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DYNAMIC SITTING EXERCISES FOR LOW BACK PAIN: A BRIEF REVIEW

Physiotherapy

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ABSTRACT

Low back pain usually arises from improper sitting postures, resulting in spinal loading and stature changes during extended periods of inactivity. This brief review explores the emerging therapeutic approach of dynamic sitting exercises for non-specific, mechanical LBP. These exercises combine lumbar hyperextension with abdominal drawing-in maneuvers. The objective is to assess the efficacy of dynamic sitting exercises in improving stature change, lumbar mobility, and pain intensity during prolonged sitting. A compilation of studies investigating the impact of dynamic sitting exercises on LBP was reviewed. The studies assessed outcomes such as stature change, muscle fatigue, lumbar mobility, and pain intensity among participants with chronic LBP. The reviewed studies consistently indicate that dynamic sitting exercises significantly contribute to positive changes in stature, lumbar mobility, and pain reduction during prolonged sitting. While short-term effects are well-documented, the long-term impact of these exercises warrants further investigation. Dynamic sitting exercises offer promise in addressing the challenges of prolonged sitting on low back health. Their incorporation into workplace ergonomics, particularly in sedentary occupations, holds potential for prevention and therapeutic intervention in LBP. The immediate positive effects observed in reviewed studies underscore the need for future research with larger sample sizes to establish sustained efficacy and clinical effectiveness in managing low back pain.

KEYWORDS

INTRODUCTION

Low back pain is one of the major causes of worldwide disability. It causes physical mental and psychological disability. Human beings are the only species having low back pain because of a unique feature of bipedal stance.[1] It is considered a symptom instead of a disease.[2]LBP can be both specific and non-specific. Non-specific LBP is mainly postural and does not have a specific cause and on the other hand specific low back pain has an underlying cause such as infection, trauma, or inflammatory conditions.[3]

In whatever position—standing, sitting, or lying down—the human body has a center of gravity that maintains the balance between muscles and bones to preserve the structures' integrity and safeguard them against harm.[4]Functional load, or the effort needed for work and everyday living activities, and ability, or the potential to do these activities, are generally out of balance in LBP. Workers who are subjected to strenuous physical activity, such as weight lifting, repetitive motions, and prolonged stillness, have a greater incidence of LBP. Mechanical low back pain is a result of poor sitting postures that cause spinal loading and stature change over an extended period of inactivity.[5]

According to duration, Acute back pain is described as lasting less than four weeks, subacute back pain as lasting between four and twelve weeks, and chronic back pain as lasting longer than twelve weeks.[6] Clinical practice guidelines advise history taking and physical examination to spot red flags, neurological testing to detect radicular syndrome, use of imaging if serious pathology is suspected (but discourage routine use), and evaluation of psychosocial factors for patients with non-specific low back pain.

The guidelines include reassuring patients about their good prognosis, encouraging them to resume normal activities, advising them to avoid bed rest, and prescribing nonsteroidal anti-inflammatory medicines (NSAIDs) and mild opioids for brief periods. to treat chronic illness patients. The guidelines advise the use of NSAIDs and antidepressants, exercise therapy, and psychological therapies for the management of people with chronic low back pain.

Also, a specialist referral is advised if there is any indication of a particular pathology or radiculopathy or if there has been no improvement after 4 weeks. Although some differences among the existing clinical practice guidelines, a sizable percentage of the advice was consistently accepted. The recommendations for the assessment of psychosocial factors and the administration of specific drugs were different in the current review compared to the prior overviews in some ways (e.g., paracetamol).[7]

LBP has therapeutic regimens like electrotherapy, manual therapy, and soft tissue manipulation and one of them is therapeutic exercises. These exercises focus on stretching, strengthening, and stabilizing the lumbar spine.[8] One of the novel approaches for non-specific, mechanical LBP is dynamic sitting exercises.

These exercises are modified versions of chair care decompression exercises including spinal hyperextension followed by abdominal drawing in maneuvers.[9] These exercises can be included as a part of ergonomics in workplaces where prolonged sitting is required.

Risk factors and causes of low back pain

Risk factors for low back are sociodemographic and lifestyle factors like a sedentary lifestyle, low Level of education, high body weight, and high body mass index (BMI). Physical workload factors like work demanding to lift or carry heavy items, digging, shoveling or pounding); manual handling of heavier loads work with vibrating tools, work demanding kneeling or squatting for one hour/day or longer; work requiring driving a vehicle for >4 hours/day for more than three months a year, work demanding standing or leaning forward without support for one hour/day or longer, work requiring sitting for >5 hours/day.[10]

Psychological and psychosocial factors also influence the physical aspects of the human body and can lead to low back pain these are depression and anxiety, shift work, social support, job satisfaction, and job demands and job control.

