

Factors Predisposing to Work Related Low Back Pain in Automobile Industry Workers – A Hypothesis

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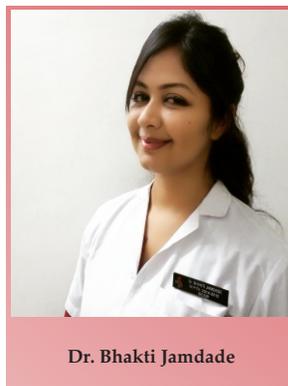
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Abstract

Background: Low back pain is a leading cause of disability and it occurs in similar proportions in all the sectors of working as well as non-working population. It also interferes with quality of life and work performance, and is the most common reason for medical consultations. Work related musculoskeletal disorders especially low back pain leads to substantial economic losses to individuals as well as community. In industrial population various factors like postural deviations, core strength, flexibility and psychosocial aspects are responsible for low back pain. There has also been a high prevalence of low back pain reported in the automobile industry. Although studies have been done to find the etiological factors for low back pain in industrial workers, but there is a dearth of literature in understanding the factors which have a high impact in development of low back pain and the relationship of these factors to the severity of the dysfunction present in this population. Thus, it becomes important to know which are the major factors leading to low back pain and other causative factors for postural deviations which in turn are leading to low back pain in automobile industrial sector. Present study hypothesized that various factors like work postures, core muscles strength, and flexibility of the workers have a major influence on the presence of low back pain in automobile industry workers in a varied proportion. 300 workers from automobile industry will be assessed using the outcome measures like core strength, flexibility, Rapid entire body assessment for high risk postures at work and Nordic musculoskeletal questionnaire for pain analysis. Statistical analysis will be done by Spearman's Correlation coefficient with alpha set at $p < 0.05$.

Clinical importance: The assessment of the factors which contributes maximally to work related low back pain can help target the specific line of management while treating this patients and also prevention of those factors which are leading to low back pain in industrial workers.

Future research: On the basis of this factors contributing to work related low back pain in industrial workers a specific exercise protocol can be designed to minimize the disability and help them to cope up with increasing work demands. Also various environmental factors and psychological factors can be considered.

Keywords: low back pain, musculoskeletal disorders, automobile workers.

THESIS SUMMARY

Introduction

Low back pain is neither a disease nor a diagnostic entity of any sort.

The term refers to pain of variable duration in an area of the anatomy afflicted so often that it is has become a paradigm of

responses to external and internal stimuli [1]. Low back pain is an important public health, economic and social problem. It is a disorder with many aetiologies occurring in different age groups and it is also a common health condition in working population as well as non working population [2]. International surveys of low back pain report a point prevalence of 15–30%, and a 1-month prevalence of between 19 and 43% [3]. Worldwide estimates of lifetime prevalence of low back pain vary from 50 to 84% [2–6]. Back pain leads to high cost for individual, the workplace and society. The prevalence of low back pain is high among industrial workers [7,8]. The working environment may be hazardous and stressful [9,10]. Work schedule and the design of the working environment can lead to errors and accidents [11,12]. Several occupational injuries exist such as musculoskeletal injuries (MSIS), spinal disorders, gas burns, scalds, and respiratory complications [12]. MSIS are among the major occupational hazards facing the working population today, especially among the working class. Burdorf, Rossignol, Fathallah, et al reported that 80% of the adult working population, would experience back pain sometime during their active life because of their nature of work, which requires heavy physical work, awkward posture, or prolong periods in one posture [13]. In occupational health, the type and severity of spinal complaints have high relationship with workload [14,15]. In automobile industries, certain activities like manual handling of weights, lifting, pushing or pulling weights or heavy objects are co related with low back pain [16]. There have been several studies done which confirm that manual handling of heavy objects in industries lead to spinal complaints [17–21]. In most of the automobile industries manual handling of weights, lifting, pushing or pulling of heavy object are constant part of work among workers in production part especially [22]. Several studies have reported incidence and prevalence of musculoskeletal disorders in industrial workers of which low back pain is reported much higher [17–21]. Many studies include various etiological factors for this low back pain like constant physical activity, reduced flexibility and core strength and also psychosocial factors [23]. Additional data on various factors predisposing to work related low back pain is very important for health promotion programmes. The main focus is to identify the work related factors for low back pain among industrial workers. This kind of knowledge is important for different levels from patients to employees, health professionals and clinical settings and finally for public health policy workers.

