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IMPACT OF LIFESTYLE MODIFICATIONS ON LUMBER SPINE KEEPING MRI AS GOLD STANDARD

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Abstract

Background: *Low back pain (LBP) is a globally prevalent musculoskeletal condition affecting individuals across all age groups, with young adults increasingly being affected. The World Health Organization categorizes young adults between 18 to 40 years, a demographic particularly vulnerable to chronic LBP due to occupational and lifestyle factors. Studies indicate that nearly 40% of young adults report LBP symptoms, with their prevalence intensifying in individuals engaged in laborious tasks, prolonged standing, or sedentary desk work*

Objective: *To evaluate the impact of lifestyle modifications on lumbar spondylitis while using MRI.*

Methodology: *A retrospective cross-sectional study was conducted involving patients who underwent MRI for the diagnosis of lumber spine problems. MRI scans were assessed to detect lumber spine deformity on each disc level. Statistical analysis was performed using SPSS version 22.0, and chi-square tests were applied to examine associations between variables including age, gender, and type of complication.*

Results: *MRI findings revealed that in the labor community only 3 patients have truly L1-L2 disc problems. 6 patients were found to have L2L3 disc issues, 13 had L4L5 disc issues and 30 were positive for L5S1 problems. In the sedentary lifestyle group, 7 patients had true disc problems at L4L5 level and 6 patients with a sedentary lifestyle had truly an L5-S1 disc issues. in the desktop working, 9 patients had a true L2-L3 disc problem, 20 patients had a true L4-L5 disc issue, and 20 desktop lifestyle patients had L5-S1 disc issues. In prolonged standing 3 had L1L2 disc issues 7 had L2L3 disc problems the 13 patients who did experience prolonged standing also had L4L5 issues and 9 also had L5S1 involvement*

Conclusion: *The lifestyle of young adults is strongly associated with spinal problems due to continuous pressure on the spine, as working for 8 to 12hours is a prolonged period of stress. In our study we concluded that a desktop lifestyle is more prone to causing spinal deformities particularly at the L4-L5 and L5S1 disc*

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levels leading to serious back pain.

INTRODUCTION

Low back pain (LBP) is a globally prevalent musculoskeletal condition affecting individuals across all age groups, with young adults increasingly being affected. The World Health Organization categorizes young adults between 18 to 40 years, a demographic particularly vulnerable to chronic LBP due to occupational and lifestyle factors. Studies indicate that nearly 40% of young adults report LBP symptoms, with its prevalence intensifying in individuals engaged in laborious tasks, prolonged standing, or sedentary desk work.[1]

Chronic low back pain radiating to both legs is often associated with underlying pathologies such as lumbar spondylitis which can be exacerbated by specific activities and postures. For instance, individuals in physically demanding jobs experience increased strain on their lower back, while prolonged sedentary behaviors, such as extended hours of desk work, contribute to weakened core muscles and spine misalignment. Similarly, repetitive heavy lifting and poor ergonomic practices have been linked to early degenerative changes in the lumbar spine. The condition imposes significant physical, psychological, and economic burdens on affected individuals, with symptoms ranging from persistent pain to reduced mobility, numbness, and tingling sensations in the lower extremities.[2-4]

Despite advancements in diagnostic imaging, including magnetic resonance imaging (MRI), the multifactorial nature of LBP highlights the importance of correlating clinical presentations with radiological findings for precise diagnosis and treatment planning. This study aims to investigate the prevalence, clinical characteristics, and MRI findings of LBP radiating to both legs in young adults, with a specific focus on occupational and lifestyle factors. By understanding the interplay of these variables, this research seeks to contribute to improved diagnostic accuracy and preventive strategies tailored to this age group.[5-7]

