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Prevalence of Mechanical Low Back Pain Among Young Adults: A Cross-Sectional Study

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Abstract.

Background: Mechanical low back pain is a prevalent musculoskeletal condition characterized by pain localized in the lumbar spine, often attributed to mechanical factors such as posture, repetitive strain, or physical activity. MLBP significantly impacts the quality of life, particularly among young adults who face substantial academic, professional, and social demands. Previous studies have highlighted the global burden of low back pain , yet there is limited data focusing on its prevalence and associated factors in young adults. Understanding these aspects is essential for developing targeted prevention and management strategies.

Objective: To determine the prevalence of mechanical low back pain and its associated demographic characteristics among young adults.

Methodology: This cross-sectional study was conducted at Parul University and included 230 participants aged 17-36 years. Data collection was carried out using a structured Google Form survey that gathered information on demographic details, history of MLBP, and pain intensity using the Visual Analog Scale (VAS). Statistical analyses were performed to calculate prevalence rates, mean age, and mean VAS scores along with their standard deviations.

Results: The prevalence of MLBP among young adults was distributed across age groups as follows: 17-20 years: 61.30%,21-24 years: 32.17%,25-28 years: 4.34%,29-36 years: 2.17%The mean age of participants was 20.68 years (SD = 2.71), and the mean VAS score for pain intensity was 3.42 (SD = 2.97). The highest prevalence was observed in the 17-20 age group, underscoring the need for early interventions.

Conclusion: The findings of this study indicate a high prevalence of MLBP among young adults, particularly in the 17-20 age group. These results highlight the importance of implementing preventive measures, such as ergonomic education and physical activity programs, to reduce the burden of MLBP in this demographic.

Keywords: Mechanical low back pain, young adults, prevalence, Visual Analog Scale, musculoskeletal disorders.

Introduction

Mechanical low back pain (MLBP) is a common musculoskeletal disorder characterized by pain localized in the lumbar spine, often influenced by mechanical factors such as posture, repetitive strain, or physical activity. The condition is particularly concerning in young adults due to their academic and professional demands. Understanding the prevalence and associated factors of MLBP in this demographic is crucial for designing effective preventive and therapeutic strategies (1, 2).

Low back pain (LBP) is recognized as a leading cause of disability worldwide, contributing to significant personal and socioeconomic burdens. Hoy et al. emphasized that the global burden of low back pain is substantial, as it is one of the leading causes of years lived with disability (YLDs) (1). Mechanical low back pain, a subset of LBP, is primarily attributed to biomechanical causes rather than systemic or inflammatory conditions (2). As noted by Maher et al., understanding the biomechanical factors underlying MLBP is critical for effective management and prevention (2).

In young adults, the prevalence of MLBP is rising due to a combination of sedentary lifestyles, prolonged sitting during academic or professional activities, and improper ergonomics. This demographic, often in the prime of their productivity, is at risk of long-term consequences if preventive measures are not implemented (3). Balagué et al. highlighted that nonspecific low back pain, including MLBP, often becomes chronic if not addressed promptly, further emphasizing the need for early intervention (3).

Epidemiological studies have consistently demonstrated the high prevalence of MLBP among various populations. Andersson provided a detailed overview of chronic low back pain, noting that the condition's epidemiological features vary by age, gender, and occupational factors (5). Among young adults, prolonged sitting, physical inactivity, and improper lifting techniques are commonly reported risk factors. Ehrlich noted that LBP often results from a combination of occupational and lifestyle-related factors, further highlighting the need for targeted strategies to mitigate these risks (4).

The role of lifestyle factors, such as smoking and physical inactivity, in contributing to MLBP has been extensively studied. Shiri et al. conducted a meta-analysis showing a significant association between smoking

and low back pain, suggesting that smoking may exacerbate inflammation and reduce spinal health (11). Similarly, sedentary behaviors and poor physical fitness have been identified as modifiable risk factors for MLBP (6).

