

Risk Factors Forchronic Low Back Pain

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Abstract

Chronic low back pain that last for more than 3 months affects an estimated 15-45% of the population and is the most common cause of disability in individuals between the ages of 45 and 65 years. It has a high morbidity with high social and economic effects. The studies done all over the world show that the prevalence of chronic low back pain is increasing. However the improvements in the understanding of the pathology and management of low back pain have not improved significantly over the years. Therefore having knowledge of risk factors for low back pain will help in the prevention of development of low back pain. Therefore a review of current literature regarding the risk factors for low back pain was carried out. According to majority of studies bad posture, lack of physical exercise, presence of low back pain related genes, low levels of education and poor nutrition had a significant association with low back pain. Few studies have found a significant association between low back pain and indulging in regular smoking, regular alcohol consumption, being overweight and underweight and low socio-economic background. However some studies have failed to find a significant association between these factors and low back pain.

Keywords: Low back pain; Risk factors; Bad posture; Physical exercise; Low socio-economic background

Introduction

It is estimated that, in all populations, an individual has an 80% probability of having low back pain at some period during their life time, and about 18% of the population experiences low back pain at any given moment [1]. Low back pain is defined as a pain or discomfort located below the margin of the 12th rib and above the inferior gluteal fold, with or without leg pain. This is a very common complaint where, most of the time, resolution and return to work occur within three months time or less. Most authors consider, pain to be "chronic" when it last for three months or more. However, some authors consider low back pain as chronic when it lasts for seven weeks or more, while some others require duration of six months or more [2]. Some studies have shown that chronic low back pain that last for more than 3 months affects an estimated 15-45% of the population and is the most common cause of disability in individuals between the ages of 45 and 65 years [3]. Chronic low back pain (CLBP) has a high morbidity with high social and economic effects. The studies done all over the world show that the prevalence of CLBP is increasing. This increase in CLBP prevalence is a concern for worry because it is a condition responsible for substantial social impact and an important source of demand for health services [2]. This is a major cause of disability and an important driver of health care costs in the United States and other countries. Current treatments are inadequate for many patients. With current therapies many patients fail to achieve adequate relief for chronic pain [4].

Low back pain and lumbo sacral radicular pain have a large number of causes. They are intervertebral disc degeneration, disc herniation, and osteoarthritis of facet joints, fractures of pars interarticularis, spondylolisthesis, injury to ligaments, paravertebral and gluteal muscle trigger points and injury or inflammation of sacro iliac joints. In addition back pain can arise as a result of primary and metastatic malignant conditions of spine, osteoporotic vertebral fractures, inflammatory disorders of spine, genitourinary, gastrointestinal and gynecological causes and these causes should not be missed in the diagnosis [5]. Although there are a large number of causes for low back pain, in the majority of cases of CLBP the aetiology is unknown [4]. Knowledge of underlying pathology and management outcomes of CLBP has not improved very much over the years [6].

Therefore studying about the risk factors for development of low back pain will help in reducing the occurrence of back pain and help to prevent acute back pain from progressing into CLBP.

Many risk factor studies express different opinions. Majority of risk factor studies mention the factors that are associated or not associated with low back pain but do not mention the possible reasons why these factors are associated or not associated with low back pain. Aim of this study is to review the current literature on risk factors for low back pain and mention probable reasons why these factors are associated or not associated with low back pain.

Association between Body Weight and Low Back Pain

Being overweight has a significant association with the lumbar sacral radicular pain [7]. The results of certain case-control studies have revealed a positive association between increased body mass index (BMI) and lumbar disc herniation among men and women [8]. Lumbar disc herniation is an important cause of low back pain and lumbo sacral radicular pain [9]. According to another study the increase in BMI does not have a significant association with the development of low back pain [10]. This finding is supported by another study done among Sri Lankan adult males that state the BMI does not have a significant association with low back pain [11]. People with increase in BMI may be having strong muscles and bones and strong muscles and bones are important in preventing low back pain. However, another study done on Sri Lankan adult females have demonstrated that being overweight and being underweight are both risk factors for low back pain [12]. People with Anorexia nervosa have a low body mass index. Osteoporosis is a complication of Anorexia nervosa and is associated with a two to three times increase in vertebral fracture risk [13]. Vertebral compression fractures (VCFs) are an important cause of low back pain and are associated with a significantly decreased quality of life [14].

