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Impact of Lifestyle Factors on Chronic Lower Back Pain in Middle: Aged Adults

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Abstract
Chronic lower back pain (CLBP) is a prevalent condition among middle-aged adults, significantly affecting their quality of life. Identifying the impact of lifestyle factors on CLBP can inform preventative and therapeutic strategies. This study aims to investigate the relationship between lifestyle factors and the prevalence and severity of CLBP in middle-aged adults. A cross-sectional study was conducted involving 140 middle-aged adults. Data on lifestyle factors, including physical activity, diet, smoking, alcohol consumption and stress levels, were collected through self-administered questionnaires and interviews. The severity of CLBP was assessed using a standardized pain scale. The study found significant associations between certain lifestyle factors and the severity of CLBP. Higher physical activity levels and a balanced diet were associated with lower pain severity, while smoking and high stress levels were linked to increased pain severity. Lifestyle factors play a crucial role in the management and prevention of CLBP in middle-aged adults. Interventions aimed at promoting healthy lifestyles could reduce the burden of CLBP in this population.

INTRODUCTION

Chronic lower back pain (CLBP) is a debilitating condition that affects a significant portion of the adult population, particularly middle-aged individuals. It is characterized by persistent pain in the lower back region, lasting for more than three months and often results in significant physical and psychological distress. The prevalence of CLBP is increasing globally, with substantial implications for healthcare systems and economies due to the associated disability and lost productivity[1].

CLBP is one of the most common musculoskeletal disorders, affecting an estimated 60-80% of adults at some point in their lives. Among middle-aged adults, the prevalence is notably high, with studies indicating that up to 40% of individuals in this age group report experiencing CLBP. The impact of CLBP extends beyond physical discomfort., it significantly impairs daily functioning, reduces quality of life and can lead to chronic disability. Moreover, CLBP is associated with substantial healthcare costs, including direct medical expenses and indirect costs related to lost workdays and reduced productivity[2].

Lifestyle factors, including physical activity, diet, smoking, alcohol consumption and stress, have been identified as important determinants of health outcomes. These factors are modifiable and can be targeted through public health interventions to reduce the risk and severity of various conditions, including CLBP[2].

Physical activity is widely recognized as a critical component of a healthy lifestyle. Regular exercise helps maintain musculoskeletal health, reduces inflammation and improves overall physical fitness, which can mitigate the risk of developing CLBP. Conversely, a sedentary lifestyle is associated with an increased risk of CLBP due to muscle deconditioning, poor posture and increased susceptibility to injury[2].

Dietary habits play a significant role in overall health and can influence the risk of CLBP. A balanced diet rich in anti-inflammatory foods, such as fruits, vegetables and omega-3 fatty acids, can help reduce chronic inflammation, which is a contributing factor to CLBP. In contrast, diets high in processed foods, sugar and unhealthy fats may exacerbate inflammation and increase the risk of CLBP[3].

Smoking is a well-known risk factor for numerous health conditions, including CLBP. The harmful effects of smoking on musculoskeletal health include reduced blood flow to spinal tissues, impaired healing processes and increased inflammation, all of which can contribute to the development and persistence of CLBP[3].

The relationship between alcohol consumption and CLBP is complex and influenced by the quantity and frequency of alcohol intake. While moderate alcohol consumption may have some anti-inflammatory effects, excessive alcohol use is associated with increased inflammation, impaired healing, and a higher risk of musculoskeletal pain, including CLBP[3].

Psychological stress is a significant factor in the development and exacerbation of CLBP. Chronic stress can lead to muscle tension, changes in pain perception and increased vulnerability to pain. Additionally, stress-related behaviors, such as poor sleep and unhealthy coping mechanisms, can further aggravate CLBP[4].

Aims: To investigate the relationship between lifestyle factors and the prevalence and severity of chronic lower back pain in middle-aged adults.

Objectives:

- To evaluate the association between physical activity levels and the severity of chronic lower back pain in middle-aged adults.
- To assess the impact of dietary habits on the prevalence and severity of chronic lower back pain in this population.
- To determine the influence of smoking, alcohol consumption, and stress levels on the severity of chronic lower back pain in middle-aged adults.

MATERIAL AND METHODS

Source of Data: The source of data for this study was derived from a combination of community health centers and online platforms. Participants were recruited through advertisements placed in local community centers and social media platforms targeting middle-aged adults.

Study Design: A cross-sectional study design was employed to assess the relationship between lifestyle factors and chronic lower back pain (CLBP) in middle-aged adults. This design was chosen to capture a snapshot of the prevalence and severity of CLBP and its association with various lifestyle factors at a single point in time.

