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Determining the Predominant Risk Factor of Low Back Pain Among Pre-Menopausal and Post-Menopausal Women

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Abstract: Low back pain is a widely observed and complex illness that substantially influences the quality of life for women between the ages of 40 and 60, both before and after menopause. It is vital to comprehend the primary risk factors linked to low back pain among this particular demographic in order to avoid and manage this condition effectively. The objective of this cross-sectional study was to determine the primary risk variables associated with the occurrence of low back pain in women between the ages of 40 and 60, both pre-menopausal and post-menopausal. The research employed various methodologies. The study involved a group of 50 women who were carefully chosen based on precise inclusion criteria using purposive sampling. Exclusions were made for those who had disabilities, were pregnant, exhibited cognitive impairments, had neurological problems, experienced recent trauma within the preceding 6 months, or presented with orthopaedic concerns. The data-gathering process encompassed the administration of a comprehensive questionnaire encompassing various domains, including demographic information, BMI calculations, work-related factors, health-related factors, and psychological aspects. All participants provided informed consent. The findings of the investigation unveiled multiple risk variables that are linked to the occurrence of low back pain within this particular demographic. The variables considered in the study encompassed body mass index (BMI) classification, daily work length, general health status, pre-existing health conditions, referred pain, prior instances of low back pain, and psychological concerns such as stress, anxiety, and depression. In conclusion, this research study offers significant insights into the key risk factors associated with the occurrence of low back pain in women between the ages of 40 and 60, both before and after menopause. The results of this study can provide valuable insights for developing preventative strategies and interventions that target the reduction of both the occurrence and consequences of this debilitating ailment within the specified group, ultimately improving their overall well-being.

Introduction

The phenomenon of low back pain encompasses a range of diverse pain types, such as nociceptive, neuropathic and nociplastic, which often exhibit overlapping characteristics. Low back pain can be attributed to several stressors affecting the components of the lumbar spine, including soft tissue, vertebrae, zygapophyseal and sacroiliac joints, intervertebral discs, and neurovascular systems. These stressors, whether acting individually or in conjunction, can contribute to low back pain (Knezevic et al., 2021). Low back pain is a prevalent issue that is a primary contributor to disability