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Association between Physical Activity and Low Back Pain

Low back pain correlates with physical inactivity such as time spent on hours watching TV or video [15]. Sports activities such as swimming and soccer were associated with decreased prevalence of low back pain [15]. According to studies done in Sri Lanka taking part in exercises such as walking and running 20 minutes/day more than three times a week had a significant protective effect on low back pain [11]. Effective strategies for preventing low back pain remain elusive. Physical exercise has consistent evidence for primary prevention of low back pain compared to no activity [16]. Several low back pain (LBP) studies have emphasized the important role of paraspinal muscle morphology on the etiology, prognosis, and management of low back pain. Theories on the role of these muscles arose from imaging studies suggesting that patients with LBP have smaller multifidus muscle cross-sectional area (CSA) and more fatty infiltration compared with asymptomatic control patients who are healthy. Inconsistencies have also been detected in the results of studies evaluating paraspinal muscle morphology between the symptomatic and asymptomatic sides of patients with unilateral LBP [17]. Back muscles act to support the spine and maintain the stability of the spine. The weakness of back muscles such as multifidus and Erector spinae can lead to low back pain and is known as a main cause of recurrence [18]. In patients with chronic low back pain, reflex inhibition induced by pain leads to atrophy of the back muscles and stiffness of the ligaments and joints. Patients reduce their activities due to pain and stiffness, which results in muscle weakness and strain. These eventually aggravate the pain in a vicious cycle [18]. A review for the European Guidelines for prevention of low back pain indicated that core stabilization exercises and traditional lumbar spine exercises are equally effective in the prevention of low back pain because both types strengthen important muscles of spine such as erector spine and multifidus [19]. Postmortem and clinical studies have demonstrated associations between atherosclerotic vascular disease and diseases of disc such as disk degeneration, loss of disc height, vertebral osteophytosis, and endplate sclerosis. Vascular disease is thought to cause disk degeneration by compromising the nutritional supply to the avascular intervertebral disk. This suggests that impaired vascular flow may be a factor associated with disk degeneration [20]. Physical activity both prevents and helps to improve many established atherosclerotic risk factors, including elevated blood pressure, insulin resistance, glucose intolerance, elevated triglyceride concentrations, low high-density lipoprotein cholesterol (HDL-C) concentrations, and obesity [21]. These reasons help us to understand the usefulness of physical exercise in preventing low back pain. Although majority of studies have found that physical exercises are useful in preventing low back pain, a study has found that there is a non-significant lower risk of development of lumbar disc disease in men who are involved with high levels of body building and strength training exercises [8]. This is supported by the study done by Henweer et al. that state lifting heavy weights and increase frequency of lifting was a moderate to strong risk factors for development of low back pain [16].

Association between Heredity and Low Back Pain

Intervertebral disc degeneration (IVD) and disc herniations are implicated as major causes of Low Back Pain (LBP), lumbo sacral radicular and pseudo radicular pains. Pseudo radicular pains can arise even without the involvement of nerves or nerve roots [22]. Recent research indicates that heredity may play a role in disc degeneration as well as herniation of intervertebral discs [9]. The rate of progression of disc degeneration might be controlled by genetic factors [23]. Interleukin 1 (IL 1) is one of the most important cytokines that have

been implicated in the process of IVD. Degenerated intervertebral discs showed a ten-fold higher IL-1 receptor gene expression compared to non-degenerate intervertebral discs [24]. Lumbar disc herniation similar to other complex diseases has both hereditary and environmental influences [24]. The strength of spinal and abdominal muscles is important in the prevention of development of low back pain [17]. Muscle fibres have different properties with respect to force, contraction speed, endurance, oxidative/glycolytic capacity etc. Although adult muscle fibres are normally post-mitotic with little turnover of cells, the physiological properties of the fibres can be changed in the adult animal upon changes in usage such as physical exercise. The signal to change is mainly conveyed by alterations in the patterns of nerve-evoked electrical activity, and is to a large extent due to switches in the expression of genes [25]. Above mentioned studies help us understand the association between heredity and low back pain.

Association between Posture and Low Back Pain

Spinal posture during activities of daily living is assessed in the management of LBP. However, the link between spinal posture and LBP is not fully understood [26]. Strong associations were found between LBP and flexed and rotated positions of the lumbar spine [16]. Compared to standing posture, sitting posture decreases lumbar lordosis and increases low back muscle activity, disc pressure, and pressure on the ischium which are associated with the development of LBP. A sitting device that reduces the low back muscle activity is known to increase sitting comfort and reduce the risk of development of LBP [27]. Degeneration of the lumbar intervertebral disc is regarded as a common cause of CLBP. The etiology of lumbar disc degeneration (LDD) is complex and not fully explained. LDD is considered to be a multifactorial disorder involving numerous genetic and environmental factors and their interactions. Heavy physical loading, trauma, bending, twisting and prolonged non-neutral work postures have been suggested to be associated with disc degeneration [28]. These may be some of the reasons why bad posture is significantly associated with the development of low back pain.

Association between Level of Education and Low Back Pain

The individuals with a college degree or higher levels of education have a lower chance of experiencing LBP than those with only a high school education or are college drop-outs [10]. According to a study done in Norway higher education level was associated with lower probability of current smoking among all male immigrants groups except Sri Lankans. Never having smoked was positively associated with education level among Pakistani and Norwegian men [29]. Education improves physical functioning and self-reported health because it enhances a sense of personal control that encourages and enables a healthy life style such as regular walking, exercising, drinking moderately, avoiding being overweight and smoking [30]. Education enables people to coalesce health producing behaviors into a coherent life style. It does by enhancing the sense of control over outcomes in one's own life [30]. According to Mullah more educated individuals find more time to engage in physical exercise than less educated individuals [31]. Above studies demonstrate that level of education has a strong association with factors such as regular physical exercise, avoiding being overweight and not smoking. All these factors are useful in the prevention of low back pain. Above description help us to understand the beneficial effect the level of education has on LBP

Association between Smoking and Low Back Pain

Long history of smoking has a significant association with LBP and

lumbar sacral radicular pain [7]. However, according to some other studies, association between smoking and development of low back pain is weak [10]. These studies have been done on different races and different countries and these may be contributing to different study findings.

