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Treatment strategies for lower cross syndrome: A systematic review

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***Abstract*---**Background: Lower cross syndrome is characterized by tightness of iliopsoas, rectus femoris and erector spinae along with weakness of gluteal and abdominal muscle. Exercises help to restore length of tight muscles and strengthening of weak muscles. Therefore, objective of this study is to conduct a systematic review of studies to date in order to determine the effects of implementing different exercise programs on the treatment of lower crossed syndrome. Method: A systematic online search of the literatures in English language was undertaken for articles published from 2010 to 2021. Articles were searched in Google Scholar, Pubmed, Science direct and Research Gate with key words "Back pain, Lower cross syndrome and Treatment strategies". Methodological quality assessment was done on the basis of Level of evidence. Result: Very less number of studies is available on effectiveness of treatment strategies in subjects having Lower cross syndrome and sample size in studies are also small but in most of studies exercise program is found to be effective. Conclusion: Low quality of evidence is there on effectiveness of treatment strategies in subjects having Lower cross syndrome. Based on analysis, recommended exercise programs include, exercise for strengthening weak musculature or for stretching tight muscles.

***Keywords*---**back pain, lower cross syndrome, treatment strategies.

Introduction

Disorders related to posture and spinal deformities can be congenital or acquired. Acquired postural disorders can be a consequence, to a large extent, of modern-day living and working conditions. Prolonged incorrect posture and reduced physical activity presents a imbalance in the musculature.[1] These imbalances can occur in muscles when they are constant position shortening or lengthening in relation to each other. The lower crossed syndrome is characterized by weakness and tightness of muscles which crosses the dorsal and the ventral sides of the body. Lower crossed syndrome occurs due to threatening mixtures of biomechanical muscle imbalance because of excessive stress it places on the structures of lower back. This postural imbalance develops a chronic pain condition of lower back that becomes more difficult to correct in later stages. [2]

In lower crossed syndrome (LCS), also known as pelvic crossed or distal crossed syndrome termed by Janda, there is overactivity/tightness of following muscles - gastrosoleus, hip flexors, hamstrings, adductors, TFL and piriformis. Along with this there is reduction in activity and weakness of the deep abdominal muscles on the anterior side and of the gluteus maximus and medius on the posterior side. This imbalance leads to anterior tilting of the pelvis, increased flexion at hip joint, and a compensatory hyperlordosis in spine at the lumbar region.

Prevalence of lower crossed syndrome in school going children of age 11 to 15 years is 21% and 29% of school children of same age are at risk of developing lower crossed syndrome in future.[3] In addition to this it is found that prevalence of developing lower crossed syndrome among young females is more than young males of same age group (21 yrs to 31 yrs).[2] The most frequent cause of LCS is a sedentary lifestyle. Sitting for extended period of time can lead to an imbalance between the muscles. If lower crossed syndrome is not treated, it can lead to obesity and low back pain in future. [4] Another potential cause is excess training of certain parts of the body while undertraining others. For example, if an individual strengthens their hip flexors and back without concentrating on their glutes and abdominals, this could lead to an imbalance. [5]