MLBP results from the interplay of various biomechanical and physiological factors. It is often associated with strain or injury to the lumbar muscles, ligaments, or intervertebral discs. Foster et al. noted that repetitive mechanical stress on the lumbar spine can lead to microtrauma, inflammation, and subsequent pain (8). In young adults, activities such as prolonged sitting, improper lifting, and lack of core strength contribute significantly to these biomechanical stresses.

The fear-avoidance model, proposed by Vlaeyen and Linton, provides a psychological perspective on chronic MLBP. According to this model, individuals with MLBP may develop a fear of movement due to the anticipation of pain, leading to reduced physical activity and further deconditioning (13). This highlights the importance of addressing both physical and psychological factors in managing MLBP.

The academic and professional demands of young adults place them at a unique risk for MLBP. Long hours of studying or working at a desk often lead to poor posture, which can strain the lumbar spine. Additionally, the increasing use of technology, such as laptops and smartphones, exacerbates this issue by promoting forward head posture and slouched sitting positions (9).

The consequences of MLBP in young adults extend beyond physical discomfort. Chronic pain can lead to decreased productivity, absenteeism, and reduced quality of life. Dionne et al. emphasized that chronic low back pain is a predictor of poor long-term outcomes, including psychological distress and socioeconomic challenges (14). Early identification and intervention are therefore crucial to prevent the progression of MLBP in this demographic.

Prevention and management of MLBP require a multifaceted approach. Ergonomic interventions, physical activity, and exercise therapy have been shown to be effective in reducing the risk and severity of MLBP. Sihawong et al. demonstrated that exercise therapy focusing on core strength and flexibility significantly improved outcomes in individuals with chronic MLBP (7). Similarly, Foster et al. highlighted the importance of integrating preventive measures, such as workplace ergonomics and physical fitness programs, to reduce the burden of MLBP (8).

Education also plays a vital role in preventing MLBP among young adults. Awareness campaigns focusing on proper posture, lifting techniques, and the importance of regular physical activity can empower individuals to take proactive measures. Hartvigsen et al. noted that public health initiatives aimed at reducing the global burden of low back pain must prioritize education and prevention (6).

Mechanical low back pain is a significant public health concern, particularly among young adults. Its high prevalence, coupled with the potential for chronicity and disability, underscores the need for targeted preventive and therapeutic strategies. By addressing the biomechanical, psychological, and lifestyle-related factors contributing to MLBP, it is possible to reduce its impact on individuals and society. Continued research and public health initiatives are essential to advance our understanding and management of this prevalent condition.

Need of the Study

Mechanical low back pain (MLBP) is a significant global health concern, affecting individuals across various age groups and socioeconomic backgrounds. In young adults, the condition is particularly alarming due to its potential to disrupt academic, professional, and personal activities during a critical phase of life. This demographic faces unique risk factors, including prolonged sitting, improper posture during studying, the physical strain of

professional training, and limited awareness about preventive measures. Understanding the prevalence and associated factors of MLBP in this population is crucial to mitigate its short-term and long-term consequences.

Globally, MLBP is among the leading causes of disability, as highlighted by Hoy et al. (1) and Hartvigsen et al. (6), emphasizing the urgent need for targeted interventions. Young adults are particularly vulnerable due to the increased demands of modern lifestyles, which often involve long hours of sedentary behavior, poor ergonomics, and inadequate physical activity (3, 2). Additionally, factors such as smoking (11), fear-avoidance behavior (13), and stress further exacerbate the condition, as noted in the literature.

The academic and professional pressures faced by students and young professionals can lead to neglect of early symptoms, increasing the risk of chronicity and decreased quality of life (8). Evidence suggests that early identification and management of MLBP can significantly reduce its impact and improve outcomes (7). However, there is a lack of localized data on the prevalence and severity of MLBP among young adults in specific regions, such as those enrolled in institutions like Parul University.