Association between Socioeconomic back Ground and Low Back Pain

Most studies reported that those with high socioeconomic position were more physically active during leisure-time compared to those with low socioeconomic position [32]. Education and race-ethnicity are important markers of social position in the United States that have established relationships with physical activity. Compared to whites and more educated individuals, blacks, Hispanics, and less educated individuals exercise less often [33]. Asian Indians that have a low educational, occupational and socioeconomic status have a greater prevalence of truncal obesity, low HDL cholesterol, hypertriglyceridemia, smoking or tobacco use and low physical activity [34]. Taking part in regular physical exercise is useful in the prevention of LBP [11] and atherosclerosis of blood vessels which is a cause of disc degeneration. Disc degeneration is an important cause of low back pain [20]. However, a study done by Hancock et al. have found that in most of the studied subgroups the CLBP prevalence has at least doubled and the increase was even larger among younger individuals with more years of education and higher economic status [6]. This could be due to that these younger individuals may be involved with less physical exercise because of spending more time on studies and also they may be using motor vehicles and other modes of transport than walking which is a beneficial exercise. Above evidence help us to understand the role of socioeconomic back ground on low back pain.

Association between Reduced Protein Intake and Low Back Pain

Reduced intake of animal proteins had a significant association with low back pain [11]. Reduced protein intake may increase the risk of protein energy weakness and cause muscle wasting and weakness [35]. Weak muscles of the gluteal region and spine are associated with the development of low back pain [36]. Studies have found that improving the strength of spinal muscles is useful in the treatment and prevention of low back pain [18]. Therefore taking a nutritious diet helps in the prevention of LBP.

Association between Alcohol Intake and Low Back Pain

A person who consumes alcohol daily had a twice the chance of developing low back pain compared to a person who does not consume alcohol [11]. Increasing frequency and intensity of alcohol use is associated with statistically significant weight gain [37]. Compared with individuals who never drank, the prevalence of metabolic Syndrome was significantly higher in men who consumed 2 to 4 drinks/day and greater than 4.0 drinks/day [38]. Metabolic syndrome is a disorder of energy utilization and storage, diagnosed by a co-occurrence of abdominal (central) obesity, elevated blood pressure, and elevated fasting plasma glucose, high serum triglycerides, and low high-density cholesterol (HDL) levels. Studies have shown being overweight has a significant association with the lumbar sacral radicular pain [7] and increase BMI is associated with increase chance of developing lumbar disc herniation [8]. Atherosclerosis is known to cause obstruction to the blood flow and reduce the blood supply to the intervertebral discs. Reduce blood supply is a cause of disc degeneration and disc degeneration is an important cause of LBP [20]. These may be reasons

why alcohol consumption has a significant association with low back pain.

Association between Pregnancy and Low Back Pain

Pregnancy-related low back pain is considered an important health problem and potentially leads to long-lasting back pain and disability. It is believed that in pregnancy in addition to biomedical factors psychosocial and social factors might be playing a role with regard to back pain [39]. A descriptive study found that 72% of women were affected with low back pain and pelvic pain (LBPP) during pregnancy. Epidural or spinal anesthesia was not associated with persistent LBPP but Elective Cesarean Section was associated with an increased risk of persistent LBPP [40]. Increase body mass index (BMI), and joint hypermobility are prominent determinants of LBPP during and after pregnancy [41]. Above studies that mention the pregnancy is related with back pain are descriptive studies and it is not clear whether the adjustments have been made with regard to other factors related to low back pain. A case control study done on Sri Lankan females after adjusting for other factors such as bad posture, increase body mass Index found that parity did not have a significant association with low back pain [12].

Conclusion

According to the above study findings, bad posture, lack of physical exercise, presence of low back pain related genes, low levels of education and poor nutrition were found to be significant risk factors for low back pain in many studies. Although physical exercises are useful in the prevention of low back pain certain physical activities such as lifting heavy weights have been responsible for causing low back pain. It is believed that the occurrence of low back pain is related to the nature, intensity and the total physical load of all the physical activities undertaken. Low socio-economic background, indulging in regular smoking, regular alcohol consumption, pregnancy, being overweight and underweight have been found to be significant risk factors for low back pain in few studies and in certain other studies these factors have not been significantly related with back pain. This article provides details of large number of risk factors and how these risk factors can contribute to development of low back pain. These findings will be useful to doctors and therapists who are well placed in the community to advice there patients on prevention of low back pain and also in designing programs either primary or secondary care based.to prevent low back pain.

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