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Spine Evaluation in Occupational Squatters with and Without Low Back Pain

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Abstract: ***Musculoskeletal disorders of the back (LBP) are amongst the leading causes of occupational injury and disability in both developed and developing countries. The clinical problem of lumbar region of spine is referred as low back disorder and has long been recognized. Occupation low back disorders (OLBD) include both acute low back and chronic low back pain. They are the most common and costly occupation health and safety problems in the working population. Moderate loading appears protective because it raises tissue tolerances through tissue remodeling. However, excessive loading reduces safety margins, and excessive repetition can decrease tissue tolerance through cumulative trauma. This study revealed as high as 60% of a cohort of individuals who engaged in regular gardening work with the adoption of deep squatting reported to have experienced back pain during and/after their gardening work.***

Keywords: Squatters, Knee osteoarthritis, Low back pain

1. Background

Musculoskeletal disorders of the back (LBP) are amongst the leading causes of occupational injury and disability in both developed and developing countries. The clinical problem of lumbar region of spine is referred as low back disorder and has long been recognized. Occupation low back disorders (OLBD) include both acute low back and chronic low back pain. They are the most common and costly occupation health and safety problems in the working population. The low back disorder may be asymptomatic but may eventually progress to different stages of illness, sometimes physical disabilities. OLBD is a wide spread occupational problem affecting a spectrum of occupations. More people take off work because of low back pain than any other disease or injury. OLBD problems are caused by multiple and complex factors and are rarely induce by direct trauma. Most of them are the result of overexertion. There were several studies on different risk factors for low back disorder. One of the important is static muscle load. It may be caused by the working posture, work task, bad lighting condition and visual strain. In addition, studies showed that postures have effects on OLBD. Posture like squatting can induce OLBD when improper tools and techniques were used.

Working with the torso near the end of flexion range in a prolonged manner could be one of the most common working postures in various occupational workers, and it has been suggested to have contribution to the development of LBP. Working postures such as sitting, lifting objects from the floor and squatting are all associated with the end range of flexion of trunk while deep squatting involves flexion of both the lumbar spine and the hip joint to their end ranges, contributes to substantially greater degree of total body flexion compared to sitting and forward bending in standing. This is mainly due to excessive loading on spine which creates large spinal compressive forces. It has been suggested that low back loading is responsible for vertebral end-plate fracture, disc herniation and nerve root irritation.

A squatting posture can be described as a "bending of the knees so that the buttocks rest on or near the heels". Certain workplace characteristics were linked with these definitions, such as 1) low working height "at or near ground level" or "at or below knee height"; 2) little or no external weight is supported or lifted; and 3) duration of the posture is "sustained" or "maintained for a long period of time". These additions to the definition of squatting postures stem from the lack of a much-needed delineation between the posture and the work. Low back pain is defined as a non-specific condition that refers to complaints of acute or chronic pain and discomfort in or near the lumbar region. It is an extremely common phenomena, a price mankind has to pay for their upright posture.70% of acute back pain recovers with rest. Pain recurs in 70%. There are two types of back pain: Inflammatory, which are worst in the morning (after rest) and mechanical, which come up after exertion. Most common cause of backache is bad posture, which increases the strain on the disc and ligaments causing faster disc degeneration. The intervertebral discs and facet joints are the major units that work together to maintain the spinal kinematics. Muscle weakness, ligament injury, broken bones or damage to the intervertebral disc can all lead to abnormal biomechanics, and in the development of low back pain. LBD risk is a function of a person's ability to withstand a given magnitude, velocity, and frequency of biomechanical loading. An individual's tolerance for a given loading pattern is mediated by several factors like: Working postures, Duration of exposure to the load and available recovery time, Availability of physical support for the trunk and upper body, Work environment (e. g., noise level). Individual Factors like Age, Gender, Strength, Endurance, etc., Pain Perception, Genetic Factors, Psychological Factors, Psychosocial and Organizational Factors, Co-worker/supervisory support, Monotony of work, Inter Action with superiors

There is substantial evidence reported in various mechanistic studies to partly explain the potential risks associated with adoption of end-range flexion postures. Spinal stability is regarded as relying on the integrity and coordination among

the (a) active subsystem (e. g. muscles and tendon); (b) passive subsystem (e. g. vertebra, dices and ligament); and (c) neutral subsystem (e. g. nerves and central nervous system). Therefore, the presence of deficiency in any of this subsystem may trigger the compensation of complementary subsystems within the spinal stability model. flexion-relaxation phenomenon is a clinical presentation which is characterized by the cessation of muscle activity at the lumbar erector spine when an end range lumbar flexion posture is adopted-may predispose the posterior spinal tissues, such as thoracolumbar fascia and spinal ligaments, to a higher level of stretch effect. The net effect of both active and passive internal forces is increased compressive and shear forces on the spine's intervertebral discs, which can lead to herniated or slipped discs and nerve impingements.

