

EFFECT OF SEGMENTAL STABILIZATION EXERCISE ALONG WITH SACROILIAC JOINT MOBILIZATION ON LOW BACK PAIN AMONG ROLLER SKATERS

^{1*}Anand Babu Kaliyaperumal, ²I. Hemasodhi, ³V. Jeyavarthini, ⁴Poongodi Anand

¹*Principal/Professor, Jijamata College of Physiotherapy, Maharashtra, India.

^{2,3}Intern, Sri Venkateshwaraa College of Physiotherapy, Puducherry, India.

⁴Assistant Professor, Jijamata College of Physiotherapy, Maharashtra, India.

*Corresponding Author: babumpt@gmail.com

DOI: <https://doi.org/10.63299/ijopt.060338>

ABSTRACT

Objective: To study the effectiveness of Segmental Stabilizing Exercises along with Sacroiliac Joint Mobilization on LBP among roller skaters.

Methodology: The study design was a pilot study. 15 samples were conveniently selected for the study. Population between the ages of 12 to 20 years roller skaters were enrolled in the survey. Segmental Stabilization exercise along with Sacroiliac Joint Mobilization were given to the subjects. They were assessed by using outcome measure like Qbps and MODI.

Result: Data analysis was done by using a paired 't' test for within the group. The results of the study shows that Segmental Stabilization along with Sacroiliac Joint Mobilization were effective in reducing LBP and disability among roller skaters ($p < 0.001$).

Conclusion: This study concluded that 6 weeks of Segmental Stabilization exercise along with Sacroiliac Joint Mobilization had a positive result in reducing LBP and disability among roller skaters, as measured by the QBPDS and MODI. As a result, the null hypothesis is rejected.

Keywords: Anterior innominate, Posterior innominate, Quebec Back Pain Disability Scale (QBPDS) Questionnaire, Modified Oswestry Disability Index (MODI) Questionnaire.

INTRODUCTION

Roller-skating is both a leisure activity and a competitive sport in which participants propel themselves across rinks or paved surfaces using special shoes fitted with wheels. Joseph Merlin, a Belgian, is said to have invented roller skates in the 1760s. The sport of roller skating is managed in India by the Roller-Skating Federation of India, which was formed by S.P. Mumick in 1955. Health issues such as back pain is common among skaters. (1)(2)

Prevalence rates of back pain in athletes can differ greatly. Based on high-quality studies, the lifetime prevalence of low back pain (LBP) in athletes is between 1% and 94%, with the highest prevalence in rowing and cross-country skiing. The point prevalence rate of LBP ranges from 18% to 65%, with the lowest prevalence in basketball and highest in rowing. Van Hilst et al. had reported a significantly higher 12-month LBP prevalence in female speed skaters (speed skating male: 54%, female: 66%, with a mean age of 18 years). A

common reason for lower back pain in roller skaters is lower back muscle strain due to stress fractures in the spine. Aggressive skaters transmit the impact of nasty foot or butt landings through the spine.

The slippage of vertebrae, partially dislocated vertebrae (spondylolisthesis), leads to backache (LBP). This condition occurs when the spondylolysis bone fracture skaters dislocate continues to skate with. (3).

SIJ mobilization with anterior/posterior innominate techniques, Maigne selling technique, and cross Stoddart technique are among the many methods that can be used, (4)(5)(6) whose effectiveness has been testified in numerous studies. Recommended treatments may include basic, small (I and IV) or big (II and III) movements maneuvers, oscillation amplitudes, as well as spinal mobilization for therapeutic purposes, respond to neuromusculoskeletal injuries by physiotherapists. Standard procedures of physiotherapy may also address the pathology underlying the condition alongside alleviating symptoms of LBP.

