

Effects of retro-walking and spinal flexion exercises in postural low back pain

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Abstract

Purpose: to determine the effects of retro-walking along with spinal flexion exercises in postural low back pain.

Materials & Methods: total subjects were 30 selected out of 69 according to the inclusion and exclusion criteria and were divided in two groups – Group A and Group B. Both groups are experimental and have 15 subjects in each group on the basis of inclusion criteria. The purpose and procedure of the study were explained in details and consent from the taken and they were free to withdraw any time without giving any reason.

Results: independent t-test was used to find the significant difference between before and after intervention result in both groups. Before the intervention, table 1; the value of t-test of numeric pain rating scale was -1.628 with significance value 0.115 of both groups; group A and B. whereas the value of t-test of Oswestry disability index was -1.374 of both groups with significance value 0.180 of group A and 0.183 of group B. After intervention, table-2; the value of numeric pain rating scale and Oswestry disability index was 0.000 and 0.000 in both groups. There was 95% of confidence interval adopted for the significant differences between the groups.

Conclusions: there were reduction in pain and disability in both groups. The statistically reduction in pain and disability in group A following 4-weeks protocol of retro-walking along with spinal flexion exercises in postural low back pain suggests including retro-walking with conventional management protocol for patients with postural low back pain.

Key words: low back pain, postural low back pain, spinal flexion exercises, retro-walking.

Вплив ретро-ходьби та вправ на згинання хребта при постуральному болі в попереку

Мета: визначити вплив ретро-ходьби разом із вправами на згинання хребта при постуральному болі в попереку.

Матеріали та методи: усього було відібрано 30 суб'єктів із 69 відповідно до критеріїв включення та виключення та розділено на дві групи – групу А та групу В. Обидві групи є експериментальними та мають по 15 суб'єктів у кожній групі на основі критеріїв включення. Мета та процедура дослідження були детально пояснені, а учасники дали згоду, і вони могли в будь-який час відмовитися без пояснення причини.

Результати: незалежний t-тест був використаний для виявлення суттєвої різниці між результатом до та після втручання в обох групах до втручання, табл. 1; значення t-тесту числової шкали оцінки болю становило $-1,628$ зі значенням значущості $0,115$ обох груп; групи А та В. тоді як значення t-критерію індексу інвалідності Освестрі становило $-1,374$ для обох груп із значенням значущості $0,180$ для групи А та $0,183$ для групи В. Після втручання (таблиця 2) значення числової шкали оцінки болю та індексу інвалідності



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Освестрі становили 0,000 та 0,000 в обох групах. Для істотних відмінностей між групами було прийнято 95% довірчого інтервалу.

Висновки: в обох групах спостерігалось зменшення болю та втрати працездатності. Статистичне зменшення болю та втрати працездатності в групі А після 4-тижневого протоколу ретро-ходьби разом із вправами на згинання хребта при постуральному болі в попереку передбачає включення ретро-ходьби зі звичайним протоколом лікування для пацієнтів із постуральним болем у попереку.

Ключові слова: біль у попереку, постуральний біль у попереку, вправи на згинання хребта, ретро-ходьба.

Introduction

The lifetime prevalence of low back pain is reported to be as high as 84%, and the prevalence of chronic low back pain is about 23%, with 11-12% of the population being disabled by low back pain (Witwit et al., 2018). Economically lower back pain is a huge burden and causes more global disability than any other condition (Nagarajan & Nair, 2010). Back pain is amongst most common causes in every age group, most common causes in adults and teenagers (Anderson et al. 2021). Back pain can affect our movement of daily living and performing any task (Teferi, 2020). Mechanical back pain accounts for 97% of cases, arising from spinal structures such as bone, ligaments, discs, joints, nerves, and meninges. Acute back pain in the absence of progressive neurologic deficits and other underlying non-mechanical causes may be treated conservatively, with specific emphasis on maintaining activity levels and function (Muazzam et al., 2021). Retro-walking also known as backward walking to help people improve walking pattern called as gait and mobility in the lower extremities. it is used to improve knee muscles hip muscles and ankle range of motion (Dangi & Nirbhavane, 2014). Retro walking differs from forward walking in which the leg swings through the air and toe lands on the ground first (Balraj et al., 2018).

