI (Oswestry Disability Index)
4. Core Strength

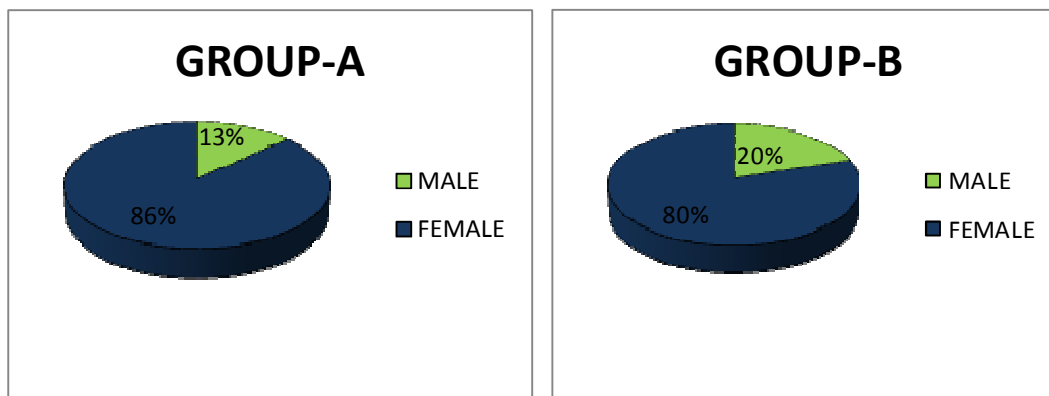
STATISTICAL ANALYSIS

Data analysis was done and the NPRS, ROM, ODI and Core Strength was recorded and tabulated. Statistical analysis was done using paired “t” test and unpaired “t” test. Intergroup significance was calculated by using paired “t” test and Intragroup significance was calculated by using unpaired “t” test.

RESULTS

TABLE 1
Shows demographic representation of gender in group A and group B

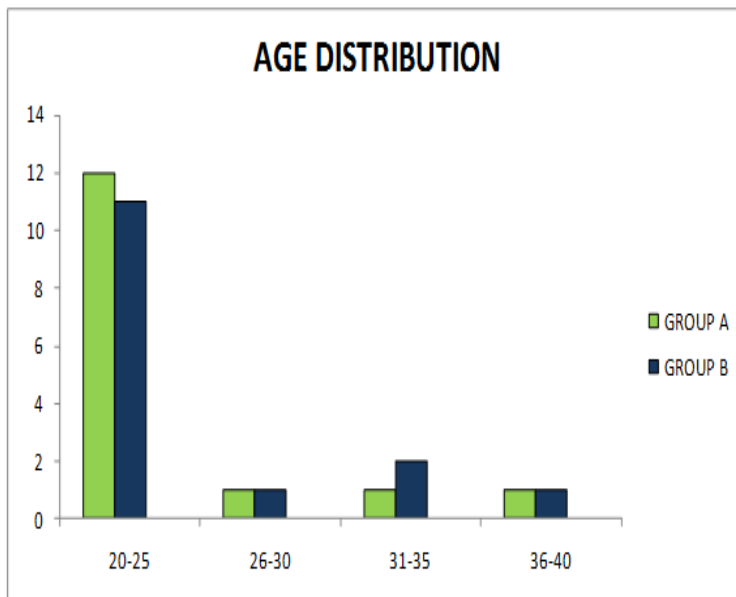
Gender	Group A		Group B	
	NO.	PERCENT	NO.	PERCENT
MALE	2	13%	3	20%
FEMALE	13	86%	12	80%



