

Incidence of Low Back Pain in Software Engineers Using Nordic and Oswestry Low Back Disability Questionnaire

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Abstract: Software engineers are particularly vulnerable to low back pain (LBP) because of their extended computer-based work hours. LBP is a common occupational issue among individuals subjected to prolonged static postures, repetitive tasks, and poor ergonomics. Using the Nordic Musculoskeletal Questionnaire and the Oswestry Low Back Disability Questionnaire, this study sought to ascertain the prevalence of LBP and accompanying impairment among software engineers and to correlate these results to specific demographic and occupational variables. 150 software engineers in the Mumbai and Thane region, ages 22 to 45, with at least one year of experience, participated in a cross-sectional study. 51.3% of people had LBP, and 16% said they had experienced symptoms in the seven days prior. 25.97% of people with LBP had mild disability, 3.90% had substantial disability, and 70.13% had no disability at all. As a result, LBP was prevalent but often linked to little functional impairment, though some had already shown signs of disability. among order to lessen and stop the progression of LBP among software engineers, the study promotes ergonomic optimization, posture instruction, activity breaks, and early physiotherapy-based therapies. It highlights modifiable occupational factors such extended sitting, bad posture, and insufficient breaks.

Keywords: Low Back Pain, Software Development Engineer, Senior Software Engineer, Nordic Musculoskeletal Questionnaire, Oswestry Low Back Disability Questionnaire

1. Introduction

Low back pain is common problem which affects our daily life. It occurs in all age groups, but commonly adults are affected. From all musculoskeletal disorders low back pain is one of the most occurring problems involving bone and muscles of the back.[1]

Musculoskeletal issues include: muscle strain, abominable neck and back postures, dull stress injuries of the neck and shoulder uphold, and psychosocial stressors for back, neck, and shoulder complaints. An occupation in computers is seen as huge challenge with pain, which can begin as it so happens in their enlightening getting ready. Reiterated unnatural, veered off, or lacking working postures, serious hand advancements, inadequate rigging or workplace plans, and ill-advised work plans are presumably going to be the particular risk factors for musculoskeletal issues. Profession related health issues in India have shown musculoskeletal issues about 40%.[3]

Work related musculoskeletal disorders is defined as widespread range of inflammatory and degenerative disease conditions which result in pain and functional loss disturbing the body part like especially upper extremity for example shoulder, neck and hands this are commonly affected. 93% of the participants had not less than one computer related complications. which are the commonest musculoskeletal symptoms reported are pain is (55%), and stiffness is (14.8%)

and the common body sites which is affected are mentioned that neck is (44%), low back is (30.5%), wrist/hand are (19%) and shoulders reported as (12.5%).[2]

Use of computers substantially increased in working populations throughout the world as well as in India. 64% of Indian IT professionals reported symptoms of pain and discomfort in a recent study. Globally, lower back pain affects more than 540 million people. It has profound effects on well-being and is often the cause of significant physical and psychological health impairments. It also affects work performance and social responsibilities, such as family life, and is increasingly a major factor in escalating health-care costs.[4]

According to epidemiological studies, in addition to the normal degenerative aging process, ergonomic working practices might aggravate low back diseases in individuals who already have back health issues or accelerate the degeneration of pre-existing back conditions.[6]

LBP has a significant impact on functional capacity, as pain restricts occupational activities and is a major cause of absenteeism. Its economic burden is represented directly by the high costs of health care spending and indirectly by decreased productivity.[5]

Major factors contributing to WR-MSD (Work Related – Musculoskeletal Disorders) include repetition, excessive

working hours, high or sudden vigour, poor posture, sedentary work, and exposure to vibration. MSD has been defined as an inflammatory and degenerative diseases that affect muscles, tendons, ligaments, joints, peripheral nerves, and supportive structures like intervertebral discs.[7]

Software engineers, who spend countless hours hunched over their desks, are particularly susceptible to developing low back pain. The sedentary nature of their work, coupled with poor posture and lack of physical activity, creates the perfect storm for spinal problems. As this issue becomes more widespread, it threatens to undermine the very foundation of India's thriving technology industry.

Need of Study:

- The consequences of this epidemic can be far-reaching. Decreased productivity, absenteeism, and even early retirement can all stem from low back pain, ultimately hindering the progress and competitiveness of India's technology sector.
- There is absence of any recognized study that has been performed on the prevalence of low back pain and the level of its severity among software engineers in Mumbai including the state of Maharashtra.
- The information provided by this study can be used to highlight the need for primary intervention and thereby promoting awareness among software engineers/developers/programmers working in the Indian technology industry.