Retro-walking involves an opposite gait process. Leg swings through the air and reaches backwards with bent knee. Toes contact with ground and bent knee get straightened when toes and foot touches the ground (Balasukumaran et al., 2019). Retro walking may help in strengthening the hip muscles knee muscles as well as ankle muscles and promote to healing and increase the range of motion of knee, hip, ankle joints (Zhang et al., 2015). It allows the patients to strengthen their muscles while performing backward walking it also helps to maintain and improve coordination (Abdelraouf et al., 2019). Retro-walking may also improve walking pattern that have gone from an injury, surgery or illness (Kim et al., 2017). Retro walking also improve the spinal alignment. Spinal alignment also disturb when patients who have pain in their lower

back. By improving their erect posture, the other problems related to spine may also can improve in some conditions (Kim, S. H et al 2016).

Material and methods of research

Participants

The participants for this study were recruited as college going students. On the basis of outcome measures Numeric Pain Rating Scale, Oswestry Disability Index and all the measurement were checked on first day (pre- treatment) and last day (post-treatment) i.e., after 4 weeks. Total subjects were 30 selected out of 69 according to the inclusion and exclusion criteria and were divided in two groups – Group A and Group B. Both groups are having 15 subjects in each group on the basis of inclusion criteria. Group A received retro-walking along with spinal flexion exercise and group B received only spinal flexion exercises. The purpose and procedure of the study were explained in details and consent from the taken and they were free to withdraw any time without giving any reason.

Selection criteria

College going students suffering from postural low back pain were included in this study. In this study patients with back pain with difficulty in function of lower back were included. Patients having a complaint of back pain with age group between 18-25 years who referred from Orthopedic out-patient department of hospital were included in this study. Patients having a history of bone and joint tumor, bone tuberculosis, severe knee pain due to trauma, infection and fracture were excluded from selection criteria.

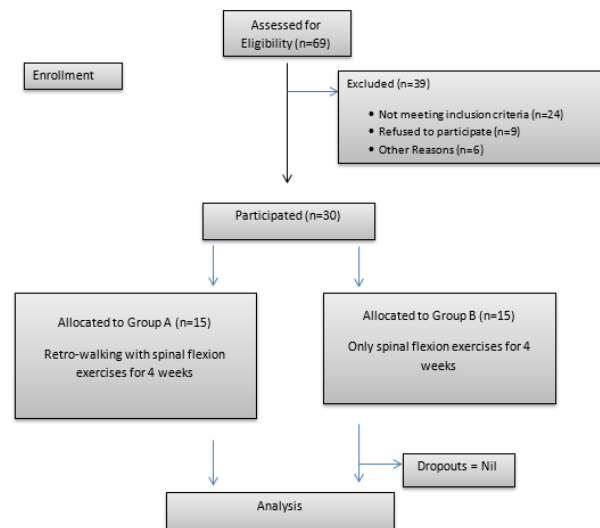


Figure 1. Flow chart of methodology that adopted in this study

Outcome Measures

Numeric Pain Rating Scale

The Numeric Pain Rating Scale that is a one-dimensional measure of pain intensity in adults, including those with various musculoskeletal disorders.

The scale is a segmented numeric version of the visual analog scale in which a respondent selects a whole number (0–10 integers) that best reflects the intensity of his/her pain (Childs et al., 2005). The 11-point numeric scale ranges from '0' representing one pain extreme (e.g. – no pain) to '10' representing the other pain extreme (e.g. – pain as bad as can imagine or – worst pain imaginable).

Oswestry Disability Index

Oswestry disability index is used to assess the patient's subjective range of perceived disability related to his/ her functional, e.g. work status difficulty in activity of daily living. The higher score show more perceived disability. Using the test at initial visits helps the examiner understands the patients' perception of the need for the more intensive treatment such as spinal manipulative therapy and education to help the patient understand the lower likelihood of disability related to back pain. It can be calculated by dividing the total score (0-5) by no. of section answered and multiplied by 100 (Sandal et al., 2021).