GRAPH 1
Shows the gender representation among group A and group B

TABLE 2
Shows demographic representation of age in group A and group B

AGE	GROUP A	GROUP B
20-25	12	11
26-30	1	1
31-35	1	2
36-40	1	1



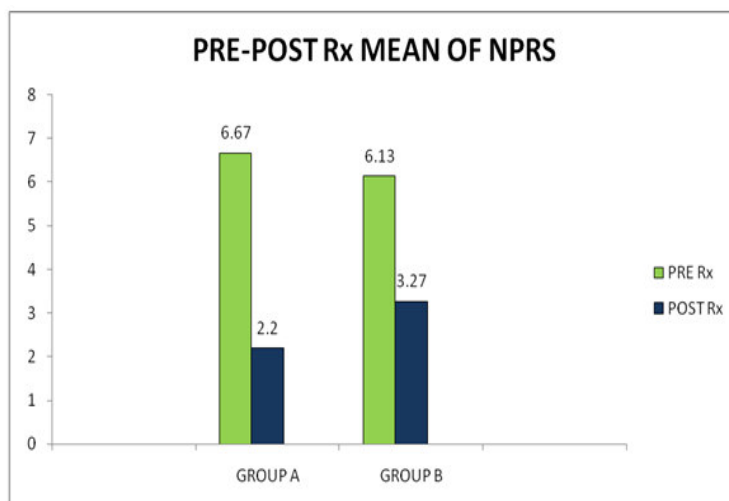
GRAPH 2

Represents the distribution of the age among Group-A and Group-B

TABLE 3

Shows the value of Pre and Post Rx Mean of NPRS

GROUPS	PRE Rx		POST Rx		p-VALUE
	MEAN	SD	MEAN	SD	
GROUP A	6.67	1.23	2.20	1.21	0.001
GROUP B	6.13	0.92	3.27	1.44	0.001



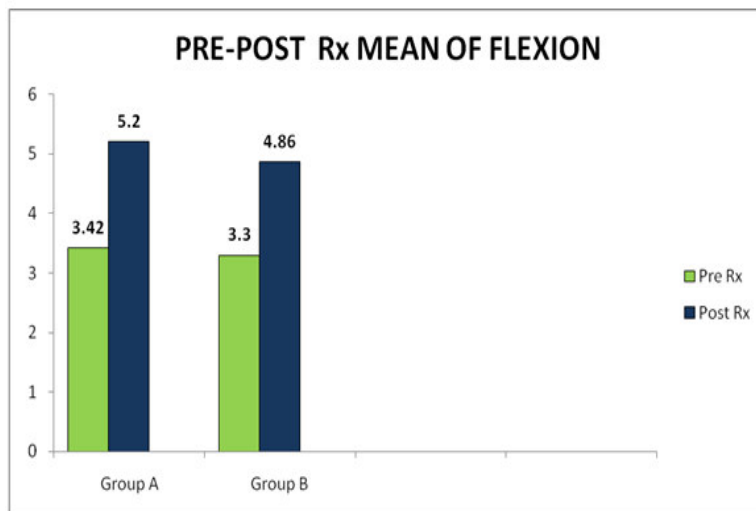
GRAPH 3

TABLE-3 Shows that there is significant change between the pre & post treatment NPRS as the value of $p < 0.05$ & GRAPH-3 represents the same. Shows that there is significant change between the pre & post treatment NPRS as the value of $p < 0.05$ & GRAPH-3 represents the same. The mean of Group A is more than Group B post treatment. Hence Group- A shows more improvement in NPRS than Group- B.

TABLE-4

Shows the value of Pre and Post Rx Mean of ROM Flexion

GROUPS	PRE Rx		POST Rx		p-VALUE
	MEAN	SD	MEAN	SD	
GROUP A	3.42	1.20	5.2	1.14	0.001
GROUP B	3.30	0.90	4.86	0.83	0.001



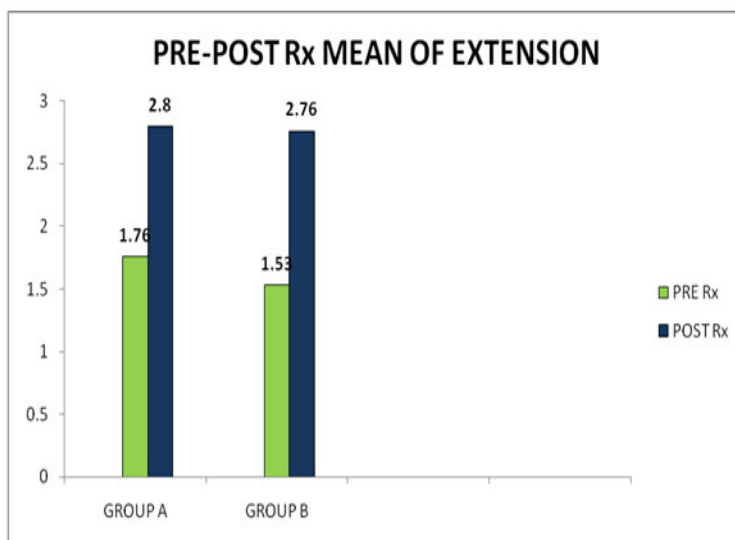
GRAPH 4

TABLE-4 shows that there is significant change between the pre & post treatment ROM FLEXION as the value of $p < 0.05$ & GRAPH-4 represents the same. The mean of Group A is more than Group B post treatment. Hence Group- A shows more improvement in FLEXION than Group- B.