Aim:

To find the incidence of low back pain and disability amongst software engineers using Nordic musculoskeletal questionnaire & Oswestry low back disability questionnaire.

Objective:

- To find the incidence of low back pain in software engineers using Nordic Musculoskeletal Questionnaire.
- To find the incidence of disability in software engineers using Oswestry Low Back Disability Questionnaire.

2. Materials and Methods

A cross-sectional study was conducted among 150 Software Engineers from Mumbai and Thane district to assess the incidence of low back pain. Participants were first screened for low back pain using Nordic Musculoskeletal Questionnaire. Those who reported experiencing low back pain were further administered with the Oswestry Low Back Disability Questionnaire to evaluate the level of disability.

Inclusion criteria:

- Currently working as a software engineers having work experience of more than 1 year (SDE1, SDE2, SDE3, SDE4, SSE, Principal SDE, Partner SDE)
- Age group between 22 – 45 years old
- Writing code/programming using a desktop or a laptop.
- Software engineers having low back pain.

Exclusion criteria:

- Any history of recent injury/trauma or accident.

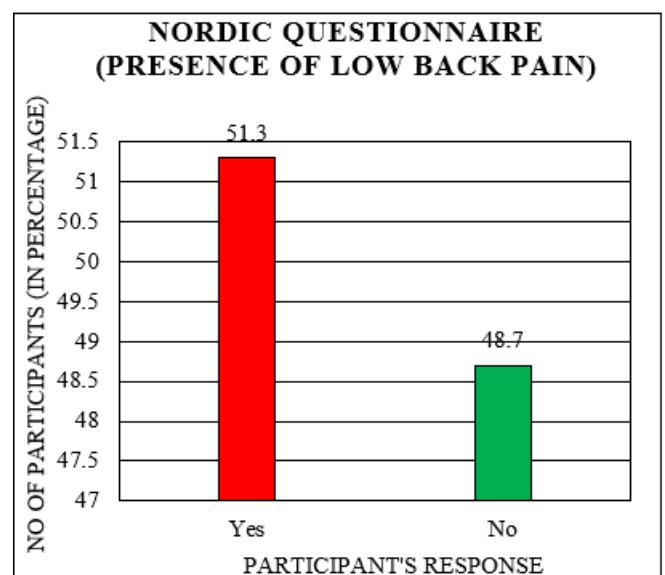
- Recent surgical history belonging to spine, lumbar radiculopathy, recent history of fracture or dislocation, or any other lumbar pathology.
- Hybrid & Work from home working pattern.

3. Procedure

- The study will be conducted after taking ethical approval from the Institutional Ethics Committee of TMV's Lokmanya Tilak College of Physiotherapy, Kharghar.
- It will be a cross-sectional survey with convenience sampling having 150 participants.
- The participants will be taken from MUMBAI and THANE district.
- The participants will be recruited following the inclusion criteria.
- The participant's consent will be taken on the consent form after explaining the need and procedure of the study.
- A demographic sheet will be given to every participant asking the participant about their name, age, gender, contact details, designation, work experience, any past medical/surgical history, and the participants will be briefed about "NORDIC MUSCULOSKELETAL & OSWESTRY LOW BACK DISABILITY QUESTIONNAIRE".
- Participants will fill the NORDIC MUSCULOSKELETAL QUESTIONNAIRE followed by OSWESTRY LOW BACK PAIN DISABILITY QUESTIONNAIRE and the data will be recorded.
- Data will be collected and statistically analysed using Microsoft Excel and SPSS version 26 softwares.

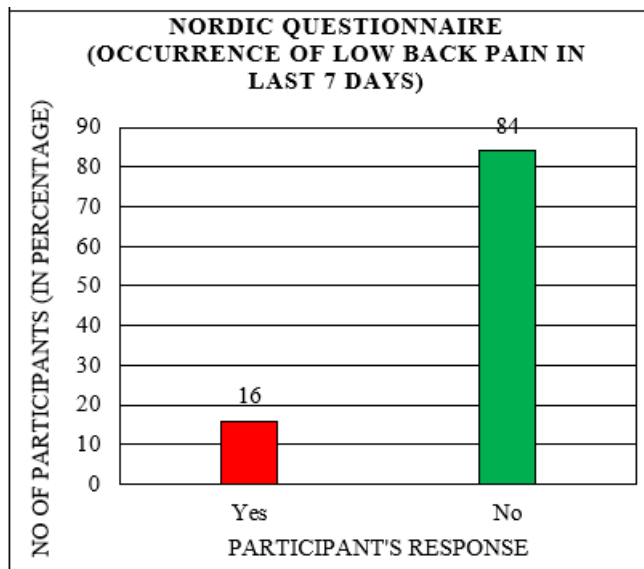
4. Data Analysis and Results

Data entry, validation, and basic descriptive statistics were analyzed using Microsoft-Excel and SPSS version 26. Descriptive statistics was applied to describe participant characteristics as well as study outcomes where continuous variables were summarized using mean \pm standard deviation or median and interquartile range while categorical variables were expressed in frequency and percentages.