Intervention

After assessing the patient, the subjects were first given hydrocollator pack on lower back region for 15 minutes in both groups to reduce muscles spasm and pain and to improve the extensibility of tissues. The temperature of hydrocollator pack was adequate for the targeted area. The hot pack was well covered with mackintosh sheet. While this process therapist asked the patient about the temperature.

Group A

Spinal Flexion Exercises

The patient in supine lying on couch and both knee will be bend and back straight, both knee hold by both hands and try to bring your both knee at chest level. Patient feels stretch on their back. Hold this position for 25-30 seconds (after that added 2 repetitions in next week) 3 repetitions and holding time will be 20-30 seconds (Sharma et al., 2018).

Retro-walking

Retro walking also known as backward walking and in this for very first week patient walk backward. 10 minutes of backward walking at their comfortable speed with 5 minutes of warm up. The participants will gradually increase the walking time up to 30 min over the period of 4weeks (Sharma et al., 2016).

Group B

Spinal Flexion Exercises

Patient in supine lying with both knees will be flexed and holds by both hands and try to touch the chest. Holding time-25-30 seconds depends on patients' tolerance

Sets of repetitions:

On 1st week – 3 repetitions with holding time mini-

um 15 seconds and maximum 30 seconds.

On 2nd week – continuing with the 1st week.

On 3rd week – 5 repetitions with holding time 20-30 seconds.

On 4th week-continuing – with the 3rd week.



Figure 2. Spinal flexion exercises.



Figure 3. Retro-walking.

Results of the study

All analysis was obtained using R SOFTWARE. Demo graphic data of the patients including age gender were summarized. The outcome measures for the statistical analysis were numeric pain rating scale and oswestry disability index. A base line data was taken at the beginning of the study (pre-test values) and after that completion of the treatment (post-test values) to analyze the difference between the two treatment methods.

Discussion

The purpose of this study was to find out the ef-

Table 1. Tests of Normality

Outcome Measures	Groups	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Numeric pain rating scale	Group-A	0.272	15	=0.004	0.870	15	0.034
	Group-B	0.232	15	0.029	0.883	15	0.052
Oswestry disability index	Group-A	0.115	15	0.200*	0.954	15	0.583
	Group-B	0.190	15	0.151	0.883	15	0.052

Table 2. Independent Samples Test result in group A and B (Before intervention)

Outcome Measures	Groups	Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Numeric pain rating scale	Group A	0.020	0.731	-1.628	28	0.115	-.53333	.32757	-1.20433	.13766
	Group B			-1.628	27.400	0.115	-.53333	.32757	-1.20499	.13832
Oswestry disability Index	Group A	2.956	0.097	-1.374	28	0.180	-3.33333	2.42553	-8.30180	1.63513
	Group B			-1.374	21.842	0.183	-3.33333	2.42553	-8.36568	1.69901

Table 3. Independent Samples Test for group A and B (After intervention)

Variables	Groups	Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Numeric Pain Rating Scale	Group A	2.065	0.162	-6.720	28	0.000	-1.80000	.26785	-2.34868	-1.25132
	Group B			-6.720	25.800	0.000	-1.80000	.26785	-2.35079	-1.24921
Oswestry Disability Index	Group A	15.049	0.001	-4.115	28	0.000	-12.26667	2.98100	-18.37296	-6.16037
	Group B			-4.115	16.436	0.001	-12.26667	2.98100	-18.57251	-5.96082

Table 4. Test result of pain and disability before and after the intervention in group A and group B

Outcome measures	Groups	Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Numeric pain rating scale (Before intervention)	Group A	0.020	0.731	-1.628	28	0.115	-.53333	.32757	-1.20433	.13766
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	Group B			-4.115	16.436	0.001	-12.26667	2.98100	-18.57251	-5.96082

fect of retro walking with spinal flexion exercises and the spinal flexion exercises alone among the college going students with postural back pain. 30 subjects were included with postural lower back pain. In this study, the subjects were divided in

two groups A and B .In both groups A and B, the subjects were given moist heat pack before starting the sessions of retro-walking and exercises protocols. The outcome measures numeric pain rating scale and Oswestry disability index were

measured, similarly reading also noted down after 4 weeks.