This requires individual exercising ‘Segmental Stabilization’ methods directed at the lower back. (7)(8) Citing stimulated pain which may act as an inhibitor. Such methods ensure a higher degree of activation of weakened muscles which amplifies local proprioception and facilitates contraction retention. (8)

The Quebec Back Pain Disability Scale (QBPDS) is a validated self-report questionnaire designed to assess functional disability in individuals with low back pain (LBP). It comprises 20 items that evaluate the difficulty experienced in performing various daily activities. These activities are categorized into six domains. Each item is rated on a 6-point Likert scale ranging from 0 (no difficulty) to 5 (unable to perform the activity). The total score is calculated by summing the individual item scores, resulting in a range from 0 to 100. Higher scores indicate greater levels of disability. (9)(10)(11)

The MODI remains the most commonly used outcome measure questionnaire for LBP. This is a self-administered questionnaire broken down into 10 sections assessing different activities of daily living. Each section is scored on a 0-5 scale, where 5 indicates maximum disability. (12)(13)(14) From the review the skaters are more prone to get LBP. The treatment approaches Segmental Stabilization

and Sacroiliac Joint Mobilization are effective in treated the LBP. This study aims to determine the combined impact of Segmental Stabilization and Sacroiliac Joint Mobilization on low back pain for roller skaters to help professionals formulate better management strategies for LBP.

Our goal was to determine the effects of combining segmental stabilizing exercises and mobilization of the sacroiliac joint on the disability and pain associated with lower back pain (LBP) in roller skaters.

METHODOLOGY

Fifteen roller skaters diagnosed with LBP were recruited by convenient sampling methods. This study included the subjects with LBP for the last one month, scoring between 40 – 70 on QBPDS, scoring between 21 – 40 % MODI, aged between 12 – 20 years (both male and female). Those who had recent surgery, trauma of low back pain, pre-diagnosed disease of neurological impairments, acute disc bulge, IVDP, etc. were excluded from the study. The baseline evaluation using MODI and QBPDS was done at the start of the study, then six months after treatment.

In the study, SIJ mobilization and mobilization techniques with anterior innominate (Fig 1a), posterior innominate (Fig 1b) were applied for three sessions of 15 to 20 seconds, then relax for 30 to 1 minute (one session per week for 6 weeks). Each technique was applied to each patient, separately. Exercise program consists of segmental stabilization exercise.

All subjects were assigned segmental stabilization exercise such as exercise for transverse abdominis in 4-point kneeling position (Fig 2a), exercise for lumbar multifidus in recumbent position (ventral decubitus) (Fig 2b), exercise for transverse abdominis in dorsal decubitus position with flexed knee (Fig 2c), co-contraction of the transverse abdominis and lumbar muscle while standing(Fig 2d).

Each exercise must be practiced 10 times, two sessions a day. Each session lasts five minutes with each position being held for five to ten seconds. The exercises were provided over the course of six weeks.



Fig 1a: Sacroiliac joint mobilization - Anterior method



Fig 1b: Sacroiliac joint mobilization - Posterior method

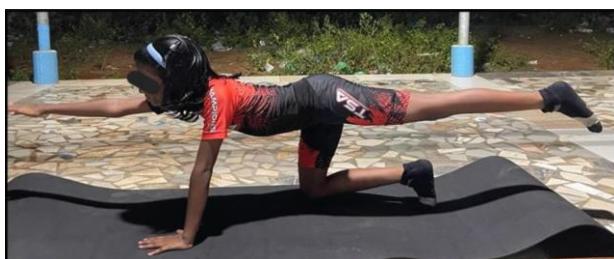


Fig 2b: Exercise for the lumbar multifidus in ventral decubitus



Fig 2c: Exercise for the transverse abdominis in dorsal decubitus with flexed knee



Fig 2d: Co-contraction of the transverse abdominis and lumbar muscle

Fig 2a: Exercise for the transverse abdominis in 4-point kneeling

RESULTS AND DISCUSSION

As for the performed statistical analysis, the mean value for the pre and post-test assessment for QBPDS Questionnaire is equal to 48.3 and 47.8 and the calculated standard deviation value of the pre and post test for QBPDS questionnaire is respectively ± 6.25 and ± 6.03 (fig 3). Therefore, the results obtained from the statistical data analysis indicate that the paired T-test value of the QBPDS Questionnaire t -value = 3.5 is significant. The mean value for the pre-test and post test assessment for MODI Questionnaire are 26.53, and 20.8 while the calculated standard deviation value of the pre and post test for MODI questionnaire is ± 3.34 , and ± 3.28 respectively (fig 4). Therefore, the results obtained from the statistical data analysis indicate that the paired T-test value of the MODI Questionnaire t -value = 12.128 is significant. QBPDS & MODI were assigned a sample size $n=15$. For those measures of outcome, the p value is 0.00354. Considering that p is less than 0.05 we conclude there is significant improvement regarding QBPDS. The p value is 0.00001. Given that p is less than 0.05 we conclude there is significant improvement regarding the use of MODI (table 1).