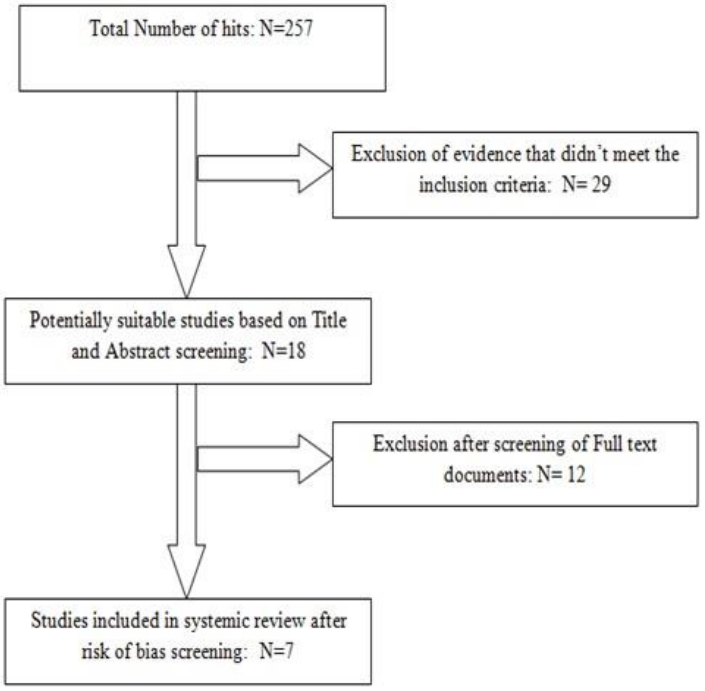
On knowing the harmful effects of LCS, various types of treatment are available, with a view to treating it and correcting postural status. In view of the above, the objective of this study is to conduct a systematic review of studies conducted to date, and to determine the effects of the application of various exercise programs on treating lower crossed syndrome.

Methodology

The articles were searched in Google Scholar, Pubmed, Science direct and Research Gate using key words: Back pain, Lower cross syndrome and Treatment strategies. The inclusion criteria for the study were the researches examining different exercise programs on lower cross syndrome on reducing back pain and enhancing functional ability of the participants. The search was focused on studies published between 2010 to 2021. On the basis of these

inclusion criteria studies were selected. Then retrieved study titles, abstract and full texts were screened. And from them the studies which met the above mentioned criteria were analyzed and presented according to the following parameters: Leading author's name, sample size, study design, level of evidence, participant's sub group, exercise program: protocol, it's frequency and duration, outcome measures taken for the studies and the study result. Methodological quality assessment of the study was done on the basis of Level of evidence.

Data extraction and analysis



Table

Reference	Number of Subjects/ Study design/ Level of Evidence	Groups	Experimental program		Outcome	Result
			Frequency & duration	Exercise program		
Kage MV et. al; (2015)	N=40 Randomized Controlled Trial 1b	N1=20 N2=20	10 sessions SWD for 15 min, Core stability exercise for	G1= Short wave diathermy (SWD- 500 watts,27.33MHz) & 8 Core stability exercises G2= Short wave	Pain intensity (Visual Analog Scale), Severity of Spinal Malalignment	Stretching and strengthening exercises are beneficial in pain reduction, normalizing

			20 repetitions with 8 second hold, Strengthening protocol was given in 3 sets for 10 repetitions	diathermy & 8 Core stability exercises together with stretching protocol for the iliopsoas, rectus femoris & erector spinae and strengthening of the abdominals and the gluteal group of muscles.	(Lumbar lordosis index), Manual Muscle Testing of abdominals and gluteals, Tests used for flexibility – SLR test, Patrick test, sit and reach test	curvature of lumbar lordosis , increase in strength of abdominal and gluteal muscles together with increase in flexibility of iliopsoas, rectus femoris and erector spinae muscles.
Yadav P et.al; (2016)	N=30 Randomized Controlled Trial 1b	N=10 N=10 N=10		G1= Moist hot pack. G2 = Moist hot pack and MET of erector spinae and iliopsoas muscle. G3=Moist hot pack and MFR of erector spinae and iliopsoas muscle.	Standing pelvic tilt angle	Significant improvement in standing pelvic tilt angle for all the three groups was seen but on comparing MET showed better results than MFR and control group.
Pradeep, et. al; (2020)	N=42 Randomized Controlled Trial 1b	N=21 N=21	45 min per session, for 6 consecutive days Moist hot pack for 15 min, 5 sets of stretching exercise with 30 second hold were performed for every muscle, For strengthening - 10	G1= Moist hot pack, Stretching of tight back extensors and hip flexors, strengthening exercise for abdominal muscles and hip extensors (curl-ups, side bridge, quadruped hip extension, and side-lying hip abduction): this is often the conventional physiotherapy protocol. G2= sciatic nerve neurodynamic SNAGs were performed together	Pressure pain threshold, Degree of lumbar lordosis, Modified Thomas test, Finger - to - floor test, Modified Oswestry Disability Questionnaire (MODQ)	Sciatic nerve neurodynamic SNAGS when given together with conventional therapy resulted in significant improvement as compared to conventional therapy alone in patients having pelvic cross syndrome in terms of pain sensitivity and flexibility.

