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Original Research Article

EFFECTIVENESS OF STRETCHING AND STRENGTHENING EXERCISES (JANDA'S APPROACH) IN SUBJECTS WITH POSTURAL BACKACHE: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Background: Chronic low back pain is often associated with imbalances in hip muscle length and strength. Low back pain could result from prolonged overstretching of the innervated soft tissues when poor sitting or standing postures were maintained. These changes in muscular tone create a muscle imbalance, which leads to movement dysfunction.

Objectives: To investigate the effect of Stretching and Strengthening exercises (Janda's Approach) in subjects with Postural Back Ache.

Study Design: Randomized Controlled Trial

Intervention: 40 participants were divided into two groups; Group A was the control group and Group B was the Janda's Approach group. Group A was given Shortwave Diathermy with Core Stability exercises and Group B was given SWD with Core Stability exercises followed by Janda's Approach Exercises.

Outcome Measure: Pain Intensity, Severity of Spinal Malalignment and Muscle Strength and Flexibility were measured using Visual Analogue Scale (VAS), Index of Lumbar Lordosis, Manual Muscle Testing of abdominals and gluteals and Tests for flexibility of iliopsoas, rectus femoris and erector spinae respectively.

Results: The results showed a significant difference between both groups in terms of VAS, index of lumbar lordosis, manual muscle testing of abdominals, gluteals and tests for flexibility of iliopsoas, rectus femoris and erector spinae..

Conclusion: The results concluded that stretching and strengthening exercises are beneficial in reducing pain, normalizing the lumbar lordosis curvature, increasing strength of abdominals and gluteals and increasing flexibility of rectus femoris, iliopsoas and erector spinae.

KEY WORDS: Postural Back Ache, Janda's Approach, Stretching Exercises and Strengthening Exercises.

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INTRODUCTION

Low back pain is a well-documented significant health problem with lifetime incidence between 54% and 90% [1]. Clinical observations suggest that aberrations of posture may play a role in the development of low back pain. McKenzie stated that low back pain (postural syndrome) could result from prolonged overstretching of the innervated soft tissues when poor sitting or

standing postures were maintained [2].

Postural low back pain is often associated with imbalances in hip muscle length and strength. Moreover, Janda first noted weakness of the gluteal muscles in patients with low back pain [3].

Janda identified two groups of muscles based on their phylogenetic development [4] but functionally, muscles can be classified as tonic or flexors and phasic or extensors [5]. It was noted that the tonic system muscles were more prone to tightness or shortness and the phasic system muscles would usually undergo weakness or inhibition and that this response depended on the neurological response of nociception in the muscular system.Lower crossed syndrome is characterized by facilitation of the thoraco-lumbar extensors, rectus femoris, and iliopsoas, as well as inhibition of the abdominals (particularly transversusabdominus) and the gluteal muscles.There is growing evidence that the back pain population is not a homogeneous group and postural variability, regarding aggravating and relieving postures may be a helpful way to explain some different subgroups [6].

Patterns of tightness and weakness can be predicted in the sensorimotor system's attempt to reach homeostasis. Prior evidences have shown that these changes in muscular tone create a muscle imbalance, which leads to movement dysfunction. Muscles prone to tightness generally have a "lowered irritability threshold" and are readily activated with any movement, thus creating abnormal movement patterns that may have direct effect on joint surfaces, thus potentially leading to joint degeneration [3,7,8]. Hence, the purpose of the study is to compare the effectiveness of Stretching & Strengthening exercises(Janda's Approach) in subjects with Postural Back Ache.

MATERIALS AND METHODS

Institutional Review Board Approval: The study was approved by the institutional review board and was conducted in conformity with the ethical and humane principles of research.

Patient Enrolment: A total of 40 subjects were recruited from various out-patient departments of the Tertiary Care Set-up in Belagavi, Karnataka, India. The subjects were screened based on the inclusion and exclusion criteria. The inclusion criteria were subjects diagnosed with postural back ache, both male & female s age group 18-60 yrs, exaggerated lumbar lordosis, pain with radiation, subjects willing to participate in the study. The exclusion criteria was: previous back surgery, any signs of neurological impairment, lumbar canal stenosis, pregnant women's, spine fracture, spondylo-listhesis.

