Original Article

Relationship between Body Mass Index and Occupation with Low Back Pain

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ABSTRACT

OBJECTIVE: This study aimed to identify the relationship between body mass index (BMI) and occupation with low back pain (LBP) incidence in Zainoel Abidin Hospital.

METHODOLOGY: This cross-sectional study used convenience sampling to include 237 patients with LBP selected from a population of 618 at the Neurology Polyclinic, Zainoel Abidin Hospital. Data were collected using the *Short Form McGill Pain Questionnaire* (SFMPQ) and analyzed descriptively to assess pain characteristics and intensity among participants. The *chi-square* test was used to identify correlations between key variables.

RESULTS: Comprehensive results were obtained. 58.7% of the samples had a thin/normal BMI, 57.4% had an occupation background of self-employed/retired/housewives, and 87.8% experienced mild pain. This study showed a relationship between BMI and LBP (p = 0.009) and no relationship between occupation and LBP (p = 0.129).

CONCLUSION: The findings indicate a significant relationship between BMI and the incidence of LBP, while no significant association was found between occupation type and LBP among patients at Zainoel Abidin Hospital. Workers are encouraged to maintain a healthy BMI and practice proper workplace ergonomics to reduce LBP risk, especially for physically demanding roles.

KEYWORDS: Body Mass Index, humans, low back pain, occupation, pain measurement, incidence

INTRODUCTION

The BMI is a popular and extensively used metric for determining body fat and classifying people according to weight and height. BMI was first created as a tool for population health evaluations, but it is now a common way to screen for weight-related health hazards in clinical and public health settings. This index classifies underweight, normal weight, overweight, and obesity. It is computed by dividing an individual's weight in kilograms by the square of their height in meters (kg/m²). In 2022, one in eight individuals worldwide was found to be fat. Eight hundred ninety million adults (16%) and 2.5 billion (43%) of adults over 18 are obese, respectively[1]. BMI issues can have a variety of effects, including diabetes, cancer, heart disease, neurological conditions, long-term respiratory illnesses, and digestive problems.

Biomechanically, being overweight, mainly obese in the abdomen, increases the stress and pressure on the lumbar spine, which may cause joint wear and disc degeneration[2]. One interesting point of contention is how this dilemma led to the development of LBP. One of the most common effects of LBP is a significant decline in quality of life, often resulting in a reduced ability to participate in daily activities and work[3]. Mobility difficulties caused by LBP are the second most common condition worldwide[4]. LBP reduces quality of life and interferes with everyday tasks. Simple chores are frequently made more complicated by the pain, which emphasizes the importance of determining important variables like BMI and occupation. Providing appropriate prevention measures and interventions for LBP risk and improving quality of life requires understanding the relationship between BMI, occupation, and incidence of LBP.

A person's work-related psychological stress might contribute to LBP in addition to BMI problems[5]. Heavy lifting jobs often put more strain on the lumbar area, causing pain that gets worse as one's body weight and workload rise. People who lead healthy lives can prevent several metabolic disorders that affect LBP[6]. Consequently, this study aims to determine how BMI and occupation affect the likelihood of LBP. LBP is a significant public health issue that affects millions of individuals worldwide. It can seriously disrupt everyday routines, lower productivity, and raise absenteeism and medical expenses. Understanding the risk factors for LBP is crucial to creating preventative interventions that improve overall quality of life. Prior research has shown a connection between the type of labor performed and the probability of developing LBP and the relationship between BMI and the occurrence of LBP[7-9].

This study provides a fresh perspective by

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investigating the link between BMI and occupational factors with LBP incidence, an underexplored topic in the literature. The results might give medical professionals useful information that could improve worker well-being and occupational health.

METHODOLOGY

Study Design

This research utilizes a descriptive and analytical methodology. The study focuses on quantifiable characteristics and is quantitative. Data is gathered at a particular point in time using a cross-sectional approach. The study's data was collected between April and May 2023.

Population and Sample

The study comprises 618 individuals with LBP who received outpatient care at the neurology polyclinic at Zainoel Abidin Hospital. A sample size of 237 persons was obtained by applying the Isaac and Michael formula to determine the number of samples. The sample was selected based on three criteria: it had to be diagnosed with LBP, be older than 18, and be willing to participate in research. The non-probability sampling method was used in conjunction with a convenience sampling strategy. A non-probability, convenience sampling strategy was used for this study's sampling, choosing participants based on their availability and compliance with the predetermined sample requirements.

Instrument

A sociodemographic instrument that includes BMI and occupation type is the first used. SF-MPQ is used in the second research instrument. The SF-MPQ is a 15-question survey that uses a 4-point intensity scale (no pain to severe pain) to evaluate pain's sensory and emotional aspects. Patients can also rate their level of discomfort using the Visual Analog Scale (VAS), which has four categories: no pain 0), mild pain (1-15), moderate pain (16-30), and severe pain (31-45). Following validity and reliability testing, this research tool has a Cronbach's alpha reliability value of 0.70 and a validity value of 0.70, suggesting that it is appropriate for further studies [10].