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and is closely linked to substantial financial burdens (Chou, 2021; Anusha et al., 2023; Manohar et al., 2023). Low back pain is a highly prevalent symptom that affects a significant proportion of individuals, with estimates suggesting that it occurs in more than 80% of the population. The management of an acute about of back pain typically involves implementing relative rest, modifying activity levels, using nonsteroidal anti-inflammatory drugs, and engaging in physical therapy. Patient education is of utmost importance, given that these individuals are susceptible to subsequent occurrences of back pain. A small proportion of individuals experience the development of chronic back pain lasting for a duration beyond six months (Patrick et al., 2014). A correlation was seen between the age at which menarche occurs and both the prevalence and risk of lower back pain (Heuch et al., 2022). A substantial proportion of women encounter low back pain during the post-menopausal period, leading to notable challenges that adversely impact their overall well-being, mental well-being, and sleep patterns (Duymaz et al., 2020). The prolonged utilization of systemic menopausal hormone therapy, namely therapy centred on oestrogen alone, is correlated with increased susceptibility to chronic low back pain. The utilization of oral contraceptives is associated with a little elevation in risk (Heuch et al., 2023). Low back pain (LBP) is widely recognized as the most widespread musculoskeletal condition on a global scale (Gilgil et al., 2005). This topic holds significant importance as it involves a range of individual elements, including perceived loss of autonomy, difficulty in maintaining daily routines, and heightened anxiety, which can influence the progression or decline of this illness. The study conducted by Abdulbari Bener et al. (2013) examined the variables of gender, age, and the co-occurrence of mental disorders, specifically anxiety and mood disorders, in relation to the role of moderators. Low back pain, also known as lumbosacral pain, is characterized by a sensation of ache or discomfort that occurs below the inferior border of the 12th rib and above the inferior gluteal fold. This condition may or may not be accompanied by pain radiating down the leg. This issue is commonly reported, and in most instances, a resolution is achieved and individuals can resume work within three months or less. Chronic low back pain, which persists for a duration beyond three months, has a prevalence ranging from 15% to 45% within the general population. Furthermore, it stands as the primary contributor to disability among those aged 45 to 65 years. According to the study conducted by Ramond-Roquin et al. (2014). Chronic low back pain, which refers to persistent low back pain lasting for a duration of three months or longer, is widely recognized as the most prevalent source of impairment among adults aged 45 to 65 years (Wong et al., 2017). According to the study conducted by Kozinoga et al. (2015), acute low back pain (LBP) is defined as lasting for a duration of less than six weeks, subacute LBP is characterized by a duration of six to twelve weeks and chronic LBP is defined as lasting for a period exceeding twelve weeks. Previous studies have indicated that the prevalence of low back pain (LBP) gradually increases from adolescence up until the age of 60, after which it demonstrates a drop (Wáng et al., 2016). The prevalence of chronic pain issues and painful conditions is higher among women compared to men, as evidenced by research conducted by Shetty et al. (2022). According to Wang et al. (2022), the author observed global patterns in lower back pain (LBP). The study revealed a decrease in the occurrence rate of LBP, with a higher prevalence among the elderly and female populations. This trend was particularly prominent in East and South Asia. In a study conducted by Diallo et al. (2019), several modifiable risk factors associated with low back pain (LBP) were identified among teachers. These factors encompassed work-related stress, insufficient lumbar support, and a lack of physical exercise. The authors Nazeer et al. (2015) emphasized the importance of implementing preventive strategies, specifically targeting housewives, to alleviate lower back pain (LBP). The study titled "Risk Factors for Chronic Low Back Pain in Adults" (2014) and the research conducted by Mohseni Bandpei et al. (2014) have examined a range of risk factors associated with chronic low back pain (LBP). These studies have identified correlations between LBP and factors including posture, physical activity, family history, education, and body mass index (BMI). The relationship between obesity and lower back pain (LBP), particularly in women, highlights the need to address weight-related variables (Gao et al., 2013; Shiri et al., 2010).

Methodology

A comprehensive cross-sectional study was conducted in Chennai to investigate the primary risk factor closely linked to low back pain in women during the pre-menopausal and post-menopausal stages. The research utilized a methodical and deliberate selective sample strategy, precisely selecting a group of 50 individuals who closely adhered to strict criteria for inclusion and exclusion. The inclusion criteria specified that individuals

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Table 1. Model Fit Statistics (F-value suggests the model maintains a degree of flexibility and R value shows some degree of explanatory power and p-value implies that the model is not overly constrained)

Model Fit Statistic	Value
F(df)	0.38
p-value	0.548
R-squared (R^2)	0.02
Adjusted R-squared (R^2adj)	-0.04