			repetitions of every exercise	with HMP and conventional physiotherapy. This procedure was done for 10 times in each limb in one single session following which the conventional physiotherapy treatment was given.		
Rishi LK et.al; (2014)	N=30 Interventional study 2b	N1=15 N2=15	4 weeeks	G1= stretching(1 week) followed by strengthening(3 weeks) G2=strengthening (3 weeks) followed by stretching(1 week)	Timed up and go test	Stretching followed by strengthening gave more significant results than vice versa. Good posture in transfemoral amputee prevents muscle dysfunction and shows improvement in functional mobility.
Sapna Nandlal Tank et.al; (2020)	N=34 Interventional study 2b	N1=17 N2=17	6 days a week , for 2 weeks Stretching exercise performed actively 30 second hold 3 repetitions, Strengthening exercise performed by 10 second hold 10 repetitions	G1=Hot pack- 20 min; Prone press up; Core stability exercise;Ergonomics G2= Stretching exercise for erector spinae & back extensors muscles ;iliopsoas muscle and rectus femoris muscle together with Strengthening exercise for abdominal muscle & gluteal maximus muscle	Numeric Pain Rating Scale(NPRS), Modified Oswestry Disability Index(MODI)	Janda's approach along with conventional treatment helps in greater improvement on pain and function in patients with non-specific low back pain.
Kale SS et.al; (2020)	N=41 Interventional Study 2b		5 sessions in a week, for 2 weeks	Passive Hip Flexor Stretch, Thoracolumbar extensors stretch, Abdominal Curl ups, Pelvic bridging;	Manual muscle testing of abdominal muscles & gluteal	Stretching & strengthening exercises i.e, Janda's Approach are effective in

				together with home exercise: lunges, Abdominal Curl ups, Pelvic bridging	muscles, Thomas test	treatment of lower crossed syndrome in school going children.
Rajalaxmi V et. al; (2020)	N=30 Interventional Study 2b	N=15 N=15	Janda's approach- Duration of the treatment was for 30 minutes, each exercise 5 to 10 seconds or less than 2minutes. Brugger's Exercise- was performed once or twice for duration of 20-30 minutes & position for 30-60second.s.	G1= Janda's approach for sensory motor training G2= Brugger's exercise	SF-12 scale,Visual analog scale, Goniometer	Janda's approach is effective in comparison to Brugger's exercise to reduce the pain and improve the range of motion in Pelvic Cross Syndrome.

Discussion

The objective of this review is to provide an overview of the different treatment strategies which are used to treat lower cross syndrome. As we have already seen previously that muscle imbalance negatively affects the biomechanics of peripheral joints and spine. So aim of different exercise programs is to normalize the tension of muscles affected by dysfunction. A majority of the studies featured both male and female participants, indicating that issues with low back can occur in both sexes. In this paper we have taken randomized control trials and interventional studies. We have 3 RCTs [6-8] and the remaining studies did not include a control group, featuring instead only experimental groups [9-12].

In order to achieve relaxation of the myofascial apparatus, physiotherapists use different types of techniques to affect tissue length such as myofascial release, bruegger's exercise and stretching of tight muscles. In turn, to activate and strengthen the muscles that are weakened, many types of exercises are used, such as core stability exercises, isometric exercises, muscle energy technique and strengthening exercises. In addition to it sciatic

nerve neurodynamic SNAGS was given along with conventional therapy to reduce pain sensitivity and improve flexibility in patients with lower cross syndrome.