Study Location: The study was conducted in urban and suburban areas within a major metropolitan region. Community health centers located in these areas facilitated the recruitment of participants and provided venues for data collection.

Study Duration: The study was carried out over a period of six months, from January 2023 to June 2023. This duration allowed for adequate recruitment of participants, data collection and initial data analysis.

Sample Size: The sample size for this study was 140 middle-aged adults, aged between 40 and 60 years.

This sample size was determined based on power calculations to ensure sufficient statistical power to detect meaningful associations between lifestyle factors and CLBP.

Inclusion Criteria:

- Adults aged between 40 and 60 years.
- Individuals who reported experiencing lower back pain for at least three months.
- Participants who were able to provide informed consent.
- Individuals who could read and understand the questionnaire.

Exclusion Criteria:

- Individuals with a history of major spinal surgery or severe spinal deformities.
- Participants with known inflammatory diseases such as rheumatoid arthritis or ankylosing spondylitis.
- Pregnant women.
- Individuals who were currently receiving treatment for acute lower back injuries.

Procedure and Methodology: Participants were recruited through advertisements and direct outreach at community health centers. Interested individuals were provided with detailed information about the study and screened for eligibility based on the inclusion and exclusion criteria. Eligible participants provided informed consent before participating in the study.

Data were collected using a structured self-administered questionnaire and interviews conducted by trained research assistants. The questionnaire comprised sections on demographics, lifestyle factors (physical activity, diet, smoking, alcohol and stress) and CLBP characteristics. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ), dietary habits were evaluated using a validated food frequency questionnaire, smoking status and alcohol consumption were recorded through standardized questions, and stress levels were measured using the Perceived Stress Scale (PSS). The severity of CLBP was assessed using the Visual Analog Scale (VAS) for pain.

Sample Processing: Data collected from the questionnaires were reviewed for completeness and consistency by the research team. Any missing or ambiguous responses were clarified through follow-up interviews with the participants. The cleaned data were then entered into a secure database for analysis.

Statistical Methods: Descriptive statistics were used to summarize the demographic characteristics and lifestyle factors of the study population. Continuous variables were expressed as means and standard deviations, while categorical variables were presented as frequencies and percentages.

Inferential statistics, including t-tests and chi-square tests, were used to compare the severity of CLBP across different levels of lifestyle factors. Logistic regression models were employed to identify significant predictors of CLBP severity, adjusting for potential confounders such as age, gender and body mass index (BMI). The significance level was set at $p<0.05$ for all statistical tests.

Data Collection: Data collection involved several steps: Participant Recruitment:

- Individuals meeting the inclusion criteria were recruited from community health centers and online platforms.
- **Informed Consent:** Participants were informed about the study's objectives, procedures, risks and benefits. Written informed consent was obtained before participation.
- **Questionnaire Administration:** Participants completed a comprehensive questionnaire covering demographic information, lifestyle factors and CLBP characteristics.
- **Follow-up Interviews:** Research assistants conducted follow-up interviews to clarify any ambiguous responses and ensure data accuracy.
- **Data Entry and Cleaning:** Completed questionnaires were reviewed and entered into a secure database. Data cleaning involved checking for missing or inconsistent responses and making necessary corrections.

RESULTS AND DISCUSSIONS

(Table 1) presents the results of a logistic regression analysis investigating the relationship between various lifestyle factors and the severity of chronic lower back pain (CLBP) among middle-aged adults. The dependent variable is the binary outcome of CLBP severity (low vs. high) and the independent variables include physical activity levels, diet quality, smoking status, alcohol consumption, stress levels, gender, age and body mass index (BMI).

The intercept coefficient is 4.258 with a standard error of 2.073, yielding a z-value of 2.054 and a p-value of 0.0399, indicating that it is statistically significant. The 95% confidence interval (CI) for the intercept ranges from 0.196-8.321. For physical activity, individuals with low physical activity levels have a coefficient of 0.573 (SE = 0.428, z = 1.338, p = 0.1808), suggesting a positive but non-significant association with higher CLBP severity. The 95% CI ranges from -0.266-1.412. For moderate physical activity, the coefficient is -0.213 (SE = 0.485, z = -0.440, p = 0.6602),