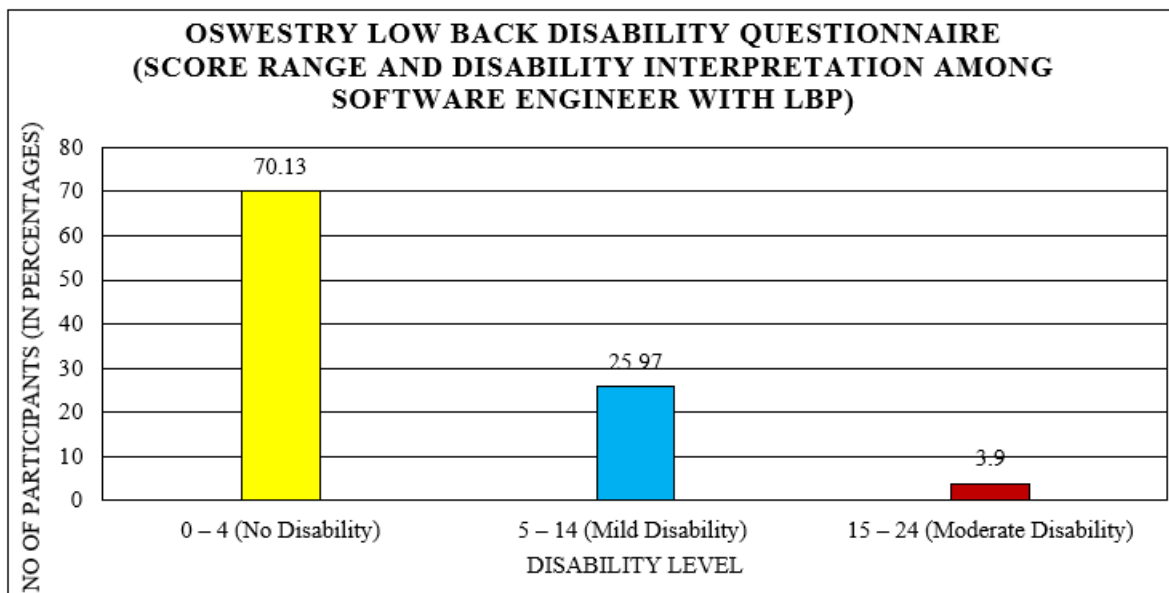
Graph 1: Presence of low back pain based on Nordic Musculoskeletal Questionnaire

More than half (51.3%) had reported presence of low back pain



Graph No. 2: Occurrence of low back pain in last 7 days based on Nordic Questionnaire

Only 16 % experienced low back pain in last 7 days (past week)



Graph 3: Score range and Disability interpretation among software engineers with low back pain.

The vast majority (70.13%) of those affected with low back pain experienced no disability, and an additional 25.97% reported only mild disability while just 3.90% suffered from moderate disability

Table 1: Characteristics of participants

Characteristics	Categories	n (%)	Mean \pm SD	Median (IQR)
Age (in years)	Overall	150 (100%)	27.80 \pm 4.12	27 (25 – 30)
	21 - 25			
	26 - 30			
	31 - 35			
	36 - 40			
	41 - 45			
Gender	Male	122 (81.3%)		
	Female	28 (18.7%)		
Designation	SDE 1	41 (27.3%)		
	SDE 2	46 (30.7%)		
	SDE 3	38 (25.3%)		
	SDE 4	24 (16%)		
	SSE	1 (0.7%)		

Work Experience (in years)	Overall	150 (100%)	4.99 ± 3.50	4 (3 – 6.13)
	1 – 3	58 (38.7%)		
	4 – 6	55 (36.7%)		
	7 – 9	25 (16.7%)		
	≥ 10	12 (8%)		

SD = Standard Deviation, IQR = Interquartile Range, SDE = Software Development Engineer, SSE = Senior Software Engineer

Table 1: Characteristics of participants

Table 1 summarizes demographic and professional profile of 150 software engineers. The average age is around 28 years, with most individuals falling between 25 and 30, as indicated by the median and interquartile range. The group is predominantly male (81.3%), with a much smaller

representation of females (18.7%). Most individuals are distributed among SDE 1 (27.3%), SDE 2 (30.7%), and SDE 3 (25.3%) while SDE 4 roles (16%) and SSE (0.7%) are less common. The average work experience is about 4.99 ± 3.50 years, with majority of the participants falling in the 1 – 3 years' experience range (38.7%).

