Health Belief Model on the Influence of Personal and Work Factors on the Perception of Low Back Pain

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ABSTRACT

The prevalence of low back pain (LBP) in Indonesia is increasing with age and deviant behavior in the workplace. If people are not aware of the vulnerability they feel, it can lead to deformities and disabilities as perceived severity. So that behavior changes with motivation for public health. This study aims to analyze the relationship between personal and work factors and the perception of LBP. This type of research is a cross sectional quantitative research. The research location is in Sukoharjo, Central Java. The sampling technique was purposive non-random sampling with a total sample of 120 respondents. Data were collected using questionnaires, then analyzed using multiple linear regression tests. The results of bivariate analysis showed that personal factors had a positive and significant correlation with the perception of LBP incidence (r=0.549, p<0.001). Occupational factors had a positive and significant correlation with the perception of LBP incidence (r = 0.680, p<0.000). Personal and occupational factors simultaneously affected the perception of LBP incidence with a p value of 0.000 and the contribution of these two variables to the perception of LBP incidence was 48.3%. It can be concluded that both partially and simultaneously, personal and occupational factors affect the perception of LBP incidence. Suggestions for further research are needed to explore other factors that influence the perception of LBP events. This is important to deepen understanding of the various aspects that can affect an individual's perception of LBP, including environmental, psychosocial, and lifestyle factors.

Keywords: Personal, Work, Perception, Low Back Pain, Health Belief Model

INTRODUCTION

Low back pain (LBP) among workers is a prevalent issue worldwide, significantly impacting productivity and quality of life. Various factors contribute to the onset of LBP in the work environment, including a sedentary lifestyle, poor posture, age, and the nature of the work performed (Mesquita & Chagas, 2022). Studies have shown a strong correlation between occupational factors and the prevalence of LBP among workers, emphasizing the need for targeted interventions and preventive strategies to address this issue (Wang et al., 2023). Additionally, research focusing on health workers has highlighted that high levels of job stress and frequent heavy lifting increase the risk of experiencing back pain among medical personnel (Mubarok et al., 2022). Occupational LBP cases are frequently reported in workplaces with a moderate number of workers, with women being slightly more prone to LBP than men, especially in their 20s and 30s (Iwakiri et al., 2022). Workplace interventions have shown significant improvements in pain, disability, fear-avoidance, and quality of life for workers affected by LBP, underlining the effectiveness of such interventions in managing this

condition and facilitating a return to work (Russo et al., 2021).

Various types of work can trigger musculoskeletal problems and disorders in workers. The World Health Organization (WHO) estimates that the prevalence of work-related musculoskeletal disorders is 50-70%. Approximately 317 million workers experience musculoskeletal disorders per year, and around 6300 workers per day die from these disorders (Tegenu et al., 2021). In Sokoto, Nigeria, a high prevalence of LBP among health workers is associated with being older, being female, working for more than ten years, and overweight/obese (Abubakar et al., 2020).

Approximately 67 - 84% of the population in developed countries have experienced LBP. Every year 15 - 45% of adults suffer from LBP (Jain et al., 2022). NBP most often occurs at the age of 35-55 years (Stamm et al., 2019). LBP issues are the second most frequent excuse not to report to work in America (Beall et al., 2021). In residents under the age of 45 years, LBP is a complaint that can be limiting activities and causing lost working hours, resulting in reduced productivity and an even more significant economic burden. It is reported that about 5% of this amount accounts for at least 75% of health costs.

The total costs incurred for medical expenses can reach 90 billion rupiah per year (Kanaan et al., 2020).

According to data from Indonesia, mistakes made when handling materials result in 25% of worker injuries (Septiana et al., 2019). According to Pratama, Asnifatima and Ginanjar (2019), 40.5% of workers have health issues that may be connected to their jobs. Of these, 16% are musculoskeletal illnesses, which include back discomfort. According to WHO data, up to 70% of people in developed nations will at some point throughout their lives experience non-specific LBP. There is proof that the number of LBP complaints in emerging nations is rising. Then, according to Grabovac and Dorner (2019), the Global Burden of Disease (GBD) reported a 9.4% global prevalence.

According to Latifah, Citrawati and Yusmaini (2022), the incidence of LBP in Indonesia is estimated to vary between 7.8% and 37%. The prevalence of LBP in Indonesia is 18% and increases with age, and is most common in the middle and early fourth decade (Wulandari et al., 2020). Research in England and America shows that the prevalence of musculoskeletal pain in the elderly ranges from 65-85%, with 36 to 70% of them suffering from back pain (Ge et al., 2021). It is estimated that 40% of Central Java residents aged > 65 years have suffered from LBP, with a prevalence of 18.2 % of men and 13.6% of women (Triwulandari & Zaidah, 2019). This prevalence increases with increasing age, which is between 3-17% of patient visits to several hospitals in Indonesia (Latief et al., 2019).

Low back pain can be caused by musculoskeletal factors related to movement or muscle activity. Social and psychological aspects also play a role in causing LBP (Moissenet et al., 2021). In addition, several important risk factors associated with the occurrence of LBP are age, gender, years of service, and knowledge of ergonomic positions. Other factors that influence the incidence of LBP include personal characteristics such as smoking, obesity, and low levels of physical activity (Igwesi-Chidobe et al., 2024).

