Review article

Nonspecific low back pain in sedentary workers: A narrative review

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(Received: January 2022 Revised: July 2022 Accepted: September 2022)

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ABSTRACT

A sedentary lifestyle is a risk factor, significantly increasing the incidence of low back pain (LBP). Higher levels of sedentary lifestyle were witnessed in the workers who spent the greatest amount of their time in sitting positions in the workplace and during free time. The incidence and prevalence of low back pain in sedentary workers were 14-37% and 34-62%. Noticeably, the people with low back pain had higher productivity loss. It specifies more research is required to help individuals with back pain to stay in their work. The main intention of this study briefly reviews the risk factors, associated adaptations, and Interventions in physical therapy for preventing and managing nonspecific low back pain in sedentary workers. To do this review, Information was gathered from the offline library resources and online electronic search databases (Scopus, COCHRANE, PUBMED). The keywords used were low back pain, sedentary workers, risk factors, adaptations, exercise therapy, and sedentary lifestyle. The prognosis and management of low back pain were greatly influenced by several risk factors related to physical, psychological, and occupational factors. During the transition of low back pain from acute to chronic stages, adaptations in various domains like psychological, behavioral, and neuromuscular changes are seen. Exercise therapy itself or in addition to other therapeutic approaches is successful in preventing and treatment of nonspecific low back pain in sedentary workforces. By identifying associated risk factors, and changes adapted by individual patients, Therapists can design proper exercise therapeutic approaches that will provide more effective interventions.

Keywords: Sedentary workers; nonspecific low back pain; risk factors; adaptations; exercise therapy.

INTRODUCTION

The prominent cause of an increase in the Disability-adjusted life years is low back pain with an increment of 49.8-50.7%, during the last twenty years. The worldwide incidence and prevalence of low back pain are 3.2% and 7.6% respectively. Based on the report on the global burden of disease 2019, low back pain stands as the ninth prominent cause for disability-adjusted life year's DALY of all age groups. But for the age group of 25-49 years, it ranks in fourth place. This highlighted the increase in the dominance of low back pain among young and middle-aged people (1). After segregation through diagnostic triage, 85%-95% of all low back pain cases are nonspecific, which is not attributable to the recognizable and known specific pathology (2). The most probable risk factors such as obesity and high body mass index are caused due to inactive lifestyle habits of the present world (3).

Sedentary behaviour is observed in the workers who work for a prolonged time in a sitting position and is found positively related to low back pain, which in turn causes work absence, reduced quality of life, and functional disability (4). Low back pain is correlated with multiple risk factors including individual, psychosocial, and physical factors, and they vary according to the type of occupation, changes in lifestyle activities, and the alteration of condition from acute to chronic stages (5). During this transition certain adaptive and maladaptive changes include psychological. behavioural and neuromuscular adaptations will be occurring in nonspecific low back pain patients in the process of coping with constant pain (6).

The identification and understanding of risk factors and adaptive changes in sedentary workforces suffering from low back pain provide a rationale for the development of prevention strategies. To achieve this, a better understanding of adaptive changes is also necessary. Low back pain guidelines often suggest practicing physical exercise to prevent and manage nonspecific low back pain. This review aims to look at the risk factors and the adaptations associated with nonspecific low back pain in sedentary workers and review the literature to elucidate the impacts of exercise in dealing with nonspecific low back pain in sedentary workers.

METHODOLOGY

A thorough literature review was conducted to explore the existing literature. Studies published in PubMed, science direct, and Google scholar until November 2021 were included in this review. They were critically evaluated to report the associated risk factors, adaptive changes, and physical exercise for the

prevention and management of nonspecific low back pain in sedentary workers.

Associated risk factors for sedentary workers with low back pain

Risk factors for nonspecific low back pain are classified into individual, psychosocial and occupational factors (7).