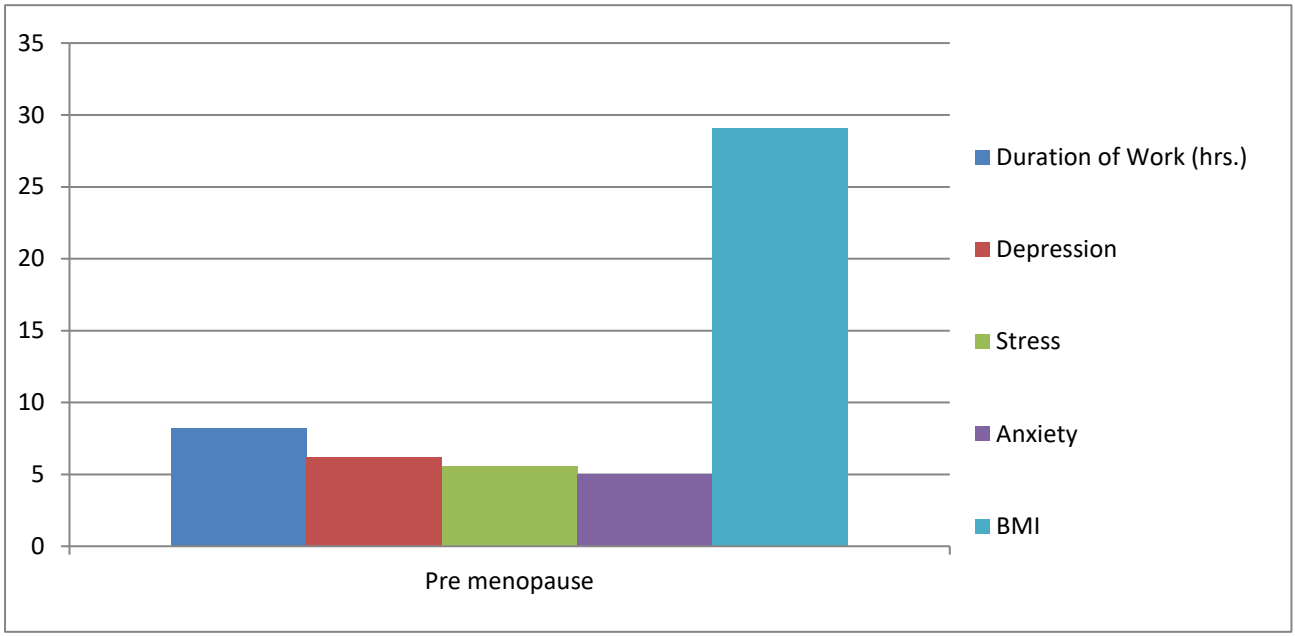

Figure 1. Pre menopause (A bar graph demonstrating the various values of the parameters of predisposing factors in the premenopausal group)

between the ages of 30 and 60 with a documented history of low back pain were eligible to participate. Stringent exclusion criteria were implemented to remove persons who were experiencing disabilities, pregnant women, individuals with cognitive impairments, individuals with neurological problems, individuals who had experienced recent traumatic experiences within the past six months, or those with orthopaedic illnesses. The research methodology involved thoroughly explaining the study's goals to potential volunteers, who provided their informed consent after fully understanding the information. A carefully designed quantitative survey was thoughtfully conducted to gather diverse perspectives. The study incorporated participant personal information, including age, height, weight, and the accurate determination of BMI (Body Mass Index). The BMI classifications employed in this study were methodical, systematically categorizing people into several groups, namely underweight (<18.5), normal weight (18.5 to 24), overweight (25 to 30), or obese (>30). In addition, the participants were thoroughly questioned about the time aspect of their daily work obligations and a diverse range of complex health-related factors. The aforementioned factors encompassed a comprehensive assessment of the individual's overall well-being, prevalent health conditions, occurrences of pain referred from other areas, previous experiences with lower back pain, and the medications they were now prescribed. The comprehensive array of psychological elements, including stress, anxiety, and depression, was meticulously assessed using the Depression Anxiety Stress Scale (DASS), a very precise measurement tool. In order to enhance the precision of data analysis, the individuals involved in the study were carefully divided into separate cohorts based on their pre-menopausal and post-menopausal status. The careful delineation enabled the precise identification of each category's primary risk factor commonly linked to low back pain. The primary objective of this comprehensive study was to provide an in-depth understanding of the complex factors contributing to low back pain experienced by women in a certain age group. The objective was to develop a deep and nuanced understanding of this widespread illness, which might provide a solid basis for creating thoughtful interventions and preventive strategies in the field of women's health.

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Table 2. Pre menopause (Average values of all the key factors predisposing to the problem studied, Duration of work indicating the level of occupational engagement, depression stress and anxiety values indicating about mental well-being and BMI gauging the overall physical health)

Category	Duration of Work (hrs.)	Depression	Stress	Anxiety	BMI
Pre menopause	8.2	6.2	5.6	5.0	29.1
This table presents the average values for the duration of work, depression, stress, anxiety and BMI among pre-menopausal women.					