This study seeks to address this gap by providing a comprehensive analysis of the prevalence and severity of MLBP in young adults aged 17–36 years. By leveraging validated tools such as the Visual Analog Scale (VAS) and collecting demographic and lifestyle data, the study aims to identify high-risk groups and associated factors. The findings can inform the design of targeted preventive measures, ergonomic interventions, and therapeutic strategies tailored to the needs of this population. Moreover, insights from this research will contribute to the broader understanding of MLBP, aligning with global efforts to reduce its burden as discussed by Briggs et al. (9) and Andersson (5).

Aim

To determine the prevalence and severity of mechanical low back pain among young adults aged 17-36 years at Parul University.

Objectives

1. To assess the prevalence of MLBP in different age groups within the young adult population.
2. To assess the prevalence of MLBP in male and female of the young adult population

METHODOLOGY

STUDY DESIGN: Cross-sectional study.

POPULATION: Young adults aged 17-36 years from Parul University.

SAMPLE SIZE: 230 participants.

DATA COLLECTION TOOL: Google Form survey, including:

- Demographic details (age, gender, academic year).
- History and frequency of low back pain.
- Pain intensity measured using the Visual Analog Scale (VAS).

ETHICAL CLEARANCE: As the study includes human subjects ethical clearance was obtained from Parul university institutional ethical committee for human research. (PU-IECHR).

CTRI NO : CTRI/2024/07/089197

STATSTICAL ANALYSIS :

Descriptive analysis of age and VAS interpreted by using statistical software IBM SPSS- 20.The descriptive statistics including means and standard deviations were obtained.

Procedure:

1. The Google Form was circulated among students and young staff members at Parul University.
2. Participants provided informed consent before completing the survey.
3. Data were analyzed using descriptive statistics to calculate prevalence, mean age, and VAS scores along with their standard deviations.

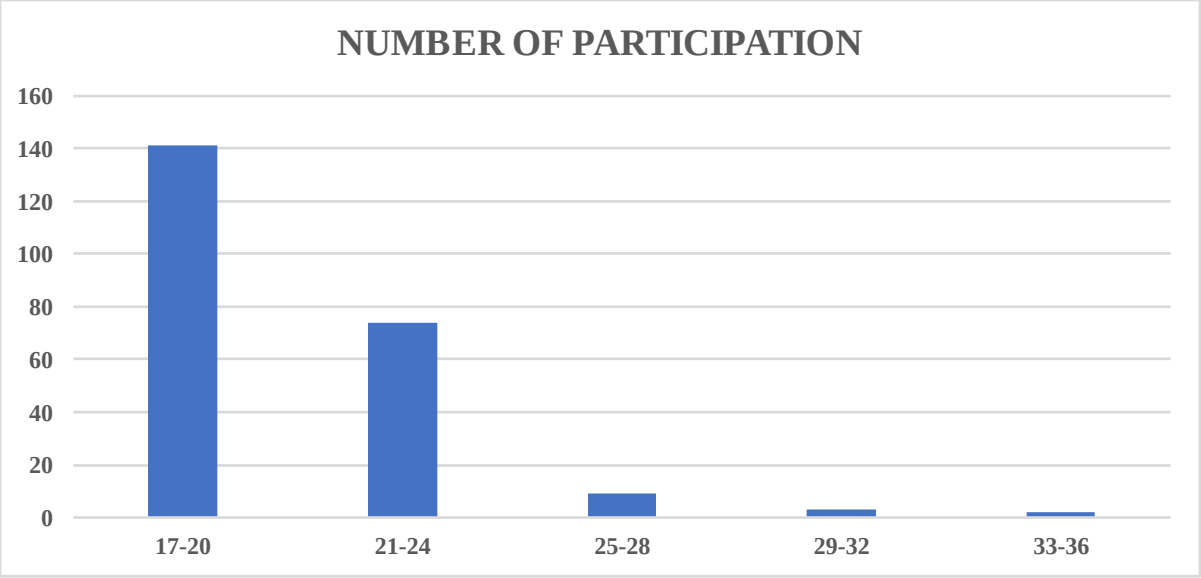
Results

Demographics:

