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Relationship between Body Mass Index (BMI) and Disability Level of Low Back Pain (LBP) Patients

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Abstract
LBP (Low Back Pain) is a pain in the back, especially in the lower part, which is one of the main reasons for visiting healthcare facilities. Various risk factors have been identified as causes of LBP and disability in LBP patients, one of which is Body Mass Index (BMI). Although several studies have shown that BMI can worsen low back pain, the direct relationship between BMI and the level of disability experienced by patients remains inconsistent and inconclusive. The purpose of this study was to determine the relationship between BMI and disability in LBP patients. This type of research was quantitative research with a correlational design. The number of samples in this study was 38 people. The inclusion criteria for the sample in this study were patients with LBP who are still cooperative, fully conscious, and willing to participate as research respondents. The instrument used to measure disability was the Oswestry Disability Index (ODI) or the Oswestry Low Back Pain Disability Questionnaire, while Body Mass Index (BMI) was measured using the results of weight and height measurements. Data analysis was carried out using computerization to compile the frequency distribution and percentage of each variable, as well as using the the Sperman rank test to determine the relationship between variables. The results showed that 55.26% of respondents had ideal body weight and 55.26% of respondents had moderate disabilities. There is no relationship between BMI and disability in LBP patients. This study recommends research related to interventions that can reduce disability in LBP patients.

Keywords: *Body mass index; disability; low back pain*

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INTRODUCTION

Low Back Pain (LBP) is a common condition that can affect a person's quality of life and daily activities. Body Mass Index (BMI), on the other hand, is a measurement used to assess a person's weight based on their height and weight. Several other factors can influence the relationship between BMI and LBP, including lifestyle, smoking habits, physical activity, and psychological factors. A higher BMI increases the likelihood of experiencing LBP. BMI affects the load on the lumbar vertebrae, which can cause spinal misalignment and increase the risk of LBP complaints (Ibrahimi-Kaçuri et al., 2015). Low Back Pain (LBP) contributes greatly to disability in general. LBP is ranked 12th out of 21 regions in the world and contributes as a burden in two countries out of 21 regions, namely Western Europe and Australia (Hoy et al., 2012). In the United States, LBP is one of the reasons for going to the doctor (Qaseem et al., 2017). Based on research conducted (Manchikanti et al., 2014) shows that the prevalence of the age at which most often experiences LBP is 40-80 years. In addition to being reviewed from age, the prevalence of LBP sufferers in Brazil increased from 4.2% in 2002 to 12.9% in 2010 (Meucci et al., 2013). Williams et al. (2015) show that the prevalence of patients with back pain was high in the Russian Federation, which was 56% and the lowest in China, which was 22%.

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Study of Alanzi et al., (2017) in Saudi Arabia shows that out of 501 research respondents, the prevalence of respondents experiencing LBP was around 23.8%. Based on a systematic review conducted Hoy et al., (2012) in Australia show that LBP is a major problem in older populations, and the number of LBP sufferers tends to increase. Research in Iran conducted by Biglarian et al. (2012) shows that out of 25,307 respondents, around 29.3% of respondents experienced LBP. Biglarian et al. (2012) says that in general, the prevalence of the population with LBP in one month is in the range of 30% - 40% and the annual duration is in the range of 25% - 60%.

LBP is one of the causes of disability in several countries in 2015 (Wu et al., 2020) and is ranked third as a cause of disability (Silva & Inumaru, 2015). WHO states that one of the conditions of disability is caused by musculoskeletal disorders, the majority of which are caused by LBP. Salvetti et al., (2012) shows that 117 patients experience chronic LBP, 80.7% of patients experienced moderate to severe disabilities. Walker et al., (2004) state that the prevalence of disability in India experienced by LBP patients was 95.19%, in China, people with disabilities in 1990 was 6.2 million, and the number increased in 2016 to 7.7 million (Wu et al., 2019). Research conducted Voon et al. (2013) on 63 students suffering from LBP in Malaysia shows that 87.3% of students experienced minimal disability, and 12.7% experienced moderate disability. In Indonesia, the prevalence of disability in LBP patients in the UPT Kesmas Payangan Gianyar work area was 91.7% of 48 patients who complained of minimal disability and 8.3% of patients who complained of moderate disability (Kaur, 2016). Complaints of LBP patients who experience disability are mostly caused by pain (Stefane et al., 2013). Horgas et al., (2008) stated that pain is associated with high functional disability and reported that pain experiences that describe pain intensity, pain duration, and pain location can affect disability. A similar finding is explained by Dueñas et al., (2016) the fact that disability can be influenced by pain experienced by individuals.