Procedure: Participants were recruited from a Tertiary Care Set-up, Belagavi. A brief history was taken about the neurological and musculoskeletal assessment for educational profile and socioeconomic statuses per the inclusion criteria. The assessment took around 15-20 minutes.

The study protocol was explained to the participants. They were asked to read the informed consent thoroughly and those participants willing to take part in the study provided a written informed consent. The patients were allotted into the two groups; Control Group and Experimental Group. The baseline & post-intervention values of the interventions using the outcome measures were done. Group A received Short wave diathermy (SWD) & Core stability exercises for 10 sessions. SWD was given with 500 watt electro-care diathermy machines with frequency of 27.33 MHz. The treatment was given for 15 minutes each day for 10 sessions [9]. Eight core stability exercises were given for 20 repetitions with 8 second hold [10].

Group B received SWD and Core stability exercises that were the same as the control group. Following this was the stretching protocol [11] for the iliopsoas, rectus femoris and erector spinae along with strengthening of the abdominals and the gluteal group of muscles given for 10 repetitions of 3 sets.

Outcome measures: Pain intensity was given by Visual Analog Scale (VAS, 0= no pain: 100= unbearable pain). All the participants completed the VAS by indicating the average pain level experienced before and after the intervention [12,13].

Lumbar lordosis index is validated parameter for sagittal malalignment analysis and can be used

as a tool to detect spinal malalignment. It has a reliability of r = -0.978 [14].

Straight Leg Raise testis performed to assess the ability to raise the leg without bending at the knees. This test is widely used to detect any pathology at the pelvis and at the hip [15,16].

Patrick testis a diagnostic test that requires a combination of flexion, abduction and external rotation at the hip which has a sensitivity of 0.82 (95% CI 0.57-0.96) [17].

Sit and reach test is commonly used to measure the low back and hamstring flexibility. it is considered that the erector spinae muscles are stressed when the head is bent down [18]. Thomas test is also called as the rectus femoris contraction test or Kendall test to assess the flexibility of the rectus femoris muscle about the knee joint [19]. Iliopsoas muscle flexibility was determined subjectively Thomas tests. For iliopsoas flexibility, the average inclinometer angle was -10.60° ± 9.61°. The critical criteria for iliopsoas flexibility were determined to be -9.69° [20,15].

Manual muscle testing is reliable with good consistency when repeated. MMT has also been proved to be legitimate evaluation tool for measurement of the musculoskeletal systems [21].

Statistical Analysis: Statistical analysis for the present study was done manually as well as using statistical package of social sciences (SPSS) version 17 so as to verify the results obtained. For this purpose the data was entered into an excel spreadsheet, tabulated and subjected to statistical analysis. Descriptive statistics (mean and standard deviation) were computed for all data. Statistical measures such as mean, standard deviation and other tests of significance such as Wilcoxon, Mann Whitney U Test, Un-paired& Paired t Test.

Various statistical tests of significance were done. Probability values less than 0.05 were considered statistically significant and probability values less than 0.001 were considered highly significant.

RESULTS

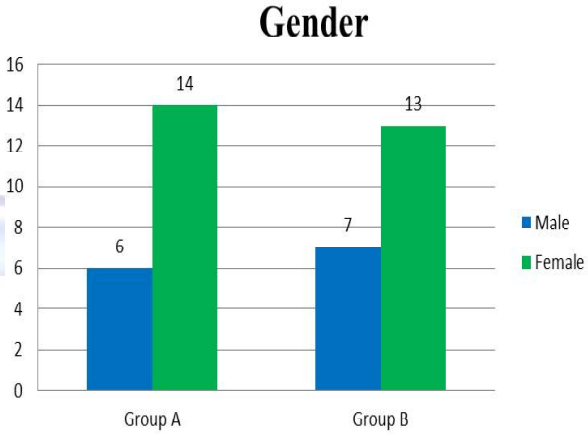
Both the control & experimental groups were administered for the outcome measures preintervention & post 10th intervention.