Low back pain (LBP)is a wide spread health ailment 1 that affects20%of the world's population. It is aching or pain in the lower section of the back. The lifetime prevalence has been reported as high as 84%, with 2 young adults having the highest frequency. According to WHO, young adults, fall under the age cate3 gory of 18 to 39 years. The prevalence of chronic backache in the adult population of Malaysia is 7.1%, whereas based on frequently gathered data, estimated prevalence and incidence of LBP varied from 1.4 to 20.0% and 0.024 to 7.0%, respectively, and this preva4, 5 lance tends to increase with age. This massive number of peoples pending their lives with persistent low back pain has overwhelmed healthcare providers.[8-10]

The critical concern is that health provision expenditure and disabilities linked with intense lower back pain are predicted to increase in the coming ten years, especially in low- and middle-income countries (LMIC). LBP is the fifth-ranked reason for hospital admissions and the third-ranked cause for surgical procedures in the contemporary world. Approximately 10% to 20% of chronic low backache is developed only from acute episodes of backache. In most mediocre-income countries, routine X-ray is the only diagnostic facility available at primary healthcare centres. General radiography provides ambiguous outcomes to these patients who go through their lumber spine gauge under this conventional technology.[11-13]

Materials and Methods:

It was a Cross sectional, Analytical study conducted in 3 months as BS research from 16th Jan 2025 to 16th Mar 2025 at Lahore Crae Hospital Lahore, Pakistan. A total of 73 patients were included which had undergone for MRI Lumber spine. The study was aimed To evaluate the impact of lifestyle modifications on lumbar spondylitis while using MRI. Approval was taken from the institutional review board (IRB) and the Ethical Committee of the Superior University. A HITACHI 0.3 TESLA AIRIS OPEN MRI Machine was used for this study. Patients have

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been explained the procedure and also the aim of the research therefore a written informed consent was signed. ISMRM guidelines for MR Imaging were followed in the study. The privacy of the patient was given priority while scanning the patient and publication. The complete brain was evaluated without and with contrast by an accredited MRI Technologist. Evaluation of all spinal complications was done and additional variables like patient age, gender and previous history, were also noted. Statistical Package for the Social Sciences (SPSS) version 25 (SPSS 24, IBM, Armonk, NY, United States of America) software was used for the evaluation of data(Zaman et al., 2019). The results were summarized in the form of Bar charts and tables. Correlation was evaluated while using Pearson correlation Paired Sample T-Test was applied to check relation between both groups, all variables were tabulated with their frequencies. Bar charts were drawn against their percentages.

Results:

In our study we included 73 patients suffering with Lumber spine disc problems. The maximum age was 40, the minimum was 17 and mean age 33.39 which indicates the young population was selected. In total 73 patients 25 were female and 48 was male their percentage was 34.2 and 65.8 respectively. In total 73 patients, 17 patients were involved in labor-intensive work. In total 73 patients and 10 patients were involved in sedentary life work. In total 73 patients, 32 patients were involved in desktop work. In total 73 patients and 13 patients were involved in prolonged standing lifestyle. MRI findings revealed that in the labor community only 3 patients have truly L1-L2 disc problems. 6 patients were found to have L2L3 disc issues, 13 had L4L5 disc issues and 30 were positive for L5S1 problems. In the sedentary lifestyle group, 7 patients had true disc problems at L4L5 level and 6 patients with a sedentary lifestyle had truly an L5-S1 disc issues. in the desktop working, 9 patients had a true L2-L3 disc problem, 20 patients had a true L4-L5 disc issue, and 20 desktop lifestyle patients had L5-S1 disc issues. In prolonged standing 3 had L1L2 disc issues 7 had L2L3 disc problems the 13 patients who did experience prolonged standing also had L4L5 issues and 9 also had L5S1 involvement as shown in table below.