TABLE-5

Shows the value of Pre and Post Rx Mean of ROM Extension

GROUPS	PRE Rx		POST Rx		p-VALUE
	MEAN	SD	MEAN	SD	
GROUP A	1.76	0.62	2.8	0.52	0.001
GROUP B	1.53	0.64	2.76	0.77	0.001



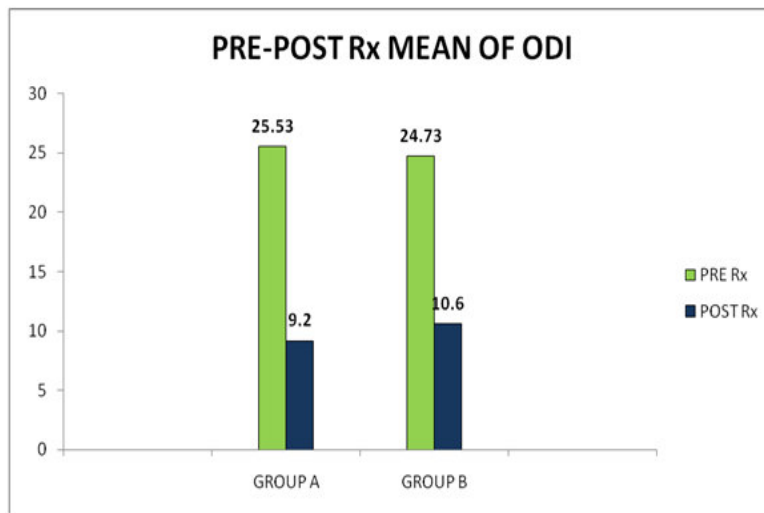
GRAPH 5

TABLE-5 shows that there is significant change between the pre & post treatment ROM EXTENSION as the value of $p < 0.05$ & GRAPH-5 represents the same. The mean of Group A is more than Group B post treatment. Hence Group-A shows more improvement in EXTENSION than Group- B.

TABLE 6

Shows the value of Pre and Post Rx Mean of ODI

GROUPS	PRE Rx		POST Rx		p-VALUE
	MEAN	SD	MEAN	SD	
GROUP A	25.53	14	9.20	5.64	0.001
GROUP B	24.73	11.44	10.60	7.20	0.001



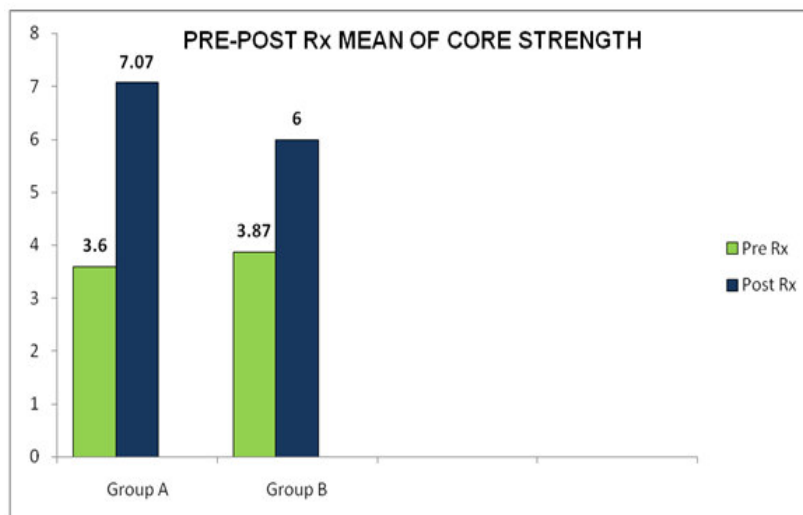
GRAPH 6

TABLE-6 shows that there is significant change between the pre & post treatment ODI as the value of $p < 0.05$ & the GRAPH-6 represents the same. The mean of Group A is more than Group B post treatment. Hence Group- A shows more improvement in ODI than Group- B.

TABLE 7

Shows the value of Pre and Post Rx Mean of Core-Strength

GROUPS	PRE Rx		POST Rx		p-VALUE
	MEAN	SD	MEAN	SD	
GROUP A	3.60	1.50	7.07	1.62	0.001
GROUP B	3.87	1.68	6.00	1.51	0.001



GRAPH 7

TABLE-7 shows that there is significant change between the pre & post treatment CORE-STRENGTH as the value of $p < 0.05$ & the GRAPH-7 represents the same. The mean of Group A is more than Group B post treatment. Hence Group- A shows more improvement in Core-Strength than Group- B.