Individual risk factors

A previous history of low back pain acts as the strongest and non-modifiable risk factor for the initiation of nonspecific low back pain (8). young middle-aged workers had more occurrences of low back pain due to their poor knowledge of coping strategies with pain, and knowledge of ergonomics, (9). One of the prominent causes of acquiring low back pain at a younger age is the existence of a family history of low back pain. Most female workers are suffering from back pain and this may be probably due to higher responsibilities both at work and office (10). The workers with an inactive lifestyle, lesser physical activity, and obesity extensively amplified the chances of occurrence of constant and chronic nonspecific low back pain (11). Theoretically, Smoking intensifies pain due to the nicotine causing an activation of the immune system and collagen scarcity, and decreasing blood and oxygen supply, giving rise to vascular damage predisposing to back pain(12).

Psychosocial risk factors

Psychosocial factors at work refer to relations among work environment, job content, managerial circumstances, and workers' competencies, which influence health, work performance, and satisfaction in the job, work-family imbalance, exposure to an unpleasant work environment, and lack of confidence in the job were associated with low back pain (13). The risk of developing chronic pain was further encouraged by the Factors like daily-life satisfaction and remuneration for the work, high amount of work, low job handling, and low social support (14).

Occupational factors

Work ergonomics is vital to ensure people work efficiently in their respective atmospheres. Workplace ergonomics plays an important role as a risk factor for sedentary workers' health. computer monitors are not in the correct position for the operator, and lower degrees of office temperature is a changeable occupational risk factor for non-specific LBP in computer-using individuals (15,16). Using non-ergonomic chairs, lack of knowledge of office ergonomics, and taking fewer breaks during work time are significant factors in low back pain, prolonged sitting for more than two hours, the vibration of the whole body, driving forward bending posture, and workstation width showed a greater surge in the lifetime prevalence (17).

Adaptations in sedentary workers with low back pain

During the transition of nonspecific low back pain from acute to chronic stages, patients will adapt to some changes in multiple domains including psychological, behavioural, and neuromuscular. Some of these changes are adaptive, which helps in decreasing the symptoms and helps to cope with a low back pain environment. Later these changes become maladaptive which increases the symptoms and inhibits the ability to cope with the environment. These maladaptive changes generally result from negative views and without a proper awareness of the relationship between pain and harm. Hence these changes are more prevalent in chronic rather than acute conditions. Psychological changes like fear-avoidance beliefs and pain self-efficacy are considered maladaptive as they are strongly associated with functional incapability and the progression of nonspecific chronic low back pain (18).

A previous study states that irrespective of the occupational physical activity an extreme degree of fear avoidance is a risk factor for continuing illness because the workforces often fear that working will worsen the pain state and they prefer to remain at home at rest. According to a study report, Sedentary office workers with low back pain, have adapted to a static sitting posture when compared to the pain-free participants, fear avoidance behaviour is the reasonable explanation of this behaviour. Pain self-efficiency is described as the faith in one's capability to perform painful or perceived painful tasks, individuals with chronic pain had the lowest average self-efficacy in changing their sedentary behaviour mostly when feeling unwell, or in pain. This seems to be a critical mediator in the relationship between fear avoidance and nonspecific chronic low back pain (19-21).

Due to this fear avoidance behaviour and to respond to pain certain behavioural changes like reducing physical activity and adopting a slumped sitting posture were seen. Muscle weakness, muscle wasting, and motor control impairments have long been described as neuromuscular maladaptation associated with nonspecific chronic low back pain (22). The sedentary occupation workers with NSCLBP had a greater functional disability, lower health-related quality of life, and musculoskeletal fitness, and it is accompanied by lower endurance in trunk extensors and flexors, weakness of hip flexors, and adductors (23). As these workers spend most of their working stretch in a drooped sitting posture the amount of postural movement is very less and causes lumbar muscle stiffness which can increase the liability of low

back pain. Most desk job professionals who work for prolonged time sedentary established tightness in the muscles like hamstrings, iliopsoas, and piriformis tightness forcing them prone to low back pain (24).

Interventions for prevention of low back pain

Low back pain is a multiple factor disorder responsible for an enormous society as well as an economic burden on people and systems offering health care facilities. Numerous interventions developed, either aimed for primary or secondary prevention. For primary prevention, most of the studies evaluate the frequency and prevalence of low back pain and also its recurrence. In both cases the impact of low back pain, disability, and cost of management plays an important role.