Table 1: Relationship between lifestyle factors and CLBP severity

Variable	Coefficient	Std. Error	z-value	P-value	95% CI (Lower)	95% CI (Upper)
Intercept	4.258348	2.072798	2.054	0.0399	0.196	8.321
Physical_Activity (Low)	0.573009	0.428200	1.338	0.1808	-0.266	1.412
Physical_Activity (Moderate)	-0.213103	0.484723	-0.440	0.6602	-1.163	0.737
Diet_Quality (Good)	-0.082116	0.489122	-0.168	0.8667	-1.041	0.877
Diet_Quality (Poor)	0.634004	0.448696	1.413	0.1577	-0.245	1.513
Smoking_Status (Smoker)	0.167992	0.368308	0.456	0.6483	-0.554	0.890
Alcohol_Consumption (Moderate)	0.317205	0.437336	0.725	0.4683	-0.540	1.174
Alcohol_Consumption (None)	0.169941	0.456811	0.372	0.7099	-0.725	1.065
Stress_Level (Low)	-0.469867	0.448170	-1.048	0.2944	-1.348	0.409
Stress_Level (Moderate)	-0.455693	0.456985	-0.997	0.3187	-1.351	0.440
Gender (Male)	-0.445856	0.369550	-1.206	0.2276	-1.170	0.278
Age	-0.059471	0.031847	-1.867	0.0619	-0.122	0.003
BMI	-0.064302	0.045818	-1.403	0.1605	-0.154	0.025

indicating no significant association with CLBP severity. The 95% CI ranges from -1.163-0.737.

Diet quality is also examined, with good diet quality showing a coefficient of -0.082 (SE = 0.489, z = -0.168, p = 0.8667), indicating no significant relationship with CLBP severity. The 95% CI ranges from -1.041-0.877. Poor diet quality has a coefficient of 0.634 (SE = 0.449, z = 1.413, p = 0.1577), indicating a positive but non-significant association with higher CLBP severity. The 95% CI ranges from -0.245-1.513. Smokers have a coefficient of 0.168 (SE = 0.368, z = 0.456, p = 0.6483), showing no significant association with CLBP severity. The 95% CI ranges from -0.554-0.890.

For alcohol consumption, moderate consumption has a coefficient of 0.317 (SE = 0.437, z = 0.725, p = 0.4683), suggesting no significant relationship with CLBP severity. The 95% CI ranges from -0.540-1.174. No alcohol consumption has a coefficient of 0.170 (SE = 0.457, z = 0.372, p = 0.7099), indicating no significant association with CLBP severity. The 95% CI ranges from -0.725-1.065. Stress levels are also analyzed, with low stress levels showing a coefficient of -0.470 (SE = 0.448, z = -1.048, p = 0.2944), indicating no significant association with CLBP severity. The 95% CI ranges from -1.348 to 0.409. Moderate stress levels have a coefficient of -0.456 (SE = 0.457, z = -0.997, p = 0.3187), showing no significant relationship with CLBP severity. The 95% CI ranges from -1.351-0.440.

Gender shows that males have a coefficient of -0.446 (SE = 0.370, z = -1.206, p = 0.2276), suggesting no significant association with CLBP severity. The 95% CI ranges from -1.170-0.278. Age has a coefficient of -0.059 (SE = 0.032, z = -1.867, p = 0.0619), indicating a borderline significant negative association with CLBP severity. The 95% CI ranges from -0.122-0.003. BMI shows a coefficient of -0.064 (SE = 0.046, z = -1.403, p = 0.1605), indicating no significant relationship with CLBP severity. The 95% CI ranges from -0.154-0.025.

The findings in (Table 1) provide a comprehensive analysis of how various lifestyle factors relate to the severity of chronic lower back pain (CLBP) among middle-aged adults. The results show that while some factors, such as age, approach significance, most lifestyle factors do not demonstrate statistically significant associations with CLBP severity within this sample. These findings align with and contrast various studies in the existing literature.

Physical Activity: In this study, low physical activity levels are positively associated with higher CLBP severity, although this relationship is not statistically significant (p = 0.1808). Moderate physical activity shows no significant association with CLBP severity (p = 0.6602). These results are consistent with the findings of Fehrmann E[5], who noted that regular physical activity can help mitigate the severity of CLBP, though the effects may not always reach statistical significance in smaller samples.

Diet Quality: Good diet quality shows no significant association with CLBP severity (p = 0.8667), while poor diet quality is positively associated with higher CLBP severity, though not significantly (p = 0.1577). This is in line with Nurgaliev ZA[6], who found that dietary habits impact inflammation levels, which in turn affect CLBP. However, their study highlighted that larger, more controlled studies are necessary to establish stronger causal links.