This systematic review shows that according to the available evidence it can be said that stretching and strengthening exercise, i.e Janda's Approach is efficient in treatment of LCS. There are few research studies available with small sample size and in which no long term effects were studied. More research articles in this area are needed, such as better quality RCT, larger sample size and long-term follow up is needed to draw appropriate conclusion. Limitation for the present study is that reviewers who screened the researches on the basis of level of evidence were not blinded to author, institution and journals, which may have cause bias in the study. For further recommendation different types of exercise and other outcome measures should be compared to evaluate the effectiveness of each exercise and benefits of them in treatment protocol of LCS.

Conclusion

Low quality of evidence is there on effectiveness of treatment strategies in subjects having Lower cross syndrome. Based on analysis, recommended exercise programs include, exercise for strengthening weak musculature or for stretching tight muscles. Further studies with large sample size and better study design are needed to draw proper conclusion.

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Conflicts of interest

There are no conflicts of interest.

References

1. Das S, Sarkar B, Sharma R, Mondal M, Kumar P, Sahay P. Prevalence of lower crossed syndrome in young adults: A cross sectional study. Int. J. Adv. Res. 2017 Jun;5(6):2217-28.
2. Hills AP, King NA, Armstrong TJ. The contribution of physical activity and sedentary behaviours to the growth and development of children and adolescents: implications for overweight and obesity. Spots Medicine. 2007;37(6): 533-546.
3. Jyoti VJ, Gakhar M, Keswani S, Jain S, Sharma P, Saraswat R. Yadav P, Arora M., Raghuveer R. Efficacy of muscle energy and myofascial release techniques in correcting anterior pelvic tilt in asymptomatic subjects with lower cross syndrome. IAMR journal of physiotherap .April 2016;4(2)
4. Kage MV. Effectiveness of Stretching and Strengthening Exercises in Patients with postural Low Back Pain A Randomized Controlled Trial.

5. Kale SS, Gijare S. Prevalence of Lower Crossed Syndrome in School Going Children of Age 11 To 15 Years. Executive Editor. 2019 Apr;13(2):176.
6. Kale SS, Jadhav A, Yadav T, Bathia K. Effect of Stretching and Strengthening Exercises (Janda's Approach) in School Going Children with Lower Crossed Syndrome. Indian Journal of Public Health Research & Development. 2020 May 1;11(5).
7. Kurtieva, S. (2021). Adaptation capabilities of functional systems of the body of adolescents with vegetative dystonia syndrome. *International Journal of Health & Medical Sciences*, *4*(1), 129-135. https://doi.org/10.31295/ijhms.v4n1.1622
8. Physiopedia- lower cross syndrome
9. Pradeep S, Heggannavar A, Metgud S. Effect of sciatic nerve neurodynamic sustained natural apophyseal glides on individuals with pelvic crossed syndrome: A randomized controlled trial. Indian Journal of Physical Therapy and Research. 2020 Jan 1;2(1):35.
10. Rajalaxmi V, Nandhini G, Senthilnathan CV, Yuvarani G, Tharani G. Efficacy of Janda's approach versus bruegger's exercise in pelvic cross syndrome and its impact on quality of life.
11. Ratnawati, I. G. A. A., Sutapa, G. N., & Ratini, N. N. (2018). The concentration of radon gas in air-conditioned indoor: Air quality can increase the potential of lung cancer. *International Journal of Physical Sciences and Engineering*, *2*(2), 111–119. https://doi.org/10.29332/ijpse.v2n2.169
12. Rishi LK, Kumar S, Lahiri S, Sharma VP. Importance of iliopsoas and erector spinae muscles in predicting the functional competence of transfemoral amputees. Int J Physiother Res. 2014;2(5):681-88.
13. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2022). Post-pandemic health and its sustainability: Educational situation. *International Journal of Health Sciences*, *6*(1), i-v. https://doi.org/10.53730/ijhs.v6n1.5949
14. Tank SN, Shukla Y. Effect of Janda's Approach on Pain and Function in Patients with Non-Specific Low Back Pain-An Interventional Study. Int J Sci Healthc Res. 2020;5:216-21.
15. Tiefel K. The Efficacy of Treatment for Upper Crossed Syndrome and the Involvement of Chiropractic. Retrieved from the Logan University website on October. 2012 Feb;15:2013.