DISCUSSION

Above study was conducted on patients having chronic low back pain by keeping pain, core-strength, flexibility and Oswestry Disability Index as outcome measures. The study was conducted on 30 subjects including both males and females in the age group of 20-40 years. This study was done to compare the effect of static yoga versus pilates in the treatment of chronic low back pain. Pilates is a system that blends stretching, strengthening and core abdominal work into some very challenging exercises. It is very effective when the cause of the pain is muscular. Pilates is used

extensively in rehabilitation programs as a means of increasing strength, flexibility and range of motion of the postural back muscles. This knowledge will give the back pain patients a better understanding of proper movement for all day to day activities. Pilates is extremely challenging regardless of the physical condition of the participant.¹⁶ Yoga is also beneficial for back pain because it involves physical movements and also exerts benefits through its effect on mental focus.¹⁷ Yoga trains the entire body together and develops a sense of harmony and balance. Pretty much all yoga poses helps in flexibility one can bring to practice those that suit without causing injury. Yoga increases flexibility, strengthen and tone muscles and release

muscle tension. Several studies on patients with low back pain concluded that yoga increased hip flexion and spinal and hamstring flexibility.¹⁹ After the analysis of data, it was found that there was significant improvement in the values of NPRS, Core Strength, Spinal Flexibility (ROM), and ODI within the group that is pre and post treatment. There was change of the outcome measures between the groups. Group A showed significant reduction in pain and functional disability and increase in ROM and core strength as

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REFERENCES

1. Winkel D: Diagnosis and Treatment of the Spine: Nonoperative Orthopaedic Medicine and Manual Therapy. Rockville, MD, Aspen, 1996.
2. Williams PL; Gray's Anatomy, 38th ed. New York, Churchill Livingstone, 1995.
3. Goel VK, Kong W, Han JS, et al.: A combined finite element and optimization investigation of lumbar spine mechanics with and without muscles, 1993. Spine 18:1531, 1993.
4. Panjabi MM, Oxland TR, Yamamoto I, et al.: Mechanical behavior of the human lumbar and lumbosacral spine as shown by three-dimensional load-displacement curves. J Bone Joint Surg Am 1994.76:413.
5. Gunzburg R, Hutton WC, Crane G, et al.: Role of the capsulo-ligamentous structures in rotation and combined flexion-rotation of the lumbar spine. J Spinal Disord, 1992.5:1.
6. Hafer TR, O'Brien M, Dryer JW, et al.: The role of the lumbar facet joints in spinal stability: Identification of alternative paths of loading. Spine, 1994. 19:2667.
7. Anderssen GBJ. Epidemiologic features of chronic low back pain. Lancet. 1999. 354:581-5.
8. Mayer TG, Gatchel RJ. Functional restoration for spinal disorders: The sports medicine approach. Philadelphia: Lea & Febiger; 1988.
9. Robin McKenzie, Treat Your Back, Spinal publications Ltd, New Zealand, 4th Edition, Pp. 1,7- 12,21-45,68.
10. Anthony H. Wheeler, Pathophysiology of chronic back pain, pain and orthopaedic neurology, June 30, 2009.
11. Strength Cond Res; Physiotherapy Occupational therapy journal. July-September, 2008, Vol. J. 2009 Oct 24.
12. Chuang LH, Soares MO, Tilbrook H, Cox H, Hewitt CE, A pragmatic multi centered randomized controlled trial of yoga for chronic low back pain: economic evaluation. Spine. (2012) vol 37: 1593-1601.
13. Williams K, Abildso C, Steinberg L, Doyle E, Epstein B, Evaluation of the effectiveness and efficacy of Iyengar yoga therapy on chronic low back pain. Spine (2009) vol 34: 2066-2076.
14. Evans S, Moieni M, Lung K, Tsao J, Sternlieb B, et al. Impact of Iyengar yoga on quality of life in young women with rheumatoid arthritis. Clin J Pain (2013) vol 29: 988-997.
15. Bartlett SJ, Moonaz SH, Mill C, Bernatsky S, Bingham; Yoga in rheumatic diseases. 3rd (2013) Curr Rheumatol Rep 15: 387.
16. Shirley D, Hodges PW, Eriksson AE, Gandevia SC Spinal stiffness changes throughout the respiratory cycle. J Appl Physiol (1985) vol 95: 1467-1475.
17. D. K. U. Kumar, Sarika Desai, Siddharth Shetty, Siddharth Shetty; Study of yoga versus exercise therapy in the management of mechanical low back pain; international journal of information research and review. 2014, August, Vol 1(2): 008-012.
18. Betul Sekendiz, Ozkan Altun, Feza Korkusuz, Sabire Akin; effects of pilates exercises on trunk strength, endurance and flexibility in sedentary adult females; Journal of bodywork and movement therapies; 2007, October, Vol 11(4):318-326.
19. Yoga improves flexibility; Education of yoga-yoga knowledge; Sept, 2013, Vol. 7(9): 40-41.
20. Pohlman J; Centering and breathing in pilates; Simply Pilates; Jan 2007: 19-25

compared to Group B. Hence the alternative hypothesis is proved.

CONCLUSION

In this study we concluded that Pilates is more effective in reducing pain and functional disability and increasing the range of motion and core-strength than Static Yoga. Hence the alternative hypothesis is proved.

would extend our gratitude to all the colleagues for their constant support.

CONFLICT OF INTEREST

None