

Frequency of Work Related Low Back Pain and Disability Among Automobile Mechanics in Lahore

Sameed Liaquat^{*}, Muhammad Jawad¹, Wardah Rauf¹, Mehak Hamna Zahra Gilani¹,
Ishrat Perveen², Serena Taj³

¹University Institute of Physical Therapy, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan

²University of the Punjab, Lahore, Pakistan.

³Public Health Institute, Quetta, Pakistan.

*samiliaquat3@gmail.com

Highlights:

- Frequency of work related low back pain was 69.4% among automobile mechanics.
- Low back pain (LBP) to lesser degree caused severe disability.
- Oswestry Low Back Pain Disability Questionnaire (OLBPDQ) was used to assess the disability caused by low back pain.

Abstract:

Automobile mechanics suffer from Low back pain because of their work and to lesser degree caused severe disability.

Objective:

To find out the prevalence of LBP and disability among automobile mechanics in Lahore.

Methodology:

The study was cross-sectional and included 180 auto-mechanics of Lahore. OLBPDQ was used to measure the disability caused by pain. Pain was measured by Visual Analog Scale (VAS). Data was collected from 180 auto mechanics from auto repair shops of Lahore.

Results:

Out of 180 individuals 125 subjects reported LBP with average age of 30 ± 5.3 years. 87 individual (69.6%) were minimally disabled and 31 individuals (24.8%) experienced moderate disability, whereas only 7 individuals (5.6%) experienced severe disability in activities of daily living (ADLs).

Conclusions:

LBP is highly frequent among automobile mechanics. Majority of the individuals suffering from LBP had minimal disability. The rate of

moderate disability was also noticeable but number of individuals with severe disability was very low. Overall LBP disturbed the quality of life.

Key Words:

LBP, Disability, Auto mechanics, Visual Analog Scale, Quality of life

Introduction:

The prevalent numbers of people with LBP at any one point in time in 1990 was 377.5 million, and this increased to 577.0 million in 2017.¹ Lumber spine has a unique construction which can be compared to a barrel shaped structure. The top of the barrel is made of deformable cartilage plate known as end plate which is 0.6 millimeter thick at but thinnest in the center.² The end plate is porous for transfer of nutrients. Load bearing ability and allows 6° between vertebrae. Its capability to bear load depends on its shape and geometry. Collagen fibers orientation within the concentric rings of annulus is oblique to others. Annulus is able to resist loads when disc is twisted. Half of this mode of loading the other half becomes disabled resulting in substantial loss of ability to bear load. Annulus and nucleus both collaborate to hold up compressive load disc is subjected to bending and compression. Under compacting forces the nucleus compresses applying hydraulic forces to end plates vertically and inner annulus laterally. As a result annulus collagen fibers protrude outward and become tense.³ The lumber spine movements are supervised by four major muscle groups divided into extensors, flexors, lateral rotators and rotators.⁴ LBP can be categorized as

acute when the pain is experienced for less than 4 weeks, sub-acute when the pain ranges between 4–12 weeks. Any pain exceeding the duration of 12 weeks is called as chronic pain. Although classification based solely on timeframe is not satisfactory. Some researches classify LBP on the basis of beginning of indication, location, symptoms, extent, regularity and severity.⁵ Grading system have been devised combining pain intensity and disability.⁶ According to sources of pain it can be classified as mechanical with a known origin such as tumor or fracture or non-mechanical with a unknown cause.⁷ Major cause of Work Related Low Back Pain (WRLBP) arises due to Awkward Posture (AP) of the auto-mechanics and poor ergonomical settings of the workshops. AP is defined as deviation of the body from its natural position.⁸ Postures attained mostly by the mechanics include kneeling, stooping, twisting and squatting. All these factors play a pivotal role in developing LBP. Another risk factor for LBP is increasing age.^{9,10} LBP can cause severe disability among individual. LBP have decreased physical activity as compared to healthy individuals having same characteristics. The quality of life declines due to workspace environment and habits while performing work along with LBP in automobile mechanics. Auto mechanics mostly work in moist condition and work space does not contain required safety precautions and equipment. It can cause physical injuries as many of them may fall from elevated platform or slip from greasy floors.¹¹⁻¹⁵ Even though a number of studies have explored the relation between auto mechanics and musculoskeletal symptoms and has consistently shown significant relationship the association between WRLBP and it causing disability has not been studied. With this rationale a study was conducted aiming at determining the frequency of WRLBP and disability among auto mechanics of Lahore.

Methodology:

180 subjects were enrolled in this cross sectional study using non purposive probability sampling technique. Sample size was calculated using 95%

confidence interval and 5% absolute precision. Mechanics of age 22-40 were included in this having WRLBP and male gender was included in this study and those having risk factors such as recent trauma or other systemic disease were excluded. Information was collected using OLBDPQ and Visual Analog Scale (VAS). The validity of questionnaire was found sufficient. The data was collected from auto-mobile workshops in Lahore city. Data was analyzed using SPSS 21.