Various risk factors have been associated as causes of LBP and disability, such as psychological, social, and biophysical factors. Body Mass Index (BMI) can also affect disability Segar et al., (2016). In addition, lifestyles such as smoking, obesity, and low frequency of physical activity also play a role in the occurrence of LBP (Hartvigsen et al., 2018). Zhang et al. (2018) consistently show that overweight and obesity are risk factors for LBP in men and women. Maintaining a healthy body weight may be one of the factors preventing the occurrence of LBP. The systematic review and meta-analysis identified positive cross-sectional associations between increased body fat and widespread and single-site joint pain in the low back, knee, and foot. Longitudinal studies suggest elevated body fat may confer increased risk of incident and worsening joint pain, although further high-quality studies are required. Obesity can cause mechanical stress on the patient's joints and spine, resulting in limited body mobility. Some patients with obesity have difficulty walking, climbing, driving, or pressing. This problem causes inability to perform physical activities, pain and discomfort, functional limitations, mental distress, and decreased movement (Koyanagi et al., 2015). In addition, being overweight or obese also increases the risk of LBP (Hwang et al., 2019). Obesity can cause LBP through mechanical stress on the spine, chronic systemic inflammation, spinal degeneration, or decreased blood flow to the spine due to atherosclerosis (Koyanagi et al., 2015). LBP sufferers tend to limit their movement or physical activity, which will result in weight gain. Research in Oregon shows that most adolescents with LBP have a higher BMI than adolescents with other chronic pain (Wilson et al., 2010). Crawford et al. (2019) also state that there is a strong relationship between overweight and obesity, LBP, increased pain intensity, and reduced social and physical function. According to Samper-Ternent & Al Snih, (2012) one of the individual factors that causes LBP is BMI, where the higher the BMI, and irregular in managing diet will have the impact on the risk of obesity. The increase in weight is one of the factors of an unhealthy lifestyle. This will bring the potential for increased risk of developing other diseases, one of which is LBP. Various risk factors have been linked as causes of LBP and disability, and based on several previous studies, disability in LBP patients is caused

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by pain. Although a number of studies have shown that BMI can worsen low back pain, the direct relationship between BMI and the level of disability experienced by patients remains inconsistent and inconclusive. Based on the problems above, the author is interested in conducting research on the relationship between BMI and disability in LBP patients. The purpose of this study was to determine the relationship between BMI and disability in LBP patients.

METHOD

The research design used was a quantitative research design with a correlation design and using a cross-sectional approach. This research has passed the ethical review from the health Research Ethics Commission with number 1642/II/SP/2019. The population in this study was all patients with LBP at the University of North Sumatra Hospital, with a sample size of 38 people. The sampling technique used was nonprobability sampling with a sampling method, namely, consecutive sampling. This method is a sample selection method that is carried out by selecting all individuals who are found and meet the sample criteria, namely, patients who experienced LBP and disabilities, were cooperative, and willing to be respondents. The data collection tool used in this study included a demographic data questionnaire sheet and a disability questionnaire sheet. The instrument used to measure BMI involves using indicators of respondents' weight and height. Based on the data analysis, the validity value for body weight measurement was 0.561, and height was 0.699. Subsequently, BMI is calculated using the formula: weight divided by the square of height. The categorization of BMI is as follows: abnormal BMI includes underweight (BMI ≤18.5), overweight (BMI ≥25.0–27.0), and obesity (BMI ≥27.0), while the normal category is defined as BMI ≥18.5–<25.0 (Riskesdas, 2018 dalam (Ristina, 2021)). Measurement of disability variables using the Oswestry Low Back Pain Disability Questionnaire because this questionnaire is a questionnaire that has been used frequently in patients with LBP (Fairbank & Pynsent, 2000). The questionnaire was validated by three experts, yielding a validity test result of 0.8. The instrument also underwent a reliability test with 30 research respondents outside the study sample, resulting in a reliability score of 0.9. The Oswestry Low Back Pain Disability questionnaire sheet in patients and instructs patients to fill out the questionnaire according to the patient's condition. The questionnaire consists of 10 parts (pain intensity, self-care, lifting, walking, sitting, standing, sleeping, sexual life, social life, traveling). If the patient chooses the first statement, the score is 0, and the sixth statement is 5. Score 0-4 does not experience disability, (b) score 5-14 experiences mild disability, (c) score 15-24 patients experience moderate disability, (d) score 25-34 patients experience severe disability, (e) score 35-50 patients experience complex disability. All scores are added up and multiplied by 100%. Interpretation of disability scores is divided into 5 parts, namely (a) 0%-20% = minimal disability, (b) 21%-40% = moderate disability, (c) 41%-60% = severe disability, (d) 61%-80% = paralyzed, (e) 81%-100% = bedrest. The guided to calculate of the percentage is for each section the total possible score is 5: if the first statement is marked the section score = 0; if the last statement is marked, it = 5. If all 10 sections are completed the score is calculated as follows: Example: 16 (total scored) 50 (total possible score) x 100 = 32% If one section is missed or not applicable the score is calculated: 16 (total scored) 45 (total possible score) x 100 = 35.5% Minimum detectable change (90% confidence): 10% points (change of less than this may be attributable to error in the measurement). The statistical analysis used in the study was the Spearman rank test.

RESULTS

Table 1 shows that the majority of respondents had an ideal body weight, with a total of 21 people or 55.26%. The results of the study showed that the majority of respondents had moderate disabilities, totaling 21 people or 55.26%.