The demographic data and clinical characteristics of the subjects are presented (Table 1). The test revealed no significant differences in age, gender and body mass index (BMI) ($p>0.05$), which indicates that the groups had similar demographic characteristics. The gender (M: F) distribution for group A was 6:14 and for group B was 7:13 (Graph 1). The mean ± SD of age for Group A was 33.30±9.79yearsand for Group B was 37.80±8.68 years (Graph 2) with a p value of 0.1324. The mean±SD for Group A & Group B of BMI was 25.09±4.36 kg/mt² and 24.90±4.44 kg/mt² respectively with a p value of 0.8916. (Graph 3)

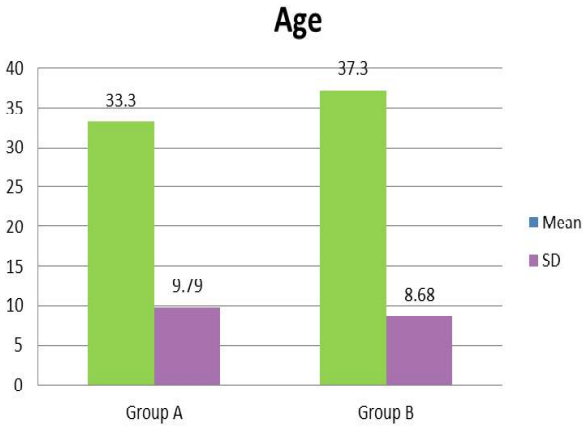
Table1: Comparison of two groups (Group A & Group B) with respect to Gender, Age and BMI.

	Group A	Group B	p value
Gender (M:F)	6:14	7:13	
Age (mean ± SD)	33.30±9.79	37.80±8.68	0.1324
BMI (mean ± SD)	25.09±4.36	24±4.44	0.8916

Graph 1: Age Distribution for Group A and Group B



Graph 2: Comparison of mean & SD for Group A and Group B in terms of Age.



Graph 3: Comparison of mean & SD for Group A and Group B in terms of BMI.

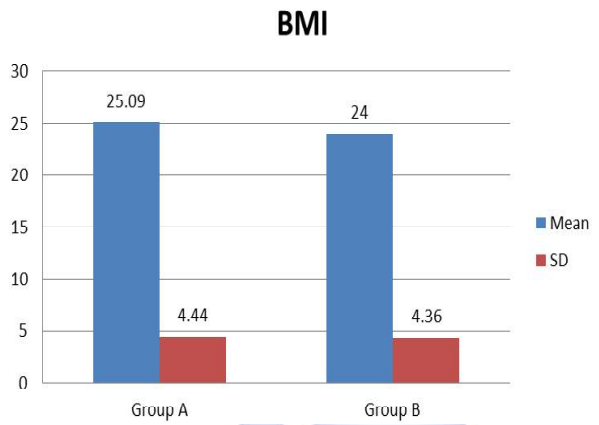


Table 2: Comparison between Group A & Group B with respect to VAS Scores, Index of Lumbar Lordosis, Strength of Abdominals &Gluteals and Flexibility of Iliopsoas, Rectus Femoris& Erector Spinae.

OUTCOME MEASURES	DIFFERENCE IN VALUES (INTER-GROUP VALUES)			
	GROUP A	GROUP B	z value	p value
VAS	1.34 ±0.92	2.57± 1.01	-3.76	0.00001*
Index Of Lumbar Lordosis	5.65 ± 3.41	7.87 ±3.05	-2.7182	0.00001*
Abdominal Strength	-0.30±0.47	-1.30±0.57	-4.0846	0.00001*
Gluteal Strength	-0.35±0.49	-1.15±0.59	-3.4489	0.0002
Iliopsoas Muscle Length	2.55±1.73	10.95±2.68	-11.759	0.0456
Rectus Femoris Muscle Length	7.10±2.77	19.65±4.98	-9.8542	0.0425
Erector Spinae Muscle Length	7.10±2.77	19.65±4.98	-9.2665	0.00001

Mean reduction in VAS was 1.34 ±0.92cm for Group A & 2.57± 1.01cm for Group B with a *p* value of 0.00001. The mean difference in the index of lumbar lordosis for Group A was 5.65 ± 3.41, Group B the mean increase was 7.87 ±3.05 with a *p* value of <0.001. The mean increase in strength of abdominals for Group A was 0.30±0.47, Group B the mean increase was 1.30±0.57 with a *p* value of 0.00001. The mean increase in strength of gluteals for Group A was 0.30±0.47, Group B the mean increase was 1.15±0.59 with a p value of 0.00002. The mean increase in flexibility of rectus femoris for Group A was 7.10±2.77, and Group B the mean increase was 19.65±4.98 with a p value of 0.0425. The mean increase in flexibility of iliopsoas for Group A was 2.55±1.73, Group B the mean increase was 10.95±2.68 with a p value of 0.0456.The mean increase in flexibility of erector spinae for Group A was 7.10±2.77, Group B the mean increase was 19.65±4.98 with a p value of 0.00001.(Table 2)