Independent t-test was used to find the significant difference between pre and post intervention result in both groups. Before the intervention, table 1; the value of t-test of numeric pain rating scale was -1.628 with significance value 0.115 of both groups; group A and B. whereas the value of t-test of Oswestry disability index was -1.374 of both groups with significance value 0.180 of group A and 0.183 of group B. After intervention, table 2; the value of numeric pain rating scale and Oswestry disability index was 0.000 and 0.000 in both groups. There was 95% of confidence interval of the differences. The result suggested that both intervention; retro walking exercises with spinal flexion exercises for group A and spinal flexion exercises for group B are better way to reduce pain and disability of lower back pain among students. In table 3, there was significant difference found in reduction of pain and disability with value 0.000 after getting intervention in both groups; group A and group B.

This study may be of significance for the health care and students who have back pain by managing it by increasing spine strength, mobility and function of daily activity. A study was conducted on the effect of backward walking with forward bending on quadriceps muscle strength and performance in patient with knee osteoarthritis. His study concludes that backward walking with forward bending improved quadriceps muscles strength and performance in individual who have knee osteoarthritis (Alghadir et al., 2019). A study focused that people adopting poor posture while using computers which results in increases pain in back pain and shoulder pain over a time (Bodwal et al., 2017).

A study was conducted to compare various postural methods, and the result of this study that the postural correction methods were useful in the management of chronic back pain and methods discussed in this study (Ain et al., 2019). Another study was conducted to investigate the effectiveness of backward walking exercises program in athlete with or without low back pain. Total 3 weeks of schedule of backward walking delivered and post test results suggest that backward walking was effective in reducing pain in athletes (Sharma et al., 2016). A study reported on the effectiveness of backward walking the patients who have gait impairment, functional disability, muscle strength. Total no. of 635 participants participated in this study. The standardized mean difference values in

favoured of backward walking for 2-4 weeks to reduce pain (-0.87) and functional disability (-1.19) and improves quadriceps muscles strength (Balasukumaran et al., 2019). The strengthening of spinal muscles by doing spinal flexion muscles with retro-walking may be beneficial for reducing pain (Kim et al., 2010). On the basis of the result of our study, retro-walking with spinal flexion exercises is helpful in reducing postural back pain and it may be considered and implemented as regular therapeutic protocol for managing the patients with postural low back pain. Retro-walking will be helpful to strengthen the knee, hip muscle in other musculoskeletal disorders related to spine and lower extremities.

Conclusion

The reduction in pain and disability is seen in both groups but present study reveals that the retro-walking is a novel method, as it is easy to understand the performed by the patients with less effort. It provides drastic long term effect in terms of reducing pain and disability among the patients with postural low back pain by adjusting biomechanical defect due to muscular imbalance and kinematics of the pelvis with lower lumbar region. The score of numeric pain rating scale and disability was statistically reduced following 4 weeks of retro-walking along with spinal flexion exercise in group A. Retro-walking can bring remarkable effects on function and posture of an individual. Therefore, the study shows that protocol of retro-walking with spinal flexion exercises has significantly reduced the pain and disability and can be concluded that retro-walking is as supportive approach for low back pain measurement.

Authors' Contribution

Conceptualization, SR and ASH.; methodology, SR, ASr and ASH; formal analysis, SR and ASH.; investigation, SR, ASr and MK.; data curation, SR, ASH and ASr.; writing – rough preparation, SR and ASH; writing – review and editing, Sr, ASH and ASr.; supervision, SR.; project administration, SR. All authors have read and agreed with the published version of the manuscript.

Conflict of Interest

Authors have declared no conflict of interest.

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