Biomechanical risk factors include. Peak shear, hand, and accumulated compressive forces during a thorough shift in the lumbar discs. Workers' beliefs of having a physically demanding job, a hostile work environment, and having more education than those in similar positions were among the self-reported risk variables discovered.[11]

Table 1: - Summary of studies conducted to evaluate the effect of dynamic sitting exercise on low back pain

Authors Journal Year	Objective	Design	Characteristics of the participants Sample size	Methods	Outcome Measures	Results	Limitations
Saiklang P., Puntumetakul R et al,2020.12	to examine the effectiveness of a novel supported dynamic lumbar extension with the abdominal drawing-in maneuver (ADIM) technique on stature change, deep abdominal muscle activity, trunk muscle fatigue, and pain intensity during prolonged sitting in chronic low back pain (CLBP) participants.	randomized crossover study	N=30, (15 males,15females)adults with chronic LBP	Control group sitting without exercise for 41 minutes Experimental group-Spinal extension with abdominal drawing in,3 times in 41 minutes	Stature change, Muscle fatigue, Muscle activity, Pain	Dynamic sitting exercises are significant in stature change, muscle activity and decreased pain	The long-term effects of the exercises were not described
Chatchawan U.,Jupamatangb U.,et al,2015.9	To study the immediate effects of dynamic sitting exercises on lower back mobility of sedentary young adults	randomized crossover study	N=71 sedentary young adults(46 males,25 females) of 18-25 years	Control group-sitting without exercise Experimental group-dynamic sitting exercises for 1 minute every 20 minutes for 2 hours	Lumbar mobility and pain	Significant improvement in lumbar mobility in experimental group but no significant difference in pain between both groups but slight increase in DSE group	The long-term effects of the exercises were not studied
Das D,Venkatesan R.,2020.13	To study the effects of Dynamic Sitting Exercise versus Spinal Extension Exercise on Pain, Lumbar Mobility and Quality of Life in Adults with Mechanical Low Back Pain	comparative experimental study	N=30,young adults of age 20-30 years with mechanical low back pain	Group A and group B received dynamic sitting and spinal extension exercise respectively for thrice a week for six weeks.	Pain,lumbar mobility,quality of life	Significantt improvement in lumabr mobility and quality of life and decreased pain scores in dynamic sitting exercise gropu than in spinal extension group	Sample size was less
Ganu S.,Merchant A.J.,2018.14	To study effects of dynamic sitting exercises for mechanical low back pain	randomized crossover study	N=40,having mechanical low back pain and prolonged sitting postures for more than 8 hours per day for 5 days a week	Control group-conventional treatment like Static Back Cat-camel exercise and Single Leg Raise in quadruped position, Abdominal Curl-ups and Bridging, Experimental group-dynamic sitting exercises along with Dynamic sitting exercises performed six times in a 1-minute period and repeated every 20 minutes while sitting over a 2-hour period. This was repeated for 4 sessions in a week.	Pain, lumbar mobility, low back pain related disability	lumbar ranges and functional independence showed statistically highly significant difference; also pain levels reduced significantly	Characteristics of the participants including as sample were not clearly defined
Phimphasak C., Swangnetr,et al,2015.15	To study the Effects of seated lumbar extension postures on spinal height and lumbar range of motion during prolonged sitting	randomized crossover study	N=24, 20-29 years of age with no history of neck,upper back or lower back pain	Participants were divided into three groups,and then randomly allocated into different orders of experimental sessions, including ABC,	Spinal height,lumbar range of motion	the results demonstrated significant differences in spinal height change among conditions after initial recovery posture intervention	Sample size of the study was less

				BCA and CAB (A, control sessions; B, unsupported sustained lumbar extension condition; C, supported dynamic lumbar extension condition).			
Fryer CJ,Quon AJ.,et al,2010	To determine Magnetic resonance imaging and stadiometric assessment of the lumbar discs after sitting and chair-care decompression exercise	Pre post experimental pilot study	N=6,hospital employees	Midsagittal MRI scans were done prior to sitting, after 15 minutes of unwinding sitting (referred to as "postsitting"), immediately following seated unloading activities, and around 7 minutes later. Then, until three consecutive height measures were equal, seated stadiometry assessments were carried out after 10 minutes of supine recumbency, 15 minutes of calm sitting, and every 10 seconds after seated unloading exercises.	lumbar total midsagittal cross-sectional IVD area, vertical height, lordotic angle, seated body height	The vertical height of the lumbar spine, mean total IVD area, and lordotic angle all decreased after 15 minutes of sitting, but after doing seated unloading activities, these parameters increased by 87.9 mm2, 5.0 mm, and 21.9 mm, respectively. Similar to this, after 15 minutes of sitting, mean seated height on stadiometry declined by 6.9 mm, and then it increased by 5.7 mm following unloading activities.	