A biomechanical injury occurs when the stresses applied to a tissue exceed its structural strength and produce tissue damage, either at the micro or macro level. There are two classes of biomechanical injuries: acute and cumulative. Acute injuries occur when an overload on the tissue exceeds its tolerance. Most occupationally-related injuries are cumulative, developing due to a decreasing tissue load tolerance with repeated loading. The repetition can cause fatigue, and the tissue tolerance decreases below the magnitude of the load. Spinal tissues have the ability to adapt to increased loading and activity. Moderate loading appears protective because it raises tissue tolerances through tissue remodeling. However, excessive loading reduces safety margins, and excessive repetition can decrease tissue tolerance through cumulative trauma.

This study revealed as high as 60% of a cohort of individuals who engaged in regular gardening work with the adoption of deep squatting reported to have experienced back pain during and/after their gardening work.

2. Aim and Objectives

Objectives

1) To screen musculoskeletal impairments and to identify the most common risk factors in occupational squatters with and without LBP.
2) To perform physical assessment of spine in occupational squatters using clinical test.

3. Methodology

A cross-sectional study was performed on the Occupational squatters which focused on with and without low back pain. Screenings of sample size of 100 subjects were chosen from the population of occupational squatters from Mumbai and Navi Mumbai region, on the basis of inclusion criteria. Female and male Occupational squatters from the age group of 18 – 60yrs. with minimum squatting exposure of 2 years were taken for the study. Subjects with a history of any recent surgery and fracture at spine and lower limbs or soft tissue injury which may affect the functionality of the lower limbs were excluded.

4. Procedure

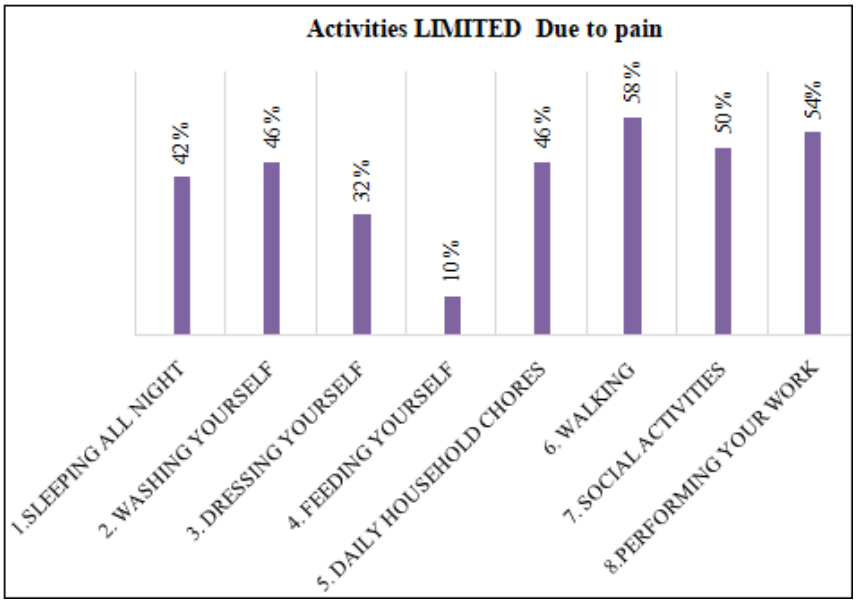
The purpose of study was explained to the subject and a verbal description of all procedures was given. Testing was performed only after informed consents taken from the subjects

5. Results

The demographic information is presented in graphs.