In the prevention of low back pain use of lumbar supports has moderate evidence when compared with no intervention, or training in preventing low-back pain, and contradictory evidence on whether lumbar supports are effective add-ons to other preventive strategies. In a randomized controlled trial usage of flexible lumbar support has shown no benefits when it is compared with placebo interventions in sedentary assembly workers; this is in accordance with the European clinical guidelines which do not advise lumbar support for the avoidance of low back pain. (25).

Table 1: Studies reviewed for risk factors

S. No	Author and Reference number	Type of Study	Objective	Conclusion
1.	Janawantanakul *et al.* ,(8)	Systematic review	To understand risk factors for the commencement of low back pain (LBP) in office workers.	History of low back pain, risk factors related to posture, and Job tension are accompanied by the onset of low back pain.
2.	Damanhuri *et al.,* (9)	Cross-sectional study	To verify the occurrence and related aspects of LBP among office workers in a Malaysian university	Low back pain let-downs an additional one-third of office workers. Most of them are young, relatively new and people who had poor data about office ergonomics.
3.	Bawab *et al.,(*10)	Cross sectional study	To estimate the occurrence and risk factors of LBP.	risk factors related to LBP were BMI, sitting in a kyphotic posture, household work, maintaining the same posture for a long period of time, and tense life.
4.	Citko *et al.*,(11)	Epidemiological study	To consider the effect of an inactive lifestyle and its associated metabolic interpreters of nonspecific low back pain in nurses and paramedics.	A physically inactive lifestyle widely augmented the incidence of frequent low back pain and the chances of increasing and existence of its chronicity.
5.	Al-Otaibi *et al.*,(17)	Review	This paper goes through scientific research on back pain related to occupation and its prevention.	Lifting heavy weights, driving, and vibration of the whole body are linked to occupational back pain.
6.	Micheletti *et al.,* (12)	Cross-sectional study	To study if a dose-response relationship happened between lifestyle factors and musculoskeletal pain intensity in the low back, neck, and shoulder.	Musculoskeletal pain is less common in people who are physically active and persons with smoking and unhealthy eating habits are correlated with extreme pain.
7.	Young *et al.,(*13)	Cross-sectional study	To check the existence of low back pain and its relation with workplace risk factors.	The factors related to low back discomfort are work, family imbalance, unfavourable work environment, job uncertainty, long working hours, and specific occupation groups
8.	Buruck *et al.,* (14)		To produce evidence on the probable relationship between psychosocial work factors from the areas of work life model and chronic low back pain	High amounts of work pressure, job control, and social support as forecasters of Chronic low back pain.
9.	Ye *et al.*,(15)	Cross-sectional study	To identify the risk factors of non-specific neck pain (NP) and low back pain (LBP) among computer using workers	Computer monitor location, office temperature, and Years of office work are found to be important risk factors for Nonspecific neck and low back pain.

Table 2: Studies reviewed for adaptations

S. No.	Author and Reference number	Type of Study	Objective	Conclusion
1.	Farragher *et al.,* (19)	Narrative review	To investigate the interrelatedness of psychological, behavioral, and neuromuscular adaptations in nonspecific chronic low back pain.	Maladaptation in various areas can lead to disability, diminished function, and quality of life related to persons with nonspecific chronic low back pain. However, present evidence proposes that maladaptation in the psychological and behavioural regions have a larger impact than those in the neuromuscular region.
2.	Jay *et al.,* (20)		To estimate the influence of fear-avoidance attitudes on long-lasting illness.	Irrespective of level of the physical activity in the occupation, fear avoidance acts as a factor for long term illness.
3.	Bontrup *et al.,* (21)		To investigate the association among back pain and occupational sitting behaviours in call centre employees	Further constant sitting behaviours among call centre workers with chronic pain and pain-related disability. Members with chronic pain have a better awareness of pain-free sitting positions and pain aggravating movements compared to individuals with acute pain.
4.	Jani *et al.,* (18)	Cross-sectional	To compare levels of self-efficacy for reducing sedentary time to those for improving Physical activity in healthy persons and individuals with chronic pain and to explore Self-efficacy for overcoming barriers to each behaviour	Individuals with chronic pain had the lowest average self-efficacy for disturbing when feeling unwell or in pain, feeling sad or unhappy, or in social circumstances where others are sitting.
5.	Jung *et al.,* (22)	Cross-sectional study	To examine the effects of extended periods of sitting on trunk muscular weakness and pain in participants with and without chronic low back pain (LBP).	Extended periods of sitting with a drooping posture could surge the risk of facing low back discomfort.
6.	Boutellier *et al.,* (23)	Cross-sectional study	To investigate whether the functioning of the muscle differs between sedentary employees with and without chronic nonspecific low back pain and to establish the relationship between functional restrictions and muscle function.	In sedentary employees with Chronic Nonspecific low back pain, more functional disability was related with lower trunk muscle endurance.
7.	Kett *et al.,*(24)	Experimental study	This study examined the effect of sitting position and postural activity on lower back muscle inflexibility.	The slumped sitting posture is due to lumbar muscle inflexibility. And it helps to find out that lengthy sitting periods are common causes of low back pain.