Total participants: 230

TABLE 1 : AGE DISTRIBUTION

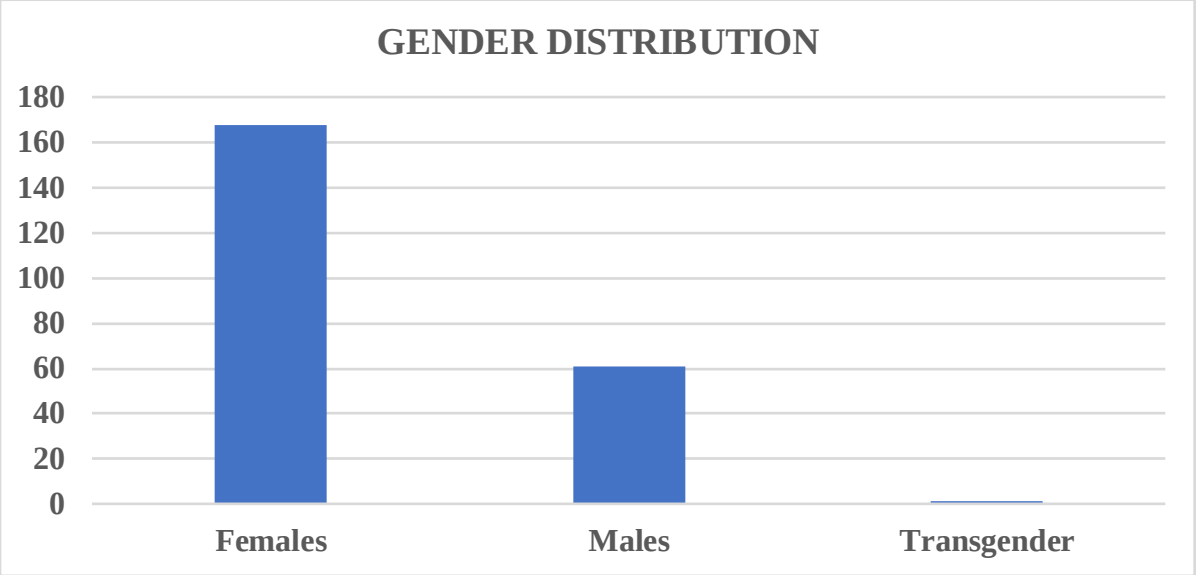
AGE DISTRINBUTION	NUMBER OF PARTICIPATION
17-20	141
21-24	74
25-28	9
29-32	3
33-36	2



GRAPH 1 : AGE DISTRIBUTION

TABLE 2 : GENDER DISTRIBUTION

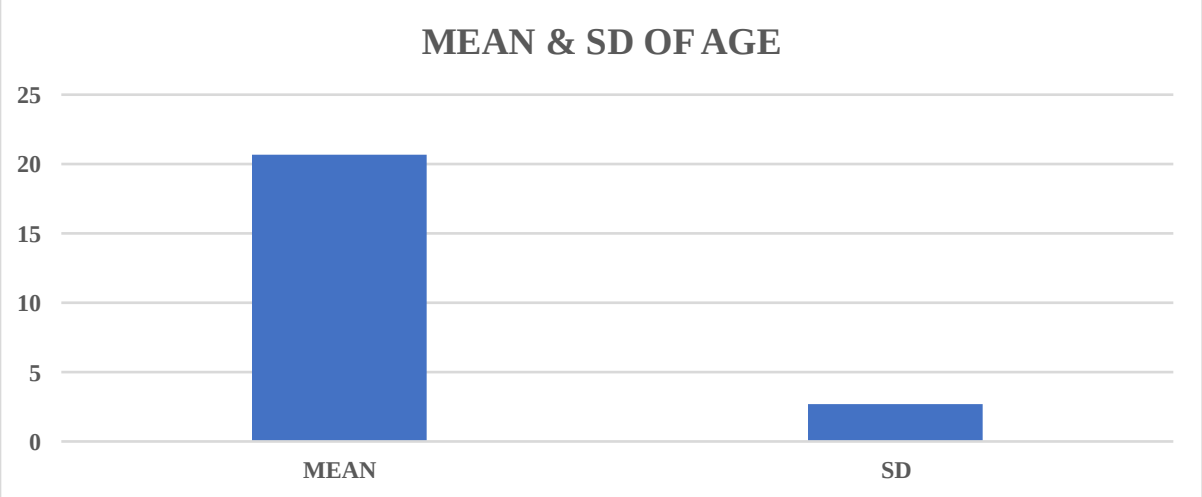
GENDER	COUNT
Females	168
Males	61
Transgender	1