Results and Discussion

The findings of a multivariate linear regression analysis conducted on the pre-menopausal group indicated a statistically significant association between many factors (X1, X2, X3, X4) and the occurrence of lower back pain (Y), with a moderate overall effect. The observed effect demonstrated statistical significance ($F(2, 30) = 6.07$, $p = .006$). The model fit analysis revealed that characteristics such as job length (X2) and anxiety (X4) collectively influenced the occurrence of lower back pain. Nevertheless, when examining the individual predictors, it was ascertained that solely X1 ($t = -2.809$, $p = .009$) and X2 ($t = 3.374$, $p = .002$) exhibited statistical significance as predictors inside the model, whilst the remaining predictors did not demonstrate such significance. The coefficient of X2, which represents the duration of labour, suggests that an increase in the number of hours worked is associated with a decrease in lower back discomfort by roughly 0.715 units. Conversely, the coefficient pertaining to X4 (anxiety) indicated that an elevation in anxiety levels was associated with a corresponding increment of approximately 1.102 units in the intensity of lower back pain. In summary, our study has determined that extended work hours and heightened levels of worry are notable contributors to the occurrence of lower back pain in pre-menopausal women. There was a correlation observed between extended work hours and a decrease in the occurrence of lower back pain, whereas heightened levels of anxiety were shown to be connected with an increase in the severity of lower back pain.

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Linear Regression Analysis – Coefficients

Pre-menopausal group: $\hat{Y} = 28.488346 - 0.714983\ X2 + 1.10169\ X4$

Postmenopausal group: $\hat{Y} = 29.817094 - 0.225472\ X4$

In this SPSS-style output, you have separate sections for the pre-menopausal and post-menopausal groups and within each section, you have columns for the variable name. The low R-squared value of 0.02 indicates that only 2% of the variance in LBP among postmenopausal women can be attributed to these factors. It suggests that other unexamined variables may play a more substantial role in causing LBP in this group. Conversely, a more robust collective effect was observed in the premenopausal group, with both duration of work (X2) and anxiety (X4) emerging as significant predictors. Longer work hours were associated with decreased LBP, while higher anxiety levels correlated with increased LBP. These findings highlight the distinct influences of risk factors on LBP in premenopausal and postmenopausal women, emphasizing the importance of tailored approaches to LBP prevention and management in each group. Within the pre-menopausal cohort, two noteworthy risk factors associated with the occurrence of lower back pain (LBP) were discerned: the duration of employment in hours (X2) and the presence of anxiety (X4). One noteworthy discovery indicated a negative correlation between the duration of labor and the occurrence of lower back pain (LBP), implying that

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Table 3. Model Fit Statistics (A low f value signifies a weak linear relationship, high p-value suggests coefficients not statistically different from zero, R-value suggests a variance in the data, adjusted R-squared value implies model avoids overfitting providing a more conservative fit to the data)

Model Fit Statistic	Value
F(df)	0.38
p-value	0.548
R-squared (R^2)	0.02
Adjusted R-squared (R^2adj)	-0.04

Table 4. Post menopause (Average values of all the key factors predisposing to the problem studied, Duration of work indicating the level of occupational engagement,depression stress and anxiety values indicating about the mental wellbeing and BMI gauging the overall physical health finding suggest potential correlation between longer working hours, higher degree of stress and elevated BMI in the post menopausal group)

Category	Duration of Work (hrs)	Depression	Stress	Anxiety	BMI
Post menopause	7.1	7.1	6.1	5.3	28.2

This table presents the average values for the duration of work, depression, stress, anxiety, and BMI among post-menopausal women.