Workplace alteration typically involves the restructuring of the setting of the work which displays its effect on risk factors that can be modified. None of the studies stipulated a piece of evidence to defend the effect of workplace and task modifications as a management strategy for the prevention of low back pain (26).

The education of the patient regarding low back pain will impart long-term faith and reduce fears and worries of the patient thereby decreasing their appointments in primary care. The education interferences comprised back schools, awareness in the form of videos and leaflets, instruction, and guidance on proper lifting techniques. These types of education strategies will provide short-term benefits in pain and disability in non-specific low back pain, as the results are small and may be inadequate as the only treatment for patients with back pain. There is no consistent evidence for the avoidance of low back pain with the help of back schools (27).

Exercise therapy alone or in combination with education witnessed a moderate level of evidence in preventing and decreasing the number of recurrences and intensity of low back pain. The explanations for this effect may be associated with strengthening the back and amplifying trunk flexibility; boosting blood supply to the spine muscles, joints, and intervertebral disks; and altering the perception of pain. Moreover, the form of exercise is modifying the risk factor and reduction in physical activity. Multidimensional strategies that involve more than one intervention have been recommended to be effective in the prevention of

low back pain. A unification of strengthening, stretching or aerobic exercises can rationally be recommended for the avoidance of LBP in the general population (28).

Table 3: Studies reviewed for prevention of low back pain

S. No.	Author and Reference number	Type of study	Objective	Conclusion
1.	Dujivenbode *et al.,* (26)	Systematic review.	To assess the effects of lumbar support.	The use of lumbar support has moderate evidence when compared to no intervention, and inconsistent evidence when used as an add-on with other preventive interventions. On the whole the evidence is unclear.
2.	Danuta *et al.,* (25)	Randomized controlled trail.	To single out good workplace intervention approaches for the avoidance of low back pain (LBP).	The outcomes of the analysis suggest that the most effective approaches for Low Back Pain prevention include technical changes to the work stand and education based on practical training. Behavioral and physical training appears to be of lesser importance.
3.	Jones *et al.,*(27)	A systematic review and meta-analysis.	To find the result of suggestions or education competed with placebo or no advice or education on pain and disability in people with non-specific low back pain.	This study gives enough evidence that advice gives a temporary benefit but the effect is small and inadequate as a sole treatment in situations where more pain relief is a prerequisite.
4.	Shiri *et al.,*(28)	Systematic Review and meta-analysis	To investigate the impact of exercise to prevent low back pain and disability	A combination of strengthening, stretching, or aerobic exercises implemented can sensibly be suggested for the prevention of Low Back Pain in the overall population.

Interventions for the management of low back pain

For the management of low back pain, there are various therapeutic interventions. The influence of chronic pain will be different in different individuals. Some of them have a minimal disturbance in life and some people are disabled in personal, work, and social life. The persistent nature of the low back pain cannot be cured but its effect on pain and disability can be reduced.

Patient education should comprise the understanding of the human spine, pain neuroscience education, satisfactory prognosis of low back pain, pain handling strategies, and advice concerning the early continuation of activities, which endorses self-handling and promotes the patient to be as physically active as achievable and endure at work. However, the proof for the advice and education is quite narrow as it benefits mostly in adjusting disability at temporary follow-up. Standard education approaches should not be used as a separate treatment, as it shows better improvements when combined with other therapeutic methods (29).