GRAPH 2 : GENDER DISTRIBUTION

TABLE 3 : DESCRIPTION OF AGE (MEAN & SD)

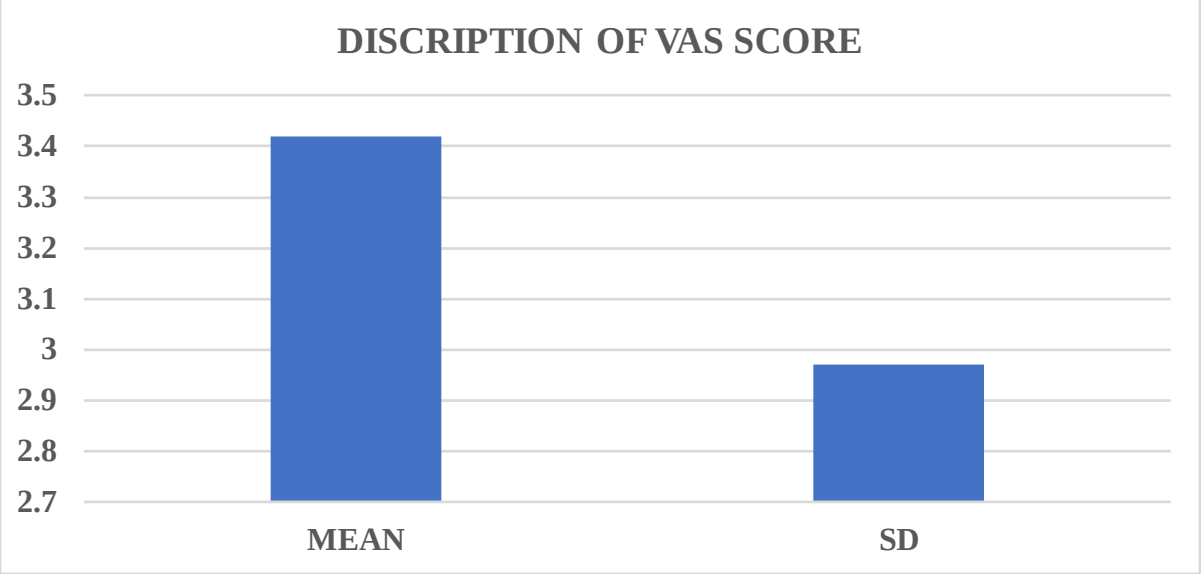
	AGE
MEAN	**20.68**
SD	**2.71**



GRAPH 3 : DESCRIPTION OF AGE (MEAN & SD)

TABLE 4 : DISCRIPTION OF VAS SCORE (MEAN & SD)