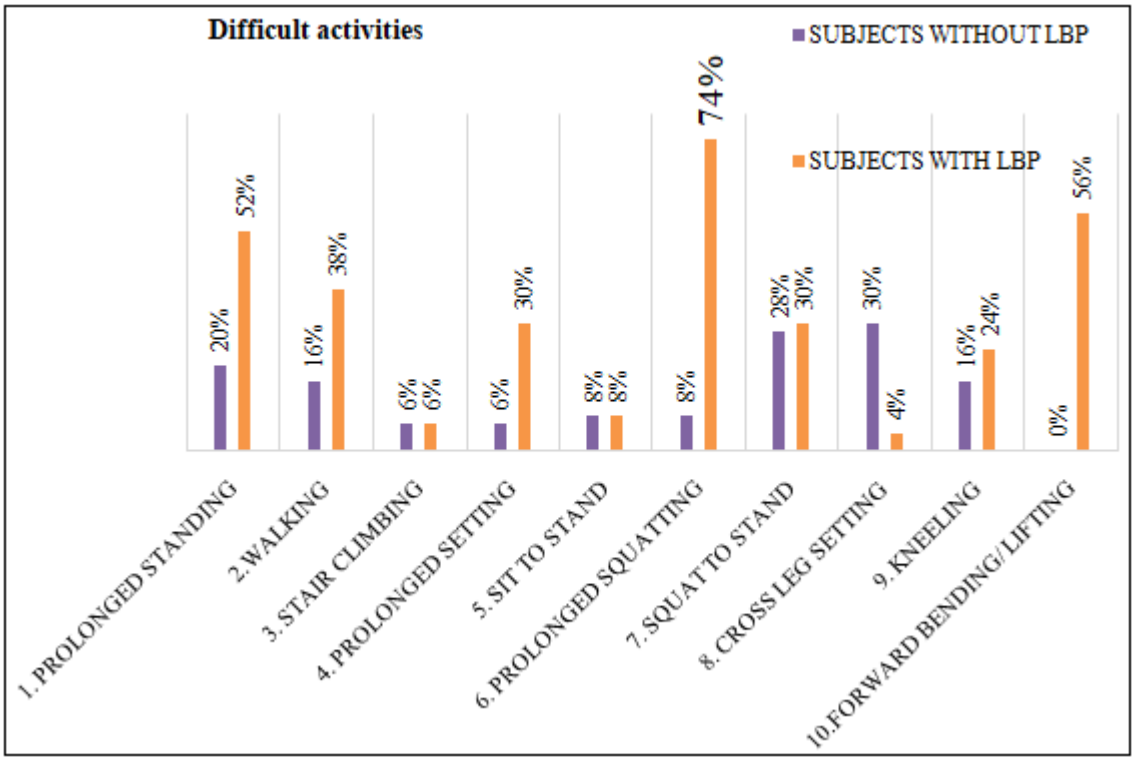
Inference:
i. Out of 50 Subjects without LBP-ii.50 Subjects with LBP-38 Males and 12 Females without LBP.29 males and 21 Females with LBP.

Inference: 1. out of 50 subjects without LBP-prevalence seen in shoulder (18%), neck and knee (14%).
11. out of 50 subjects with LBP – prevalence seen in LBP followed by knee (18%), leg (12%).



Inference: Out of 50 subjects with LBP

Activities limited due to pain are walking (58%), performing your work (54%).



Inference: Out of 50 subjects with LBP
Risk factors are prolonged squatting (74%), forward bending (56%) and prolonged standing (52%).

6. Discussion

Occupational squatters have to squat throughout their work. It forms a very essential component of their lifestyle and helps in earning a livelihood. Any difficulty in performing these movements can drastically affect the performance of an occupational squatter. These difficulties can be attributed to the musculoskeletal changes in their spine and other Close chain joints which occurs due to their postures during daily life. The present study was conducted with an aim to Evaluate the Spine of Occupational Squatters with and without Low Back Pain.

It helps to assess the posture of the spine in the weight bearing position according to a predefined criterion. Spine has long been considered to influence the mechanical alignment and dynamic function of the lower limb and may therefore be related to the development of lower limb musculoskeletal conditions. Some variations in the Spine is associated with changes in lower limb motion and muscle activity, and is strongly influenced by some systemic conditions, such as neurological and rheumatologic diseases. Human spine posture is highly variable among healthy individuals and ranges from flat to high arched. Measurement of Spine is widely considered to be an important component of musculoskeletal examination in clinical practice and research, as variation in Spine have been found to influence lower limb gait kinematics, muscle activity balance and functional ability, and predisposition to overuse injury. Identification of the hip, knee and ankle joint centers enables the measurement of the lower limb mechanical axis (hip-knee ankle) angle and mechanical axis deviation, both of which have been used in calculating the predicted amount of alignment correction.

Our study shows that Occupational squatters have more difficulty in prolonged squatting than the amateur. Prolonged Squatters with back pain have 74% of difficulty and the subjects without back pain have 8%. Excessive squatting can lead to various deformities but may also place greater demands on the neuromuscular system to stabilize the foot and maintain upright stance. The other difficult activities seen are Forward bending and prolonged standing [6] This can be compared in 56% of people with back pain in respect to forward bending and 52% of people suffering from back pain during prolonged standing. This position is maintained throughout their work for about 68% of their day ie.13 hours a day [15]. But with repetitive Squatting and overuse of Back muscles the anterior trunk shortens and leads to changes towards Kyphotic posture. Another factor that could contribute to the flattening of spine is squatting for ADL's. It leads to overuse of extensors of the spine due to the strong contractions required by them on hard floors in order to have a controlled motion at the foot.

7. Conclusion

The study concludes that there is a significant change in postures in occupational squatters and was observed more in people suffering from back pain when compared with the ones without.

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