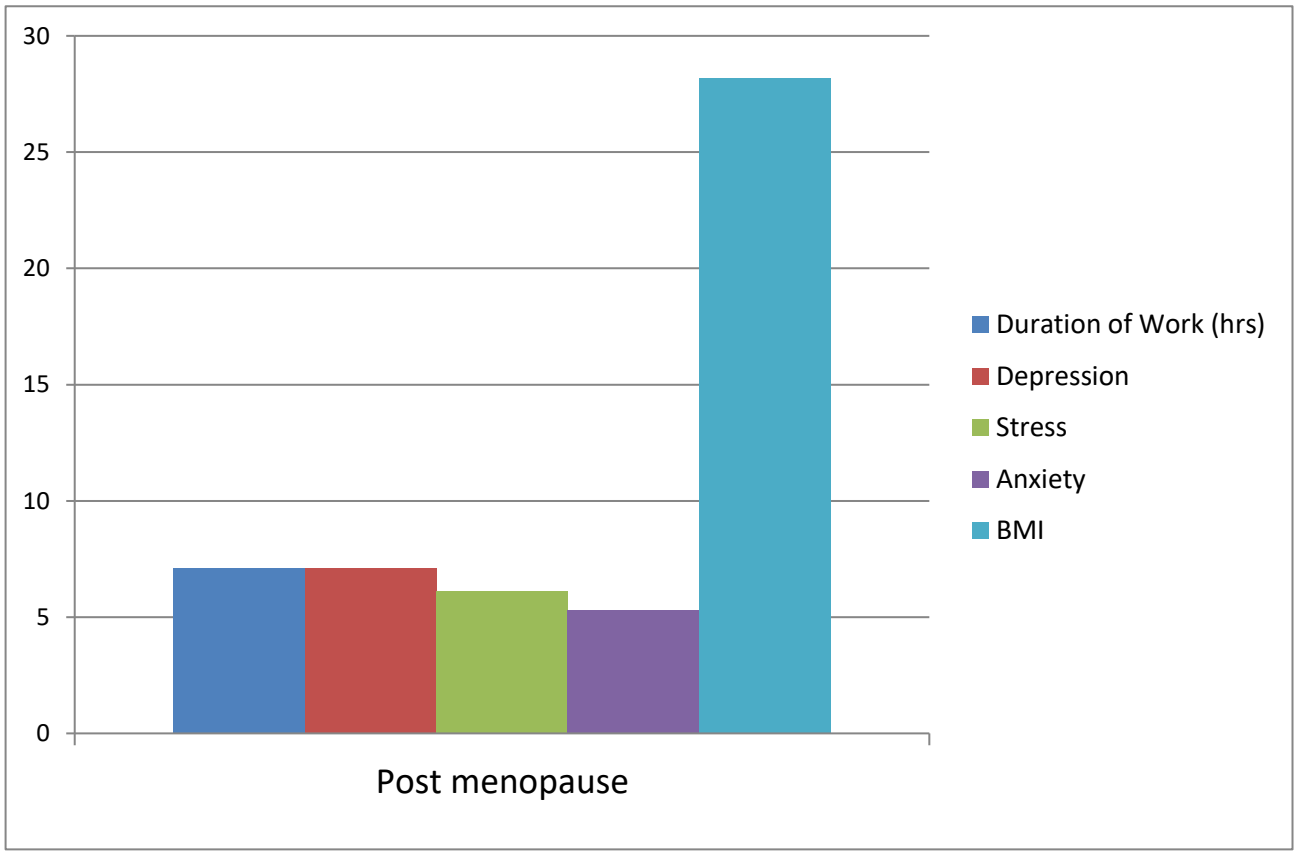

Figure 2. Post menopause (A bar graph demonstrating the various values of the parameters of predisposing factors in the premenopausal group)