Data Analysis

The characteristics of the respondents and the percentage of each category for the research variables were described using univariate analysis, and frequency and percentage calculations were made for every categorical variable. To verify that the samples were independent and that the data types were suitable for this study, the chi-square test was also used to evaluate correlations between categorical variables.

Ethical Statement

The Regional General Hospital Zainoel Abidin Banda Aceh's Health Research Ethics Committee approved this research after it underwent ethical testing. It was deemed ethically appropriate based on the seven standards of the World Health Organization (2011) and referred to the CIOMS Guidelines 2016 with Number: 040/ETIK-RSUDZA/2023 and Protocol Number 23-02-040.

RESULTS

Characteristics of Respondent

Respondent characteristics, such as age, gender, BMI, and type of occupation, are considered in the study. **Table I** below demonstrates that data was obtained from 237 patients at the Neurology Polyclinic of Zainoel Abidin Hospital. Of these patients, 154 (65.0%) were late adults (> 40 years old), 134 (56.5%) were women, and 164 (69.2%) had thin/normal BMIs. Most patients (136, or 57.4%) worked as housewives, retirees, or self-employed.

Table I: Characteristic Respondents

Characteristics	f	%
Age (Years)		
18-40 (Early Adult)	83	65
>40 (Late Adult)	154	35
Total	237	100
Gender		
Male	103	43.5
Female	134	56.5
Total	237	100
BMI		
Thin/Normal	139	58.6
Overweight/Obesity	98	41.4
Total	237	100
Type of occupation		
Self-Employed/Retiree/Housewife	136	57.4
Civil Servant/Indonesian National Army	61	25.7
Farmer/Laborer/Fisherman	40	16.9
Total	237	100

Characteristics of LBP from Respondent

These data show that, out of the 237 patients who reported having mild pain, 208 individuals (87.8%) reported having mild pain, and 29 individuals (12.2%) reported having moderate pain. **Table II**

Table II: Characteristic LBP from Respondents

Characteristics	f	%
Pain		
Mild	208	87.8
Moderate	29	12.2
Total	237	100

Relationship between BMI and LBP

The analysis using the chi-square test on the 2 x 2 table revealed the following results: out of 139 people with thin/normal BMI, an average of 115 (82.7%) experienced mild pain. Conversely, out of 98 people with fat/obese BMI, 93 people experienced mild pain. The analysis results in **Table III** show a p-value of 0.009, indicating a significant relationship between BMI and pain in LBP patients.

Table III: Relationship between BMI and LBP

BMI	Pain in Patients with LBP						p-value
	Mild		Moderate		Total		
	F	%	f	%	f	%	
Thin/Normal	115	82.7	24	17.3	164	100	0.009
Overweight/ Obese	93	94.9	5	5.1	98	100	

Relationship between Occupation and LBP

An analysis was conducted to determine the relationship between occupation types and the incidence of LBP using the chi-square test for the 3x2 table. **Table IV** shows that the most common type of occupation is self-employed/retirees/housewives, totaling 136 people, with a mild pain category of 116 people (85.3%), while the lowest is farmers/laborers/ fishermen, totaling 40 people, with mild pain in 34 people (85%). The analysis results showed a p-value of 0.129, with the interpretation that there is no relationship between occupation and pain in LBP patients.

Table IV:
Relationship between Occupation and LBP

Type of occupation	Pain in Patients with LBP						p-value
	Mild		Moderate		Total		
	f	%	f	%	f	%	
Self-Employed/ Retiree/Housewife	34	85	6	15	40	100	0.129
Civil Servant/Indonesian National Army	58	95.1	3	4.9	61	100	
Farmer/Laborer/ Fisherman	116	85.3	20	14.7	136	100	

DISCUSSION

This study demonstrates that BMI and pain are significantly correlated in patients with LBP, although occupation and pain are not. BMI is a significant contributing factor to LBP. People with higher BMIs are more likely to suffer from low back discomfort because they put more mechanical strain on their spines, especially if they are overweight or obese. Carrying too much weight can put further strain on the lower back, causing the joints and spinal discs to deteriorate and aggravating pre-existing spinal disorders. Dorsopathy is more likely to occur if a person's BMI is not controlled[11].

Furthermore, inflammation is frequently associated with a high BMI, exacerbating lower back discomfort and stiffness. On the other hand, a low BMI could be a sign of inadequate spinal support and poor muscle mass, which could further increase the risk of LBP. Thus, it is essential to maintain a healthy BMI through food and exercise to manage and avoid LBP.

The results of this study demonstrate how BMI has a significant impact on the incidence of LBP. Increased mechanical strain on the spine is linked to higher BMI levels, especially in those who are overweight or obese. This increased pressure can increase the risk of LBP by causing the joints and discs in the spine to deteriorate. Additionally, being overweight is frequently associated with inflammatory processes that can make LBP and stiffness worse[12]. On the other hand, keeping a healthy BMI is essential for lowering the risk of LBP. A healthy diet and consistent exercise can help control weight and enhance spinal support13 by strengthening muscles. As this study shows, knowing how BMI and LBP relate can help develop preventative measures to lessen discomfort and improve the general quality of life for those at risk.