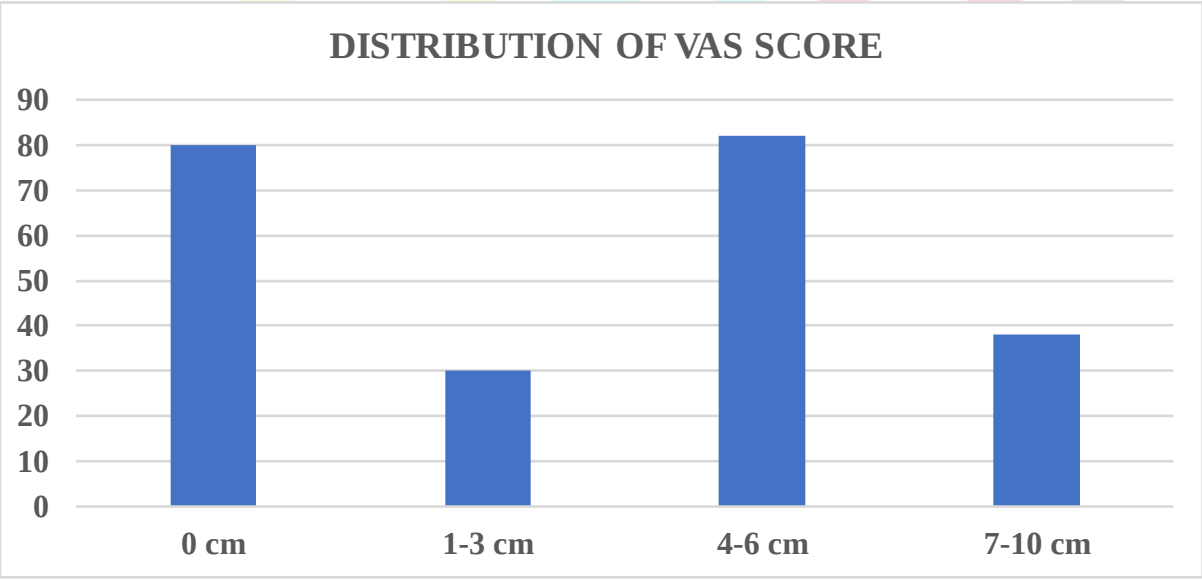
	VAS SCORE
MEAN	**3.42**
SD	**2.97**



GRAPH 4 : DESCRIPTION OF VAS SCORE (MEAN & SD)

TABLE 5 : DISTRIBUTION OF VAS SCORE

Vas Score	Total Number	Severity
0 cm	80	No Pain
1-3 cm	30	Mild Pain
4-6 cm	82	Moderate Pain
7-10 cm	38	Severe Pain



GRAPH 5 : DISTRIBUTION OF VAS SCORE

PREVALENCE OF MECHANICAL LOW BACK PAIN :

Overall prevalence: Significant across all age groups, highest in the 17-20 years category.

Discussion

The findings of this study reveal a significant prevalence of mechanical low back pain (MLBP) among young adults at Parul University, with notable variations across age groups and genders. This discussion elaborates on the results, situating them within the broader literature, and examines their implications for prevention, management, and further research.

The study observed that the highest prevalence of MLBP occurred in the 17-20 age group, comprising 61.30% of participants. This aligns with the existing literature, which identifies young adults as increasingly susceptible to musculoskeletal disorders due to lifestyle changes, including prolonged sedentary behavior, poor ergonomics, and increased academic demands (Hoy et al., 2014; Maher et al., 2017). The relatively lower prevalence in older age groups (e.g., 25-28 years: 4.34%, 29-36 years: 2.17%) may be attributed to factors such as greater awareness, better adaptation to physical stressors, or underreporting in these cohorts.

The mean age of participants was 20.68 years, indicating that the sample predominantly represents early adulthood. This stage of life is critical for intervention, as young adults are establishing habits that may influence long-term musculoskeletal health. Early identification and management of MLBP can prevent chronicity, which is a common concern as noted by Balagué et al. (2012).

Gender analysis revealed that females reported higher mean VAS scores (3.8, SD = 2.44) compared to males (2.99, SD = 2.71). This finding corroborates prior research suggesting that females may experience higher pain sensitivity and report greater pain intensity due to physiological, hormonal, and psychosocial factors (Andersson, 1999). Additionally, cultural and societal influences might lead to differences in pain perception and reporting between genders.