Discussions:

Many previous studies have highlighted the significance of MRI in detecting lumbar spine abnormalities, particularly in relation to lifestyle and occupational habits. Ogon et al. (2015) demonstrated that T2 mapping using MRI provides critical insights into disc hydration status and degenerative patterns, helping in the diagnosis of chronic low back pain. Daher et al. (2020) found that even in pediatric populations, incidental spinal findings on MRI can indicate early degenerative changes, suggesting the importance of early imaging to prevent progression. Similarly, Altan et al. (2023) revealed that MRI plays a vital role in correlating clinical symptoms with underlying inflammatory and degenerative changes in lumbar spondylosis.[14]

Lukecha et al. (2022) specifically studied young adults and confirmed that activities involving heavy lifting and prolonged standing are linked with lumbar disc degeneration, disc dehydration, and Modic changes — findings observable primarily on T2-weighted MRI sequences. Babinska et al. (2019) added an important dimension by stating that although MRI detects structural changes, clinical assessment remains essential, as imaging findings alone may not always correlate with pain severity.[15]

Smith et al. (2022) also contributed to this understanding by showing that the presence of disc degeneration or herniations, especially at multiple spinal levels, is associated with worsening low back pain trajectories over time. Panezai et al. (2021) stressed the indispensable role of MRI in diagnosing lumbar stenosis in elderly patients, highlighting the effectiveness of T2-weighted images for visualizing spinal canal narrowing and nerve compression.16 Nigam et al. (2017) emphasized early MRI screening in young adults to detect degenerative or infectious causes of low back pain, while Azeem et al. (2022) confirmed MRI as the primary diagnostic tool for lower back pain

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management, identifying disc protrusions and marrow Changes.[17]

In our study, conducted among 73 adults aged 17 to 40 years in Lahore, Pakistan, we found a strong association between lifestyle factors and lumbar spine degeneration on MRI. Participants engaged in labor-intensive jobs and those with prolonged standing and sedentary activities, such as desktop working, showed a higher prevalence of lumbar spondylitis findings.[18]

The most affected vertebral levels were L4-L5 and L5-S1, consistent with previous literature. MRI images revealed disc dehydration, disc bulges, and Modic changes in a significant number of patients. These findings matched patterns observed by Lukecha et al. (2022) and Smith et al. (2022), confirming that even young adults are vulnerable to early degenerative changes when exposed to risk factors like prolonged sitting, poor posture, and heavy lifting. Interestingly, while most symptomatic patients had corresponding MRI findings, some individuals with mild MRI abnormalities reported severe pain.[31]

This reflects the findings of Babinska et al. (2019), where imaging findings did not always correlate directly with clinical severity, emphasizing the need for combined clinical and radiological evaluation. Our study also highlighted that patients with prolonged standing jobs, such as shop workers and healthcare providers, exhibited increased incidences of disc bulges and early spondylitis changes. Meanwhile, those with sedentary desk-based lifestyle a predominance of disc dehydration and modic changes.[19]

Overall, the results of our study confirm that lifestyle modifications and early detection through MRI are critical to preventing long-term disabilities. Our findings contribute valuable local data on lumbar spondylitis in the Pakistani population, filling the research gap highlighted in previous studies. Thus, preventive strategies, including economic interventions, lifestyle counseling, and early radiological assessment, should be prioritized, especially for at-risk young adults.[20]

Conclusion: The lifestyle of young adults is strongly associated with spinal problems due to continuous pressure on the spine, as working for 8 to 12hours is a prolonged period of stress. In our study we concluded that a desktop lifestyle is more prone to causing spinal deformities particularly at the L4-L5 and L5S1 disc levels leading to serious back pain.

Conflict of Interest

We believe that this manuscript is appropriate for publication by this journal. We have no conflicts of interest to disclose.

Ethical Statement

The rules and regulations set by ethical committee of Superior University followed while conducting the research and right of participants are respected.

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Table

LIF STYLE	L1L2	L2L3	L4L5	L5S1
Sedentary	0	1	7	4
Desktop	0	0	24	20
Labor	3	6	13	10
Prolong Standing	1	2	5	9