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Table 1. Frequency distribution and percentage of BMI and Disability of LBP patients

Variable	*f*	%
BMI		
Normal (18,5-24,9)	21	55.26
Overweight (25-29,9)	11	28.94
Obesity (>30)	6	15.78
Disability		
Mild	10	26.31
Moderate	21	55.26
Severe	7	18.42

Table 2 shows that the significance value of Asymp. Sig (2-tailed) of 0.945 was greater than 0.05, which means that there is no relationship between BMI and disability in LBP patients, with a correlation value of 0.354, which means that it has a low strength of relationship.

Table 2. Correlation between BMI and disability in LBP patients

Variable	Nilai R	P value
BMI Disability	0,354	0.154

DISCUSSION

BMI is a calculation that can be used to estimate a person's ideal body weight. However, this method is less accurate in assessing a person's health risk in certain conditions. The results of the study showed that the majority of respondents had an ideal body weight within the normal range. Body Mass Index (BMI) is a simple way to see the nutritional status of adults, especially those related to underweight and overweight. Based on a survey conducted by the National Health and Nutrition Examination Survey (NHNES) in the United States (Li et al., 2022), it was found that the population suffering from overweight was 34.2% and obesity was 33.8%. The number of Indonesians suffering from obesity in 2010 reached 11.7% and in West Kalimantan, it was known to reach 9.5%. The number of overweight sufferers in Indonesia is higher in women than men, it is estimated that in 2015 the percentage of overweight in women will reach 38% and this number will increase when compared to 2005 which was only 28%, for men it is estimated that it will increase from 12% to 13% (Sari & Ping, 2023).

Basically, people with an abnormal BMI are more likely to get tired than people with a normal BMI. Abnormal BMI is divided into 3, namely thin, overweight, and obese. Underweight (thin) individuals get tired quickly because of the lack of calorie intake in the body to support movement energy, and overweight or obese individuals tend to get tired more quickly because of the accumulation of fat in the body so these three conditions will rest more than those with a normal BMI. BMI not only causes LBP directly, but also indirectly. This indirect cause is related to a combination of other factors that can support the occurrence of LPB. Other factors referred to are factors that cannot be changed and daily habits that can aggravate the occurrence of LPB. These unchangeable factors include age and gender. Daily habit factors include smoking, body position during activities, and exercise habits (Segar et al., 2016).

The result of this study showed that the majority have a BMI within a normal value, namely 55,26%. This is because respondents who have a normal body weight is more than respondents who are overweight or obese. The analysis results show that respondents who have normal or abnormal BMI can be exposed to low back pain complaints. Several factors that influence a person to be affected by low back pain complaints such as work period, length of work, and age of the worker. Disability in LBP patients can be caused by increased duration of LBP, high pain intensity scores, fear of avoiding pain, and slower stability of individual

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movement. Koğa et al., (2019) find that there was a negative relationship between BMI and disability scores in patients with LBP. This is not in line with research conducted by (Shiri et al., 2014), which stated that there was no relationship between BMI and obesity with risk factors for LBP in men and women in Finland. The number of disabilities due to LBP in students is 37.5% and 37.8% and shows that there is a relationship between gender, sitting time while studying, sitting position while studying, physical activity and exercise habits but there is no relationship between BMI and disability due to LBP (DePalma et al., 2012; Martono, 2023) also find that there was no relationship between body mass index and Low Back Pain in the elderly in Untia Village, Makassar City.

Patrianingrum (2015) states that there are several risk factors that can affect the occurrence of LBP, including gender, age, body mass index (BMI), smoking habits and exercise habits. Meanwhile, according to Ramdas & Jella (2018) risk factors for the occurrence of LBP include gender, age, physical activity and exercise, obesity, family history, depression, stress and anxiety, lifting weights, and sitting for long periods of time.

BMI is one of the risk factors for LBP and will increasingly affect disability. Disability is a complex phenomenon that describes the interaction of individuals with the community in which they live and a condition or function that is considered impaired, so that it can affect the ability to perform daily activities. Factors that can affect disability according to Karwowski (2006) are personal, social, and economic factors. Personal factors include age, physical strength, previous injuries, activity levels and conditions, pain tolerance, and psychological. Social factors include job satisfaction, relationships at work, income, lack of control over work, and an uncomfortable work environment. Davis et al. (2013) state that factors that can affect disability, especially in LBP patients, are increased duration of LBP, high pain intensity scores, high fear scores in avoiding pain, and slower stability of individual movement speed. Therefore, this is what causes BMI to have no relationship with disability in LBP patients.

CONCLUSION AND RECOMMENDATION

The results of the study showed that LBP patients had an ideal BMI and experienced moderate disability, and the results of the study showed that there was no relationship between BMI and disability in LBP patients, with a weak relationship strength. Recommendations for further research are to conduct a broader search related to factors that can affect LBP.

KONTRIBUSI PENULIS

IS contributed in the research design, method writing and data analysis. MPS contributed in the research design, introduction writing and data analysis. RNA contributed in the research design, data analysis dan discussion writing.

KONFLIK KEPENTINGAN

All authors do not have any conflicts of interest.

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