Table 2: Low back pain and disability among software engineers

Variables (Outcomes)	Categories	n (%)
Nordic Questionnaire (Presence of Low Back Pain)	Yes	77 (51.3%)
	No	73 (48.7%)
Nordic Questionnaire (Occurrence of Low Back Pain in last 7 days)	Yes	24 (16%)
	No	126 (84%)
Oswestry Low Back Disability Questionnaire (Score range and Disability interpretation among software engineers with LBP)	0 – 4 (No Disability)	54 (70.13%)
	5 – 14 (Mild Disability)	20 (25.97%)
	15 – 24 (Moderate Disability)	3 (3.90%)

LBP = Low Back Pain

Table 2: Low back pain and disability level among software engineers

Table 2 represents tabular summary and brief interpretation of the provided data on low back pain and disability among software engineers, based on the Nordic and Oswestry Questionnaires. More than half (51.3%) had reported presence of low back pain. However, only a small fraction (16%) experienced low back pain in the past week. The vast majority (70.13%) of those affected with low back pain experienced no disability, and an additional 25.97% reported only mild disability while just 3.90% suffered from moderate disability.

5. Discussion

The present cross-sectional study investigates the incidence and recent prevalence of low back pain (LBP) among software engineers, using both the Nordic Musculoskeletal Questionnaire and the Oswestry Low Back Disability Questionnaire as principal assessment tools. The study findings reveal that more than half of the participants who were engineers (51.3%) reported experiencing LBP at some point, highlighting the burden of this musculoskeletal complaint within the information technology sector.

Only a fraction (16%) of respondents reported LBP symptoms in the preceding week, indicating that, whereas incidence is high, persistent or acute episodes are comparatively less common in this relatively young professional cohort. The high point-prevalence suggests that occupational exposures such as prolonged sitting, repetitive posture, and ergonomic inadequacies may contribute substantially to LBP, consistent with past literature in similar occupational groups.^[1] However, the drop in short-term prevalence may reflect intermittent or self-limiting episodes rather than being a chronic problem.

Assessment of functional disability through the Oswestry Index reveals that the overwhelming majority (70.13%) of those experiencing LBP reported no measurable functional limitation. An additional 25.97% fell within the 'mild disability' range, with only 3.9% reporting moderate disability, and no participants classified as having severe or extreme disability. These outcomes indicate that, despite a high burden of reported back pain, the negative impact on daily function and work productivity is generally limited for most engineers in this sample. These results reinforce previous findings that associate professional computer usage with frequent, yet mostly mild, musculoskeletal complaints.

Comparatively, earlier epidemiological investigations among desk-based workers have consistently reported a high prevalence of musculoskeletal pain, with risk modulated by factors such as work duration, posture, and inadequate breaks. As in the present study, gender and age distribution suggest a predominance of risk among males in early professional years, possibly owing to greater occupational exposure or different physical activity patterns.

Nevertheless, the relatively low burden of moderate and severe disability in the current findings could be attributed to younger sample age and effective self-management practices, or possible under-reporting due to concerns about work performance and job retention.

One limitation of the current study is its cross-sectional design, which does not account for the fluctuating or recurrent nature of LBP over time. Furthermore, the reliance on self-reported symptoms may introduce reporting bias. Despite these constraints, the robust sample size and use of validated assessment tools enhance the reliability of observed trends. In summary, this investigation demonstrates a considerable incidence of LBP among software engineers, accompanied, however, by minimal levels of recent disability. These findings underscore the importance of workplace health

promotion—specifically ergonomic interventions, routine physical activity, and early management strategies—to mitigate the impact of LBP in this occupational group.

6. Conclusion

This study highlights that over half of the surveyed software engineers (51.3%) experienced low back pain, though only 16% reported recent occurrences within the past week.

Despite the prevalence of low back pain, 70.13% exhibited no disability, while mild and moderate disabilities accounted for 25.97% and 3.90%, respectively.

The cohort was predominantly male, averaged 28 years of age, and held early-career designations, suggesting youthful demographics with generally low chronic disability despite frequent reports of discomfort.

These findings underscore the need for ergonomic modifications, preventative physiotherapy interventions, and health promotion strategies in tech workplaces to further reduce pain and disability in this population.

Conflict of Interest:

None

Sources of Funding:

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