Table 1: Statistical analysis of QBPDS and MODI

Scale		Mea n	SD	Samp le Size	T- Valu e	P - Value
QBP DS	Pre tes t	48.3	6.2 5	15	3.5	0.003 54
	Post tes t	47.8	6.0 3			
MOD I	Pre tes t	26.5 3	3.3 4	15	12.1 28	<0.00 01
	Post tes t	20.8	3.2 8			

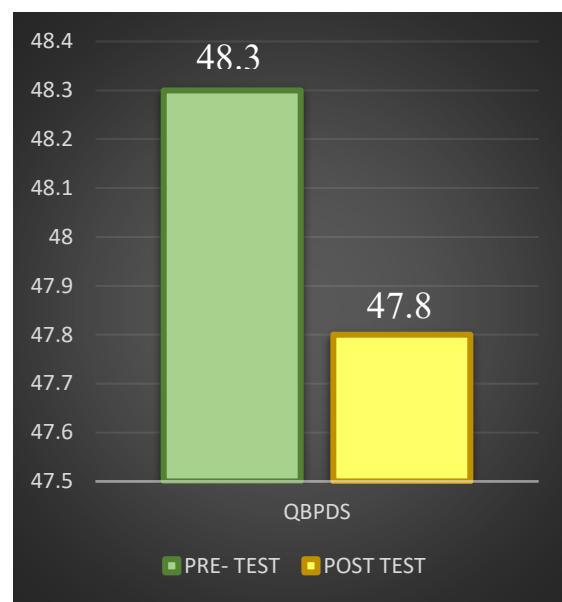


Fig 3: Pretest & post-test mean of QBPDS

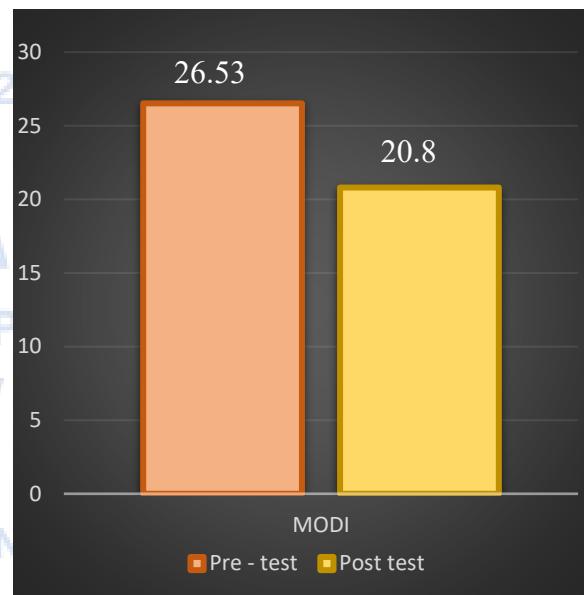


Fig 4: Pretest & post-test mean of MODI

This study, a sample with the purpose to assess the impact of Segmental Stabilizing exercises with Sacroiliac Joint Mobilization on LBP of roller skaters, was conducted on participants with the inclusion criteria age of 12-20 years. Both male and female subjects from this age group were included in the study. 15 subjects were selected after being tested with the QBPDS and MODI. A post-test was conducted after 6 weeks of training on all 15 subjects. Paired 't' test statistical analysis was done for the study.

This research has a relatively small sample size and limited scope due to the power analysis conducted, but it did suggest that the LBP investigation would only require 15 participants to yield meaningful

statistical interactions. Roller skaters experienced marked improvement in LBP after undergoing training with Segmental Stabilizing Exercise and Sacroiliac Joint Mobilization.