The study underscores the role of sedentary behavior and poor posture, particularly in the 17-20 age group, as significant contributors to MLBP. Prolonged sitting during academic activities and the use of electronic devices are prevalent among young adults, promoting biomechanical stresses such as forward head posture and lumbar strain. This finding aligns with the work of Foster et al. (2018), who highlighted the biomechanical impacts of modern lifestyles on musculoskeletal health.

Physical inactivity further exacerbates MLBP risk. Regular physical activity is essential for maintaining core strength, flexibility, and overall spinal health. The low engagement in preventive physical activities among young adults, as indicated by the study, underscores the need for targeted educational and intervention programs.

MLBP's impact extends beyond physical discomfort. Chronic or recurrent low back pain can lead to reduced academic performance, absenteeism, and impaired quality of life. The psychological burden, including fear-avoidance behavior, can perpetuate a cycle of inactivity and deconditioning (Vlaeyen & Linton, 2000). Socioeconomic consequences, such as healthcare costs and reduced productivity, further underscore the need for early and effective interventions.

Globally, low back pain is among the leading causes of disability (Hoy et al., 2014). The study's findings align with international data but highlight unique aspects of the Indian young adult population, particularly in an academic setting. Factors such as cultural attitudes toward health, access to healthcare, and lifestyle patterns may

influence the prevalence and management of MLBP in this demographic. Comparative studies across regions and cultures could provide deeper insights into these variations.

The high prevalence of MLBP among young adults emphasizes the urgent need for preventive measures. Ergonomic education, emphasizing proper posture during academic and professional activities, is critical. Simple adjustments, such as using supportive chairs, maintaining a neutral spine, and taking regular breaks from sitting, can significantly reduce the risk of MLBP.

Exercise therapy focusing on core strengthening, flexibility, and endurance has proven effective in managing and preventing MLBP (Sihawong et al., 2016). Incorporating physical activity programs into academic curricula or workplace wellness initiatives can foster long-term musculoskeletal health.

Additionally, public health campaigns can raise awareness about the risks of MLBP and promote proactive health behaviors. These campaigns should address modifiable risk factors, including smoking cessation and weight management, which have been associated with low back pain in previous studies (Shiri et al., 2010).

While the study provides valuable insights, certain limitations warrant consideration. The reliance on self-reported data via a Google Form may introduce reporting bias. Participants might underreport or overreport symptoms due to subjective perceptions or social desirability. Future studies should consider incorporating objective measures, such as clinical assessments or imaging, to complement self-reported data.

The cross-sectional design limits the ability to establish causal relationships between demographic factors and MLBP. Longitudinal studies are needed to explore the temporal dynamics of MLBP and identify predictors of chronicity.

The sample was drawn from a single university, which may limit the generalizability of findings. Expanding the study to include diverse populations across different educational, occupational, and geographical settings would enhance its external validity.

This study highlights the high prevalence of MLBP among young adults, particularly in the 17-20 age group, and identifies key demographic and behavioral factors associated with this condition. The findings underscore the need for comprehensive preventive and therapeutic strategies, combining ergonomic education, physical activity promotion, and public health initiatives. By addressing the multifaceted contributors to MLBP, it is possible to mitigate its impact and improve the quality of life for young adults.

Future research should build on these findings to develop targeted interventions and explore the broader implications of MLBP within the Indian context and beyond. Collaborative efforts between healthcare providers, educators, and policymakers are essential to address this growing public health challenge effectively.

Conclusion

The study reveals a high prevalence of mechanical low back pain among young adults, particularly in the 17-20 age group. The findings emphasize the importance of addressing lifestyle factors and implementing ergonomic interventions to reduce the burden of MLBP in this population.

Limitation :

1. Sample size small.
2. The data collected from only one university

Further recommendation :

1. A study can be done with different universities .

2. A study can be done on different age group.
3. A study can be done large sample size.

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Conflict Of Interest : None

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