Results:

The response rate in this study was 67%. Frequency of LBP was found to be 69.4% (Table1). Frequency of mechanics standing without causing them extra pain was 44(35%), individuals experiencing extra pain during standing was 47(37%) (Table2). Out of 125 individual 86 (69.35%) were minimally disabled, 31 (25%) were moderately disabled whereas a small count of individuals 7(5.6%) was severely disabled during ADL's on OLBDPQ (Figure 1)

LBP	Frequency (%)
Yes	125(69.4)
No	55(30.6)
Total	180

Table 1 : Frequency of Low Back Pain

Standing	Frequency (%)
I can stand as long as I want to	44(35)
I can stand as long as I want to but it causes me extra pain	47(37)
Pain prevents me from standing more than 1 hour	23(18)
Pain prevents me from standing more than half hour	8(6)
Pain prevents me from standing more than 10 minutes	2(1)

Table 2: Frequency of standing disability among mechanics

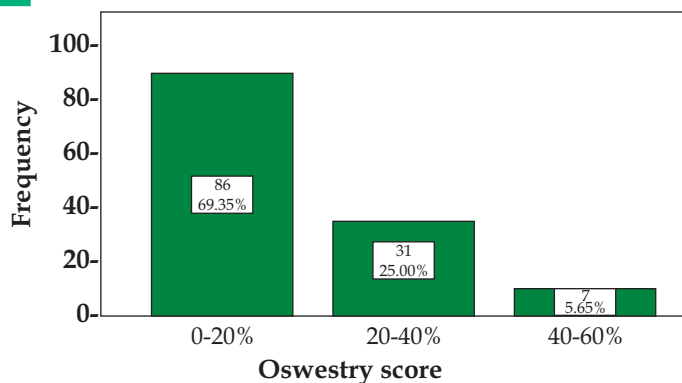


Figure 1: Frequency of Disability on OLBDQ

Discussion:

This study documented WRLBP and Disability among automobile mechanics which was 69.4% in Lahore city. In Bangladesh it was reported that the burden of LBP in auto repairers was 67%¹⁶, whereas in Malaysia it was reported to be 87%¹⁷ which is slightly higher than result of current study. Mechanics in this study reported that common habit of work was in squat sitting position and frequently transitioned their position from sitting to standing and often lifted heavy weights. A study conducted by Cole¹⁸ demonstrated a direct interrelation between lifting as a risk factor for LBP. In common practice mechanics attain unneutral position of spine thus compressing and overstressing the structures beyond their natural limit.⁸ In this study it is found that 48 individuals could stand for long duration but it caused them extra pain. The most regular finding was agonist-antagonist muscle coactivation. In a study conducted by Nelson and et al¹⁹ demonstrated co-activation of gluteus medius in subjects developing LBP during prolonged standing. In this study the response rate was 67% which is low as compared to similar study conducted in developed countries.²⁰ A pretext for this difference might be that developed countries have established framework regarding occupational health, whereas in Pakistan a developing country conventional framework is lacking. Similar response rates have been seen in other study conducted in Pakistan.²¹ Job dissatisfaction, increased workload and low wages are

considered as trigger psychosocial variables. Several strategies are used to subsist the stressors including avoidance from work, attainment of specific posture during work.²² Sleep was occasionally disturbed in 45 (36%) and 23 (18.40%) individuals could only sleep less than 6 hours. This can be attributed to the psychological factors such as anxiety and burnout and muscle fatigue due to faulty posture. Numerous studies point out the fact that anxiety and burnout cause decrease in sleep.²³ Moreover workstation ergonomics were found major contributor to anxiety in comparison to socio demographic variables and job nature.²⁴ Muscle weakness can be caused due to high work demands. Muscle weakness can be defined as a condition in which muscle does not give the required output. Muscle weakness can be accounted as a major cause of functional disability and low back pain as an end result.²⁵ In contradiction to a research that was conducted in 2018 by Jamdade showed that AP a probable cause of low back pain. But, the conclusion of contemporary systematic reviews rejects these universally acknowledged facts. The study demonstrates absence of correlation between work-related posture and lower back pain. They examined standing sitting and twisting, non ergonomic postures like kneeling or squatting, and prolonged sitting at work and leisure time are not associated with back pain.¹⁰

Conclusions:

Frequency of LBP was high among automobile mechanics. Majority of individuals suffering from LBP had minimal disability and rate of moderate disability was also remarkable but fewer numbers of mechanics suffered from severe disability. LBP was identified as major contributor in decline of quality of life.

References:

- 01- Lee H, Hübscher M, Moseley GL, et al. How does pain lead to disability? A systematic review and meta-analysis of mediation studies in people with back and neck pain. *Pain* 2015; 156(6): 988-97.