Berid Rackwitz et al., (2006) An exercise evaluation, including a comprehensive review of randomized controlled trials focused solely on segmental stabilizing exercises for adult patients with LBP, was incorporated into the study. Their goal was to evaluate the effectiveness of segmental stabilizing exercises on adults with acute, subacute, and chronic LBP regarding pain, its recurrence, resultant disability, and return to employment.

For acute lower back pain, segmental stabilizing exercises are as effective as GP care in pain relief during the short term and impairment and pain during the long term while being more effective in reducing recurrence of LBP. In the short and long term, Segmental Stabilization exercises are more effective than GP care and may be as beneficial as other physiotherapy therapies in reducing persistent LBP disability and pain. They concluded that for LBP, segmental stabilizing exercises are more effective than GP treatment, but not as effective as other physiotherapy treatments.

Shraddha S. Kawishwar et al., (2020) describe SIJP as associated with the anterior sacroiliac and posterior sacroiliac ligaments, interosseous ligaments, or articular cartilage which are the SIJ tissues. The treatment of SIJ pain is challenging. Basic physical therapy includes repetitive exercises, manual joint mobilization, manipulation, bracing, massage, patient education, conditioning, therapeutic exercise, and electrotherapeutic modalities. The inclusion and exclusion criteria were applied to a total of 93 patients. Patients were randomized into two groups. Group A was treated with ultrasound therapy and Mulligan mobilization while Group B received ultrasound and conventional therapies.

The selected outcome measures included pain VAS, lumbar flexion MODQT, and functional disability MODQ. In their research, they indicated that both Mulligan mobilization and Conventional were effective in the subjects with Sacroiliac joint pain, but found that Mulligan mobilization was more effective than conventional therapy. This research utilized Segmental Stabilization and Sacroiliac joint Mobilization. Functional disability QBPD and MODI were the outcome measures assessed.

According to the statistical data analysis, the paired t-test value of the both QBPS Questionnaire ($t=3.5$) and MODI Questionnaire ($t=12.128$) has attained statistically significant levels within the context of this research design. (15)

Bharti Neha et al., (2016), A systematic review claimed that pharmacology soft tissue release literature is insufficient, as well as literature on mobilization with soft tissue release, deep transverse friction, positional release techniques, mulligan, laser therapy, and therapeutic modalities like TENS and ultrasound. In the analysis, pain was recorded using the visual analog scale (VAS) in seven studies, the numerical pain rating scale (NPRS) in six studies, and the thermometer pain rating scale in one study. MODI was assessed in eleven studies.

RAND, SF-36, and EQ-5D were utilized in three studies. Attention in clinical research and practice should be directed towards these issues to alleviate the multifactorial psychosocial pain and improve the living conditions of patients suffering from SIJ pain and dysfunction. Limitations of the study include a lack of literature on therapeutic interventions and differences in methodologies. Consequently, this study aims to address functional disability concerning the degree of incapacity in patients with sacroiliac joint pain (SIJP). (16)

Future recommendations of this study are to include the peripheral non-traumatic low back pain, including pain from the ankle, non-elite senior regional roller-skating participants, and elite senior roller skaters from other regions and non-elite senior countries. Access to participants and the explanatory level of the exercise scheme provided were major limitations of this study.

CONCLUSION

The conclusion drawn from this study is that there was a significant reduction in low back pain and disability after implementing the Quadrant-Based Pain Description Scale (QBPD) & Modified Oswestry Disability Index (MODI) post 6 weeks of Segmental Stabilizing Exercise combined with Sacroiliac Joint Mobilization performed on roller skaters.