Hypothesis

Low back pain (LBP) is one of the most significant medical and socioeconomic problems in modern society [24]. The main predictors of back pain include physical stress (e.g., prolonged lifting, driving, forceful or repetitive movements involving the back). Low back pain prevalence is related to the type of occupations such as driving, manual handling and occupations that involve a lot of improper body movements [25]. Work-related physical exposures, especially heavy lifting and manual materials handling, working in awkward postures, and whole-body vibration, are well established risk factors for LBP [25–26]. Low back syndrome, although self-limiting in most cases, leads in a small percentage of patients to chronic problems that can be very costly to manage, and those cases that resolve are prone to recurrence at a rate of up to 90% [27]. The main risk factors for low back pain among production workers were extreme trunk flexion, as well as lifting of loads, pushing or pulling heavy loads and exposure to whole body vibration. Thus it becomes

important to assess the various factors like work posture, core muscle strength and flexibility which influence the presence of low back pain in automobile industry workers and also to find the maximum extent to which this various factors influence the low back pain among industrial workers. This study is based on the hypothesis that some of the factors like core strength, high risk work postures and flexibility; causing work related low back pain industrial workers contribute more than the other factors to cause symptoms and disorders in automobile industry workers. To meet this purpose, an analytical cross sectional study will be conducted, the approval for which has been obtained from the institutional review board. The sample will be collected from an automobile industry that has an incidence report of low back pain as per the records available in the occupational health centre of the concerned industry by convenient sampling method. On the basis of incidence report of low back pain in past 1 year sample will be recruited. Workers working for more than 6 months in industry and having low back pain since 1 month within the age group of 20 – 50 years will be recruited in the study; this is done to eliminate the potential confounders in the study. Workers with any surgical intervention, diagnosed as prolapsed intervertebral disc or pain due to any metastatic or infective origin will be excluded from the study. The data collection, assessment and analysis shall be done as per STROBE statement guidelines. Study will include all the population of the workers having low back pain in the past 1 year. Factors like core strength, flexibility, postural analysis at work place and pain intensity will be assessed. Core strength will be assessed using pressure biofeedback device, flexibility will be assessed using sit and reach test, and postural analysis will be using rapid entire body assessment (REBA) with a photographic method. Pain intensity, severity and location will be assessed using Nordic musculoskeletal questionnaire (NMQ). Statistical analysis will be done by Spearman's Correlation coefficient with alpha set at $p < 0.05$.

Discussion

Work related musculoskeletal disorders (WMSDs) continue to be a major source of disability and lost work time. Low back pain is not a disease but a constellation of symptoms that usually is acute or self limiting. A combination of physical, psychological and psychosocial workplace risk factors have been documented to be responsible for low back pain. Physical risk factors such as high forces, high repetition, and working with arms overhead, long-term static postures, local contact forces and vibration have been commonly identified [28].