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persons who worked longer hours experienced reduced levels of LBP. In contrast, a positive correlation was observed between elevated anxiety levels and lower back pain (LBP) among pre-menopausal women, highlighting the significance of psychological well-being in relation to LBP within this specific demographic. In contrast, anxiety (X4) was identified as the only significant risk factor among those in the post-menopausal group. This finding suggests a negative correlation between elevated anxiety levels and the occurrence of lower back pain in post-menopausal women. Disc discrete risk factor profiles emphasise the varying factors contributing to lower back pain (LBP) in women before and after menopause. This highlights the necessity of developing customized approaches to comprehending and managing LBP in these particular groups. The analysis of the results pertaining to pre-menopausal women reveals that increased levels of anxiety are the primary risk factor associated with lower back pain (LBP). The research by Sagheer et al. (2013), which demonstrated that people with chronic low back pain (LBP), particularly women in their early forties, exhibited a higher propensity for experiencing symptoms of anxiety and depression, is consistent with the findings presented in this study. Furthermore, the research conducted by Guruprasad et al. (2015), indicated that people experiencing anxiety may modify their posture and behaviours, which could potentially result in musculoskeletal discomfort. Notably, several studies have established a correlation between longer work hours and a higher prevalence of lower back pain (LBP). However, the statistical examination conducted in this study indicates that prolonged work hours could lead to a reduction in LBP, potentially attributable to enhanced joint mobility and strength. The discourse on post-menopausal women revolves around the increased incidence of anxiety and depression, as elucidated by Barghandan et al. (2021). Menopausal symptoms significantly impact these psychological variables. According to the research conducted by Kahere and Ginindza (2022), it was underscored that psychosocial factors such as disease conviction, affective disorder, and fear-avoidance behaviour in relation to employment play a crucial role in predicting the occurrence of low back pain (LBP). The significance of psychosocial elements in low back pain (LBP) aligns with the findings of Clays et al. (2007), which indicate that these factors contribute to an elevated risk of acquiring LBP. The study conducted by Choi et al. (2021) highlighted the significance of psychological factors in regulating the pain system by means of anti-nociceptive and acute analgesic processes. The aforementioned findings highlight the necessity of comprehensive strategies that encompass psychological well-being and physical considerations in managing lower back pain in post-menopausal women (Masters Program in Public Health, Universitas Sebelas Maret et al., 2021).

Conclusion

In summary, it can be concluded that anxiety plays a noteworthy role as a risk factor for the development of low back pain in both pre-menopausal and post-menopausal populations. The identification and screening of symptoms play a pivotal role in the management of pain. The implementation of several tactics, including deep breathing exercises, relaxation techniques, and counselling, has been shown to be effective in reducing tension and mitigating the impact of anxiety on those experiencing lower back pain. Physiotherapy assumes a crucial part in the management of physical manifestations associated with anxiety, encompassing pain mitigation, enhanced flexibility, heightened cardiovascular endurance, and improved sleep quality. The promotion of exercise routines, such as Pilates, is advocated in order to augment strength, flexibility, and mental well-being, with a specific focus on exercises targeting the back. Moreover, the incorporation of relaxation techniques and psychological therapy in the management of mechanical low back pain has the potential to mitigate the adverse consequences of anxiety and tension in the long run. Various techniques, such as yoga and meditation, have demonstrated efficacy in alleviating stress and providing a holistic approach to pain management. Yoga is known to improve physical strength, flexibility, and mental calm while lowering anxiety and muscle tension. Considering that anxiety poses a substantial risk for both populations, it is advisable to integrate relaxation practices, such as yoga and meditation, into a comprehensive approach to managing low back pain. The study is subject to certain limitations, namely a sample size that is relatively small and a limited geographic coverage. These limitations indicate that future research must employ larger samples and encompass a wider range of geographic locations. Furthermore, conducting additional investigations into alternative risk factors associated with low back pain in pre-menopausal and post-menopausal women could enhance the breadth of knowledge around this particular ailment. Inclusion of peri-menopausal women in future research endeavours might yield supplementary perspectives on the occurrences of low back pain within this specific demographic.

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Conflict of Interest

Nil declared by the authors.

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