- 02- Farcy J. Spinal Balance. Spinal Anatomy: Springer; 2020: 485-9.
- 03- McGill SM. Low back disorders: evidence-based prevention and rehabilitation: Human Kinetics; 2018.
- 04- Allegri M, Montella S, Salici F, et al. Mechanisms of low back pain: a guide for diagnosis and therapy. F1000Research 2016; 5.
- 05- Dionne CE, Dunn KM, Croft PR, et al. A consensus approach toward the standardization of back pain definitions for use in prevalence studies. Spine 2008; 33(1): 95-103.
- 06- Ferrer-Peña R, Gil-Martinez A, Pardo-Montero J, Jiménez-Penick V, Gallego-Izquierdo T, La Touche R. Adaptation and validation of the Spanish version of the graded chronic pain scale. Reumatología Clínica (English Edition) 2016; 12(3): 130-8.
- 07- Eromon PE. Psychological and functional disabilities in patients with low pain presenting at the family medicine clinics of Irrua Specialist Teaching hospital, Irrua, Edo state. Faculty of Family Medicine 2015; 4(2).
- 08- Anita A, Yazdani A, Hayati K, Adon M. Association between awkward posture and musculoskeletal disorders (MSD) among assembly line workers in an automotive industry. 2014.
- 09- Toossi M. Employment outlook: 2008-18-labor force projections to 2018: older workers staying more active. Monthly Lab Rev 2009; 132: 30.
- 10- Jamdade B, Shimpi A, Rairikar S, Shyam A, Sancheti P. Factors predisposing to work-related lower back pain in automobile industry workers. International Journal of Occupational Safety and Ergonomics 2018: 1-7.
- 11- Kamal A, Cincinelli A, Martellini T, Palchetti I, Bettazzi F, Malik RN. Health and carcinogenic risk evaluation for cohorts exposed to PAHs in petrochemical workplaces in Rawalpindi city (Pakistan). International journal of environmental health research 2016; 26(1): 37-57.
- 12- Khan AA, Inam S, Idrees M, Dad A, Gul K, Akbar H. Effect of automobile workshop on the health status of automechanics in NWFP, Pakistan. African Journal of Environmental Science and Technology 2010; 4(4): 192-200.
- 13- Rehan M. Workplace Safety and Health Conditions and Facilities in Small Industries in Jeddah Saudi Arabia. 2017; 3: 34.
- 14- Caldwell DJ, Armstrong TW, Barone NJ, Suder JA, Evans MJ. Hydrocarbon solvent exposure data: compilation and analysis of the literature. AIHAJ-American Industrial Hygiene Association 2000; 61(6): 881-94.
- 15- Brosseau L, Bejan A, Parker D, Skan M, Xi M. Workplace safety and health programs, practices, and conditions in auto collision repair businesses. Journal of occupational and environmental hygiene 2014; 11(6): 354-65.
- 16- Akter S, Rahman MM, Mandal S, Nahar N. Musculoskeletal symptoms and physical risk factors among automobile mechanics in Dhaka, Bangladesh. South East Asia Journal of Public Health 2016; 6(1): 8-13.
- 17- Shukriah A, Baba M, Jaharah A. Prevalence and factors contributing to musculoskeletal disorder among garage worker in Malaysia. Journal of Fundamental and Applied Sciences 2017; 9(5S): 1070-9.

- 18- Cole M, Grimshaw P. Low back pain and lifting: a review of epidemiology and aetiology. *Work* 2003; 21(2): 173-84.
- 19- Nelson-Wong E, Gregory DE, Winter DA, Callaghan JP. Gluteus medius muscle activation patterns as a predictor of low back pain during standing. *Clinical Biomechanics* 2008; 23(5): 545-53.
- 20- Torp S, Riise T, Moen BE. Work-Related Musculoskeletal Symptoms among Car Mechanics: A Descriptive Study. *Occupational Medicine* 1996; 46(6): 407-13.
- 21- Fiaz MW, Ahmad A, Munawar A, Rabia K, Fatima M. Prevalence of musculoskeletal pain in traffic police wardens of Lahore, Pakistan. *Rawal Medical Journal* 2018; 43(1): 61-3.
- 22- Torp S, Riise T, Moen BE. The impact of social and organizational factors on workers' coping with musculoskeletal symptoms. *Physical Therapy* 2001; 81(7): 1328-38.
- 23- Thinkkhamrop W, Laohasiriwong W. Factors associated with musculoskeletal disorders among registered nurses: Evidence from the thai nurse cohort study. *Kathmandu University Medical Journal* 2015; 13(3): 238-43.
- 24- De Silva P, Hewage C, Fonseka P. Burnout: an emerging occupational health problem. *Galle Medical Journal* 2009; 14(1).
- 25- Nur NM, Dawal S, Dahari M. The prevalence of work related musculoskeletal disorders among workers performing industrial repetitive tasks in the automotive manufacturing companies. *Proceedings of the 2014 international conference on industrial engineering and operations management Bali, Indonesia; 2014; 2014. p. 7-9*