The BMI is a useful classification tool for determining if an adult is overweight or obese. It is a straightforward yet effective measure of weight concerning height. A thorough investigation at the Neurology Polyclinic of Zainoel Abidin Hospital has shown a strong relationship between BMI and the occurrence of LBP. Notably, women who are categorized as overweight or obese are likely to develop LBP more frequently. According to a study, women are more likely to have LBP. Through mechanical pressure on the disc, body weight and fat mass directly contribute, or indirectly, through the metabolic system and inflammation. These have a direct impact on lower back discomfort. A weight loss program can help reduce the short- and long-term effects of lower back discomfort[14]. Moreover, it has been demonstrated that a higher BMI and body weight are directly[15] This study emphasizes how much BMI influences the incidence of LBP. Even while being overweight or obese has the most significant risk, LBP can also occur in people with a normal BMI because of other variables like occupation, comorbidities, and insufficient sleep[16].

According to this study, the occurrence of LBP and occupation type did not significantly correlate. Since most participants in the sample population held jobs that did not require a lot of physical labor, the lack of this link may be explained by the small variety of occupations within the sample group[7]. Consequently, our sample did not sufficiently reflect the possible influence of physically demanding activities on LBP. Additionally, most respondents' jobs mainly involved lower back-stressing activities, which decreased the risk of LBP connected to the workplace. These results imply that a broader range of occupational activities, particularly those involving high levels of physical exertion, may have a more noticeable impact on LBP than job type[17].

For long-term health and recovery, independent medical rehabilitation and maintaining a healthy lifestyle are essential, and they frequently provide more long-lasting advantages than depending only on prescription medications. Instead of only treating symptoms, rehabilitation aims to address the underlying causes of health problems, such as muscular imbalances or bad posture, strengthen the body and increase mobility. Regular exercise, a healthy diet, and stress reduction help people avoid

health issues down the road and give them the power to take charge of their well-being. On the other hand, medical medications frequently have adverse effects and don't treat the underlying causes of illnesses, even though they can help treat acute symptoms or provide short-term respite. More thorough, long-lasting gains in health and quality of life can result from prioritizing prevention through rehabilitation and a healthy lifestyle. According to a poll, people with LBP typically favor medical consultations above rehabilitation consultations and leading a healthy lifestyle[18].

LBP has been linked to work-related variables, especially in employment requiring heavy lifting, extended sitting, or repetitive motions. The lower back muscles and spine are severely strained by jobs that include awkward postures, bending over a lot, or moving heavy objects, which raises the risk of persistent pain and damage. Sedentary occupations, including those in offices, can aggravate LBP by requiring extended periods of sitting with bad posture, which can cause spinal compression and muscular stiffness. Stress at work and mental exhaustion can also make pain seem worse or cause strain in the muscles. Lowering LBP and enhancing general spinal health need ergonomic solutions, frequent rests, and back and core strengthening exercises.

Although occupational characteristics are frequently associated with LBP, much research indicates that there may not be a clear correlation between specific employment categories and LBP. In this study, no correlation was identified between the type of occupation and LBP, despite existing theory suggesting a relationship between the two. For example, LBP may be experienced at similar rates by those in sedentary or low-physically demanding employment as by people in physically demanding occupations. This suggests that other factors, such as genetics, lifestyle choices, or individual health conditions, maybe more critical. Moreover, regardless of the kind of work, non-occupational variables like lack of physical exercise, bad posture outside of work, or underlying medical disorders may lead to LBP. The amount of vibration each person experiences affects this, resulting in a variation in the impact of each person's spine experiences[19]. Activities with a high workload will impact the spine's function, increasing the likelihood of disc friction and ultimately leading to LBP[20]. According to a study, various work-related factors can influence the development of low back discomfort. Age and private or public transportation usage are two variables that may affect the incidence of LBP[21]. Therefore, it is essential to assess the consistency of research samples, considering factors like age, activity level, and long-distance travel. In such circumstances, the beginning of lower back discomfort may be more directly associated with the person's general health and habits than with their place of employment. Therefore, it is essential to assess the consistency of research samples, considering factors like age, activity level, and long-distance travel. In such circumstances, the beginning of lower back discomfort may be more directly associated with the person's general health and habits than with their place of employment.

CONCLUSION

These findings prove that maintaining a normal BMI can help prevent lower back pain. Although no significant relationship was found between occupation and lower back pain in this group, this may have been influenced by the limited variety of job types within the study sample. These results suggest the need for broader research and serve as a reminder to adopt a healthier lifestyle to support spinal health.

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AUTHOR CONTRIBUTION

Marlina M: Study conception and design; study supervision; critical revisions for important intellectual content.

Husna C: Study conception and design; study supervision; essential revisions for important intellectual content.

Rizki MR: Data collection; literature review/analysis; manuscript writing; references.

Tarigan AA: Study conception and design; study supervision; critical revisions for important intellectual content.

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