Manual therapy comprises high-velocity thrusting and lower velocity oscillating practices. Massage implies techniques that promote relaxation of the underlying muscles. Both the treatment techniques had integrated support for short-term effectiveness and clinical practice guidelines mention these therapeutic approaches only when they are provided as a part of the multi-modal package (30).

Cognitive behavioural therapy can be in effect in decreasing pain and disability and enhance the quality of life which in turn develops the work status. It is a successful psychosocial intervention for chronic low back pain, very limited evidence is available for the effect of cognitive behavioural therapy on chronic low back pain. Recommendations from the guidelines often suggest that psychological therapies should only be used as a part of multi-modal treatments (31).

Exercise training interventions comprise methods that stick to exercise physiology standards, conventional mind-body exercises (Tai Chi, yoga), varieties that underline specific regulators of movement and bodily responsiveness (Pilates, motor control exercise, or stabilization exercise), and methodologies that include psychological ideologies such as graded activity with graded experience. All these exercise approaches are more effective when they are given as individually supervised programs rather than a group exercise program. When equated with usual care, exercise therapy for sub-acute and chronic low back pain was correlated with minor costs and greater outcomes for quality-adjusted life-year (QALY). Clinical practice guidelines advise trunk muscle strength and endurance training to reduce pain and disability in patients with acute low back pain. In the cases of chronic low back pain, multi-modal exercises, aerobic exercise, aquatic exercise, movement control, and trunk mobility

exercise unveiled a better effect in doing well with pain and disability (32).

Physical activity in the form of various exercise training procedures is in effect and would be integrated into regular care for adults due to its ability for improving pain, physical function, muscle strength, and mental health. It has a greater effect than hands-on therapy. However, there is less evidence that Pilates, stabilization, motor control, resistance training, and aerobic exercise training, are the most effective treatments (33). Lifestyle modification and making a habit of doing physical activity represent a unique and motivating way of focusing on the prevention and management of low back pain (34).

Table 4: Studies reviewed for management of low back pain

S. No.	Author and Reference number	Type of Study	Objective	Conclusion
1.	Gordan *et al.,* (32)	Systematic review.	To discover the influence of back pain on humanity and the role of physical activity.	A general exercise program that has the components of improving muscular strength, flexibility, and aerobic fitness is beneficial for the recovery of non-specific chronic low back pain.
2.	Meher *et al.*,(29)	Review article	To provide a summary of the diagnostic and management guidelines for nonspecific low back pain	Management guidelines allow diagnostic triage to identify cases of low back pain. Management involves education, pharmacological therapies, Non- pharmacological therapies, and appropriate review.
3.	Owen *et al.,* (33)	Network meta-analysis.	Study the efficiency of specific manners of exercise coaching in non-specific chronic low back pain	Pilates, stabilization/motor control, resistance training, and aerobic exercise training have low-quality evidence as the most successful treatments, Exercise is better than hands-on treatment. Heterogeneity and less number of studies with high quality are both limitations
4.	George *et al.,* (30)	Clinical practice guidelines	To bring up-to-date the suggestions offered on interventions conveyed by physical therapists	
5.	Hajihasani *et al.*, (31)	Systematic review	To explore the effect of combining cognitive behavioural treatment with regular physical therapy on pain and depression decline, enhancement in quality of life, and improved function.	Though seeming to be advantageous for pain, disability, functional capacity and quality of life, cognitive behavioural treatment effects on depression cannot be as serious as the effects of Physical therapy.

CONCLUSION

Sedentary workers spend most of their work and leisure time inactively. Risk factors for nonspecific chronic low back pain include both modifiable and unmodifiable risk factors including age, smoking, obesity, unhealthy lifestyles, psychological strain, and pre-history of low back pain. Because of fear avoidance behavior, persons with chronic low back pain reduce their physical activity and movements resulting in improper functioning of the muscles and changes in posture. Exercise plays an important role in both the prevention and management of nonspecific chronic low back pain. Various education strategies and structured exercise protocols are necessary to encourage the patients to be physically active in order to manage the nonspecific chronic low back pain.

CONFLICT OF INTEREST

There are no conflicts of interest among authors**.**

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