REFERENCES

1. Tse, P. Y., Shen, W. Y., Chan, K. M., & Leung, P. C. (1987). Roller skating--is it a dangerous sport? *British Journal of Sports Medicine*, 21(3), 125-126.
2. Ruhe, A., Bos, T., & Herbert, A. (2012). Pain originating from the sacroiliac joint is a common non-traumatic musculoskeletal complaint in elite inline-speedskaters-an observational study. *Chiropractic & Manual Therapies*, 20(1), 1-7.
3. Hoy, D., Brooks, P., Blyth, F., & Buchbinder, R. (2010). The epidemiology of LBP. *Best practice & research Clinical rheumatology*, 24(6), 769-781.
4. Dogan, N., Sahbaz, T., & Diracoglu, D. (2021). Effects of mobilization treatment on sacroiliac joint dysfunction syndrome. *Revista da Associação Médica Brasileira*, 67, 1003-1009.
5. Son, J. H., Park, G. D., & Park, H. S. (2014). The effect of Sacroiliac Joint Mobilization on pelvic deformation and the static balance ability of female university students with SI joint dysfunction. *Journal of physical therapy science*, 26(6), 845-848.
6. Anand babu kaliyaperumal (2023). A study to compare the effectiveness of the Pilates method and Gyrotonic expansion exercise on spinal stability in chronic low back pain. *Global journal of research*, 12(11). 65-68.
7. Sipko, T., Paluszak, A., & Siudy, A. (2018). Effect of Sacroiliac Joint Mobilization on the level of soft tissue pain threshold in asymptomatic women. *Journal of Manipulative and Physiological Therapeutics*, 41(3), 258-264.
8. Rackwitz, B., de Bie, R., Limm, H., von Garnier, K., Ewert, T., & Stucki, G. (2006). Segmental stabilizing exercises and LBP. What is the evidence? A systematic review of randomized controlled trials. *Clinical rehabilitation*, 20(7), 553-567.
9. Do Nascimento, R. K. B., Costa, S. C. F., Sales, T. S., & da Silva, R. M. V. (2018). Effects of Segmental Stabilization in Patients with LBP: Systematic Review. *Manual Therapy, Posturology & Rehabilitation Journal*, 1-6.
10. Speksnijder, C. M., Koppenaal, T., Knottnerus, J. A., Spigt, M., Staal, J. B., & Terwee, C. B. (2016). Measurement properties of the quebec back pain disability scale in patients with nonspecific LBP: systematic review. *Physical Therapy*, 96(11), 1816-1831
11. Demoulin, C., Ostelo, R., Knottnerus, J. A., & Smeets, R. J. (2010). Quebec Back Pain Disability Scale was responsive and showed reasonable interpretability after a multidisciplinary treatment. *Journal of clinical epidemiology*, 63(11), 1249-1255.
12. Jenks, A., Hoekstra, T., van Tulder, M., Ostelo, R. W., Rubinstein, S. M., & Chiarotto, A. (2022). Roland-Morris Disability Questionnaire, Oswestry Disability Index, and Quebec Back Pain Disability Scale: Which Has Superior Measurement Properties in Older Adults With LBP?. *journal of orthopaedic & sports physical therapy*, 52(7), 457-469.
13. Mehra, A., Baker, D., Disney, S., & Pynsent, P. B. (2008). Oswestry Disability Index scoring made easy. *The Annals of The Royal College of Surgeons of England*, 90(6), 497-499.
14. Fritz, J. M., & Irrgang, J. J. (2001). A comparison of a modified OswestryLBPdisability questionnaire and the Quebec back pain disability scale. *Physical therapy*, 81(2), 776-788.
15. Baradaran, A., Ebrahimzadeh, M. H., Birjandinejad, A., & Kachooei, A. R. (2016). Cross-cultural adaptation, validation, and reliability testing of the modified Oswestry disability questionnaire in Persian population with LBP. *Asian spine journal*, 10(2), 215.
16. Akshay K, Subbiah B, Rajeev R, Jagadevan M. Surface electromyographic analysis of the bilateral abdomen and back muscle during selected yoga posture. *J Bodyw Mov Ther*. 2024 Oct;40:1994-2000. doi: 10.1016/j.jbmt.2024.10.015. Epub 2024 Oct 23. PMID: 39593556.
17. Kawishwar, S. S., Samal, S., & Ramteke, S. (2020). To Study the Effect of Mulligan Mobilization Versus Conventional Therapy in Sacroiliac Joint Pain. *Indian Journal of Public Health Research & Development*, 11(5), 444-449.
18. Neha, B., Arunmozhi, R., Maneesh, A., & Pooja, A. (2016). Effectiveness of therapeutic interventions in sacroiliac joint dysfunction: a systematic review. *Int J Physiother Res*, 4(3), 1484-1488.