Various intrinsic and extrinsic factors are responsible for the low back pain in industrial sector. Noor Sazarina Mad Isa et al (2014) conducted a study in automotive industry workers in Selangor to evaluate the prevalence and the risk factors of low back pain which included work postures and physical activity [29]. The study concluded that occupational risk factors mainly physical demands were significant risk for low back pain among manual material handling workers. This study included only the sustained work posture and physical demands of the manual material handling workers. Jonathan L Vandergrift et al (2011) conducted a study to examine the association between occupational physical and psychosocial ergonomic risk factors and low back pain. The study concluded that exposure to awkward back postures and hand force exertion in automotive industry increased the risk of low back pain also observed the impact of psychosocial work environment on risk of low back pain [30]. Murtezani A et al (2011) conducted the study

to determine the prevalence of low back pain (LBP) in industrial workers, to check for possible low back pain related risk factors and investigate the associations between physical activity and severity of low back pain and concluded that work-related physical factors showed strong associations with low back pain. Above mentioned studies considered the extrinsic factors like physical activity demands of the workers working in automotive industry and its association with low back pain but none of them concentrates on the assessment of the intrinsic factors of the workers which includes core muscles strength, flexibility of the workers and also if the working posture of the worker is at risks, which are also the risk factors for low back pain. So this study concentrates on various intrinsic factors such core muscles strength, flexibility, work postures and pain intensity in the automobile industry population. Industrial workers have to adjust their postures according to the work assembly which includes manufacturing the parts, fixation of various parts, assemble the body, paint shop, quality assurance department. All this assemblies includes bending, twisting the trunk, overhead activities, forward leaning postures, slump sitting, stooping, kneeling, manual handling of weights in awkward positions, pushing or pulling of weights and transfer of which predispose them to be at high risk postures and all this postural deviations equally contribute to low back pain [29].

The core muscle strength is one of the contributing factors for low back pain. The core consists of the abdominal muscles groups (transverse abdomens, internal oblique, external oblique and rectus abdomens), hip abductors/ adductors, hip flexors, the pelvic floor, and lumbar spine. Core stability is important for the maintaining an upright posture and especially for movements and lifts that require extra effort such as lifting a heavy weight from the ground. Without core stability the lower back is not supported and can result in low back pain, poor posture. Workers in automobile industrial have to work in various awkward positions and static postures for long duration with repetition of activities [31]. Mehdi Ghasemkhani et al (2008) discussed that repetitive movements with awkward postures are hazardous when they involved the same joints and muscle groups and when workers do the same motion too often, too quickly and for too long. Manual workers have a static posture of the neck and back. A static posture can produce fatigue because constantly tensed muscles never have an opportunity to recover; thus the potential for discomfort increases [32]. Flexibility is another component that can lead to low back pain. Lack of flexibility in the lower body, particularly in the hamstrings and hip flexors, can cause low back pain [33]. Individuals with LBP commonly present decreased flexibility in the lumbar region, and lower limb muscles which in turn can cause low back pain. Reduced flexibility in low limbs especially in hamstrings and hip flexors due to prolonged sustained positions and lack of stretching leads to low back pain. The hamstrings, when tight, can pull on the pelvis and cause tightness and discomfort in the lower back. Also when hip flexor muscles such as iliopsoas are tight, they tilt your pelvis forward and compress your lower back and cause symptoms of low back pain. Piriformis tightness can also lead to back and leg pain [33]. Thus flexibility can be one of the important factors leading to low back pain in industrial population. Thus this study will be concentrating on this various factors leading to low back pain in automobile industrial population and also find the impact of these factors in producing the symptoms and disorders.

Clinical Implication

Systematic study of all the causative factors of low back pain in

automobile industry workers will help us to know the impact of core muscle strength, flexibility, and work posture in producing the symptoms of low back pain and also which of these factors contribute maximum in producing the symptoms. This in turn can help us to formulate a structured protocol for the treatment of such complaints which will target the specific factor leading to low back pain. Also various preventive measures can be taken to reduce the prevalence of low back pain in this population by taking extrinsic and intrinsic factors into consideration. Various motivational and informative lectures, group activities to maintain the flexibility, strength and endurance of muscles and training of manual material handling can be undertaken.

Future Direction

Specific exercise protocol can be designed for this population considering the factors that is maximally responsible for producing the symptoms. Various other factors like psychosocial and environmental factors can also be taken into consideration.

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