DISCUSSION

The present controlled trial was aimed to find out the effectiveness of Stretching and Strengthening Exercises in subjects with Postural Low Back Ache for 10 sessions in terms of pain reduction using VAS, improvement in the index of lumbar lordosis, muscle strength of abdominals and gluteals and flexibility of iliopsoas, rectus femoris, erector spinae. SWD & core muscle strengthening exercises was a common conventional treatment given to both the groups. Along with this, stretching and strengthening protocol was an intervention added in the control group for 10 sessions.

In the present study the age, gender& BMI showed no statistical difference in both groups which represents the homogeneity of the subjects. Also, there was no significant difference in the baseline or pre-intervention values for VAS, index of lumbar lordosis and scores of strength of abdominals and gluteals and flexibility of iliopsoas, rectus femoris and erector spinae.

Impairments of lumbopelvic muscle function may compromise the structural integrity of the spinal complex, making it susceptible to further injury, prolonged recovery, or chronicity of pain. Management of low back pain requires an understanding of the sensorimotor mechanisms utilized for trunk stabilization and postural control [21].

SWD has been a proven effective modality for chronic low back pain which is consistent with the results of the study [22]. A study done by Monika et al presents use of strength exercises in rehabilitation process of persons with low back pain syndrome and concludes that increase of muscle strength also positive influence on range of motion of trunk and lower limbs and decrease of pain in persons with low back pain syndrome [23]. Also a systematic review of randomized controlled trials from Collaboration

Back Review Group provide the evidence that specific exercises are effective for the treatment of acute low back pain and that these exercises may be helpful for patients with chronic low back pain to increase return to normal daily activities and work [24].

Mc Ceary proposed that in the erect position, weakness of abdominals permits an anterior pelvic tilt and a lordotic posture [25]. In our study, a decrease in index of lumbar lordosis explains a concurrent decrease in anterior pelvic tilt that could have been caused by strengthening of abdominals. The Janda approach includes a careful analysis of muscle imbalance and its role in the perpetuation of the dysfunction. The muscular system lies at a functional crossroads since it is influenced by stimuli from both the CNS and the musculoskeletal systems. Muscles that tend to get weak often go hand in hand with muscles that tend to get tight [4].

Janda'a approach hypothesized that a weak muscle may merely be one that is inhibited because of a tight or hypertonic antagonist (Sherrington's law of reciprocal inhibition). He hypothesized that restoring muscle tension or the length of a tight muscle might spontaneously facilitate a weak antagonist. The normalization of muscle tone and length should be followed by specific strengthening, movement re-education, and endurance training. Once peripheral structures are normalized, muscle balance is restored. Normal muscle tone surrounding joints must be restored [3,4]. Sherrington's law of reciprocal inhibition states that a hypertonic antagonist muscle may be reflexively inhibiting their agonist [26].

Therefore, in the presence of tight and/or short antagonistic muscles, restoring normal muscle tone and/or length must first be addressed before attempting to strengthen a weakened or nhibited muscle. Techniques to decrease tone must be specific to the cause of the hypertonicity [4]. Asymmetrical stress factors should be eliminated in order to decrease biomechanical overload and compromise.

Limitations: Firstly,due to small sample size, the results cannot be generalized.Second, the present study investigated only the short-term effects and did not consider any follow-up after the 10th session.

Future Scope of the Study: Further studies can be conducted with a larger sample size with a longer follow-up period in order to investigate the long-term effects of Janda'sApproachin Postural Low Back Ach.

CONCLUSION

Stretching and strengthening exercises are effective in reducing pain, normalizing the lumbar lordosis curvature, increasing strength of abdominals and gluteals and increasing rectus femoris, iliopsoas and erector spinae.

Conflicts of interest: None

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