Dynamic sitting exercises for low back pain

These exercises can be used as a modified version of chair care decompression exercises. To perform the exercise patient must sit on chair and perform a combination of lower back hyperextension and abdominal drawing-in exercises. Subjects were instructed to perform the following sequence of actions: 1) Relax their arms on the armrests, 2) Extend the lower back until they could feel slight stretching in the lower back and hold for 5secs, then 3) Gently draw in the abdomen to return to the neutral sitting posture in 1-5. This exercise was performed six times in 1 minute and repeated every 20 minutes while sitting over 2 hours. These exercises need to be performed as a part of ergonomic care.

CONCLUSION

Although there are numerous exercise protocols for lower back pain which need some specialized equipment and methods, dynamic sitting exercises can be included in the routine of prolonged sitting postures to prevent lower back pain caused due to sustained postures. These studies conclude that dynamic sitting exercises are beneficial in the treatment of low back pain by improving lumbar mobility,strature change, and spinal height. the development of the general understanding of low back pain, the expansion of available treatments for rehabilitation program planning, and the potential adoption of innovative therapeutic modalities. The clinical effectiveness of dynamic sitting exercises over the long term and with a large sample size will need to be determined by subsequent investigations.

REFERENCES

1. Plomp KA, Dobney K, Collard M. Spondylolysis and spinal adaptations for bipedalism: The overshoot hypothesis. Evolution, medicine, and public health. 2020;2020(1):35-44.
2. Maher C, Underwood M, Buchbinder R. Nonspecific low back pain, The lancet[internet].2016;October,10; 389:10070:736-47.
3. Balagué, Federico, et al. Non-specific low back pain. The Lancet. 2012;379:9814: 48491. Level of evidence 1A
4. EBENBICHLER GR, ODDSSON LI, KOLLMITZER J, ERIM Z. Sensory-motor control of the lower back: implications for rehabilitation. Medicine & Science in Sports & Exercise. 2001 Nov 1;33(11):1889-98.
5. Will JS, Bury DC, Miller JA. Mechanical low back pain. American family physician. 2018 Oct 1;98(7):421-8.
6. Qaseem A, Wilt TJ, McLean RM, Forciea MA. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. Ann Intern Med. 2017 Apr 4;166(7):514-530
7. Oliveira C, Maher C, Pinto R. Clinical practice guidelines for the management of non-specific low back pain in primary care: an updated overview. Euro Spine J 2018; 27:2791–2803
8. Lizier DT, Perez MV, Sakata RK. Exercises for treatment of nonspecific low backpain. Rev Bras Anestesiol.2012 Nov-Dec;62(6):838-46
9. Chatchawan U, Jupamatangb U, Chanchitc S, et al. Immediate effects of dynamic sitting exercise on the lower back mobility of sedentary young adults. J of phys ther sci. 2015;27(11): 3359–3363
10. Kerr MS, Frank JW, Shannon HS, Norman RW, Wells RP, Neumann WP, Bombardier C, Ontario Universities Back Pain Study Group. Biomechanical and psychosocial risk factors for low back pain at work. American journal of public health. 2001 Jul;91(7):1069.
11. Frymoyer JW, Pope MH, Clements JH, Wilder DG, MacPherson B, Ashikaga T. Risk factors in low-back pain. An epidemiological survey. JBJS. 1983 Feb 1;65(2):213-8.
12. Saiklang P, Puntumetakul R, Selfe J, Yeowell G. An evaluation of an innovative exercise to relieve chronic low back pain in sedentary workers. Human Factors. 2022 Aug;64(5):820-34.
13. Das D. Dynamic Sitting Exercise versus Spinal Extension Exercise on Pain, Lumbar Mobility and Quality of Life in Adults with Mechanical Low Back Pain. Indian Journal of Physiotherapy & Occupational Therapy Print-(ISSN 0973-5666) and Electronic–(ISSN 0973-5674). 2020 Jan 30;14(1):83-7
14. Ganu S, Merchant A. Dynamic Sitting Exercise for Mechanical Low Back Pain. International Journal of Health Science and Research.2018;8:10:95-100.
15. Phimphasak C, Swangnetr M, Puntumetakul R, Chatchawan U, Boucaut R. Effects of seated lumbar extension postures on spinal height and lumbar range of motion during prolonged sitting. Ergonomics. 2016 Jan 2;59(1):112-20.