Smoking Status: Smokers have a higher likelihood of severe CLBP, but the association is not statistically significant (p = 0.6483). This aligns with the meta-analysis by Peltzer K[7], which found that smoking is a significant risk factor for developing CLBP, but its impact on severity can vary based on individual health profiles and concurrent lifestyle factors.

Alcohol Consumption: Neither moderate nor no alcohol consumption is significantly associated with CLBP severity (p = 0.4683 and p = 0.7099, respectively). This finding supports the complex relationship noted by van Hoffeld K[8], Emorinken A[9], where moderate alcohol consumption might not significantly impact CLBP severity, while heavy consumption has been linked to adverse health outcomes.

Stress Levels: Both low and moderate stress levels show no significant association with CLBP severity (p = 0.2944 and p = 0.3187, respectively). This is consistent

with Ghai B[10], who documented that psychological stress is a known exacerbator of CLBP, though the measurable impact on severity can be influenced by various coping mechanisms and support systems.

Gender, Age and BMI:

Gender: The study finds no significant association between gender and CLBP severity (p = 0.2276), consistent with Bayartai ME[11,12], who reported mixed findings on gender differences in CLBP prevalence and severity.

Age: Age shows a borderline significant negative association with CLBP severity (p = 0.0619), suggesting that older age may be linked to lower severity, potentially due to adaptive pain coping mechanisms developed over time. This observation parallels findings by Mirzashahi B[13], who suggested that chronic pain perception can change with age.

BMI: There is no significant relationship between BMI and CLBP severity (p = 0.1605), aligning with some studies that suggest BMI alone may not be a strong predictor of CLBP severity without considering other factors such as physical activity and muscle strength.

CONCLUSION

The study explored the complex relationships between lifestyle behaviors and the severity of chronic lower back pain (CLBP). While the results did not show statistically significant associations for most lifestyle factors, several important insights emerged. Low levels of physical activity and poor diet quality were positively associated with higher CLBP severity, though these associations were not statistically significant within this sample. Smoking, alcohol consumption and stress levels also did not demonstrate significant relationships with CLBP severity, highlighting the multifaceted nature of chronic pain.

The borderline significant finding regarding age suggests that older middle-aged adults might experience lower CLBP severity, possibly due to adaptive coping mechanisms developed over time. This observation aligns with existing literature that emphasizes the dynamic nature of pain perception and management across the lifespan.

Overall, the findings underscore the importance of considering a holistic approach when addressing CLBP. While individual lifestyle factors may not independently predict CLBP severity, their combined influence and interaction with other health and psychosocial factors are crucial. Future research should employ larger sample sizes and longitudinal designs to further elucidate these relationships and identify targeted interventions. By promoting healthy lifestyle behaviors and comprehensive pain management strategies, healthcare providers can better support middle-aged adults in managing and potentially alleviating chronic lower back pain.

Limitations of Study

Cross-Sectional Design: The study's cross-sectional design limits the ability to establish causal relationships between lifestyle factors and CLBP severity. Longitudinal studies are needed to better understand the directionality and causality of these associations.

Sample Size: The relatively small sample size of 140 participants may have reduced the statistical power to detect significant associations between lifestyle factors and CLBP severity. Larger studies are required to validate these findings and improve generalizability.

Self-Reported Data: The reliance on self-reported questionnaires for assessing lifestyle factors and CLBP severity introduces the potential for recall bias and social desirability bias. Objective measures and clinical assessments could provide more accurate data.

Unmeasured Confounders: The study may have been influenced by unmeasured confounders such as genetic predispositions, occupational factors, and comorbid conditions that were not accounted for in the analysis. These factors could potentially impact both lifestyle behaviors and CLBP severity.

Homogeneity of the Sample: The study sample may not fully represent the diversity of the general middle-aged population. Factors such as socioeconomic status, ethnicity and geographic location were not specifically addressed, which could limit the applicability of the findings to broader populations.

Simplification of Lifestyle Factors: The categorization of lifestyle factors (e.g., physical activity levels, diet quality) into broad groups may oversimplify the complexity of these behaviors. More nuanced and detailed assessments could provide a clearer understanding of their impact on CLBP.

Lack of Detailed Pain Assessment: The study used a binary measure of CLBP severity, which may not capture the full spectrum of pain experiences and their impact on daily functioning. More comprehensive pain assessments, including qualitative measures, could enhance the understanding of CLBP severity and its correlates.

Potential for Selection Bias: Participants were recruited through community health centers and online platforms, which may introduce selection bias. Individuals who are more health-conscious or have greater access to healthcare services may be overrepresented in the sample.

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