The impact of LBP if there is no belief for healthy behavior as perceived benefits as a study of health beliefs models properly can cause various health problems such as scoliosis, lordosis, and other disorders that can affect cardiorespiration (McPhee & Graven-Nielsen, 2022; Tarabeih et al., 2022). LBP sufferers will experience a decrease in endurance and strength (McPhee & Graven-Nielsen, 2022), so that productivity and quality of life will decrease. So that health motivation as a promotive effort is prioritized over corrective action (Melo et al., 2022). Factors that are likely to cause the incidence of LBP need to be identified. Many studies have been conducted on personal and work factors in LBP (Hossian et al., 2022).

Potential industrial activity include convection industrial centers. There are numerous convection industries in Sukoharjo Regency, Central Java, including PT Dan Liris, PT Sri Rejeki Isman Tbk (Sritex), Batik Keris, PT Jaya Perkasa Convection, and others. In particular, PT Dan Liris employs 8000 people, of which 4000 work in the apparel and convection area (Dan Liris, 2023). According to the data, Sukoharjo employs a sizable number of convection workers, many of whom may get lower back pain. This is in line with the study conducted by Alhowimel et al. (2021), which examined parameters related to smoking, age, gender, and BMI.

Additionally, studies conducted in 2024 by Anjali et al. (2024) show that prolonged periods of inactivity and bad posture at work can aggravate musculoskeletal conditions like LBP. Research on individual characteristics, the workplace, and perceptions of LBP events is therefore required in order to better understand the process of signals to action toward individual action as convection workers in order to control LBP incidences and preserve or even boost convection worker productivity.

METHODS

This research is a type of cross-sectional quantitative research. The analysis was carried out in the Sukoharjo area, Central Java from January to March 2020. The population in this study was all convection workers in the Sukoharjo Regency area, namely PT Dan Liris, totaling 4000 employees. The sampling technique was purposive non random sampling. The inclusion criteria in this study were: (1) active convection worker at PT Dan Liris, (2) had a history of/experiencing LBP, (3) work period > 1 year, (4) age: 19-54 years, (5) at least graduated elementary school, (6) willing to be a sample. Exclusion criteria included: (1) experiencing vertebral postural abnormalities, (2) taking permanent analgesic drugs. The sample size formula used in multivariate analysis is 15-20 samples per independent variable (Hair et al., 2010). This research consists of personal variables, work factors, and perceptions of low back pain. The sample used in this research was 119 people, exceeding the sample size formula for PT Dan Liris workers, Sukoharjo Regency.

The instruments used in the research were questionnaires and interviews. For questionnaires before the instrument is used in research, the instrument is first tested on respondents to test its validity and reliability. The forms of validity in research are: content validity, face validity, construct validity and criterion validity. Testing the content validity of the question items was carried out using the Pearson correlation technique (product moment correlation).

In the 122-item instrument test on 30 convection worker respondents, there were 8 invalid items. Of the 8 invalid instrument items, there are 3 personal variables, 3 work factors, 2 items for perception. There were 8 invalid instrument items, making the total instrument 122 items in this study after statistical analysis only 114 instrument items remained. Face validity assessment can be done qualitatively and quantitatively. Basically, to ensure face validity, researchers examine the extent to which the question items in the questionnaire have been structured with good sentences, are clear, not too long and each question item only asks one question. So that each

question item does not give rise to misinterpretation and the answer obtained is the actual answer (Murti & Nurchayati, 2019). Construct validity is based on the suitability between the measurement results of the measuring instrument used and the theoretical concepts of the variables studied. The reliability test in this research questionnaire shows that the Cronbach's alpha coefficient value is higher the closer it is to 1. The results of the Cronbach's alpha analysis of 30 convection worker respondents, obtained 0.933 (≥0.60), meaning that the instrument shows a reliability value, namely internal consistency and high where the correlation coefficient is close to 1. The collected data was analyzed using multiple linear regression analysis. With an ethics license of 1.185/X/HREC/2019, the project was granted approval by the Health Research Ethics Committee at Dr. Moewardi Hospital.

RESULTS AND DISCUSSION

Results based on sample characteristics show that the majority of the sample are female (79%), aged 36-40 years (23.5%), education equivalent to high school (76.5%), and income equivalent to UMP (UMK/ 69.7%). A complete description of the characteristics of the respondents can be seen in table 1.

Table 1
Distribution of Respondents by Gender

| Variable	Characteristic	F	%
Sex	Men	25	21
	Women	**94**	**79**
Age	≤20 years old	2	1,7
	21–25 years old	21	17,6
	26–30 years old	26	21,8
	31–35 years old	16	13,4
	36–40 years old	**28**	**23,5**
	41–45 years old	11	9,2
	46–50 years old	11	9,2
	≥51 years old	4	3,4
Education	Elementary School Graduate/equal	3	2,5
	Middle School Graduate/equal	22	18,5
	High School/equal	**91**	**76,5**
	Bachelor Degree/ University Graduate	3	2,5
Income	**Minimum Wage**	**83**	**69,7**
	Over the Minimum Wage	34	28,6
	Uncertain	2	1,7
Body Mass Index (BMI)	High	57	47,9
	Intermediate	61	51,3
	Low	1	0,8

Source: Primary data analysis, 2020

To make it easier for readers to understand the data, here are several graphs that illustrate the distribution of respondents based on gender, age, education, income and BMI.
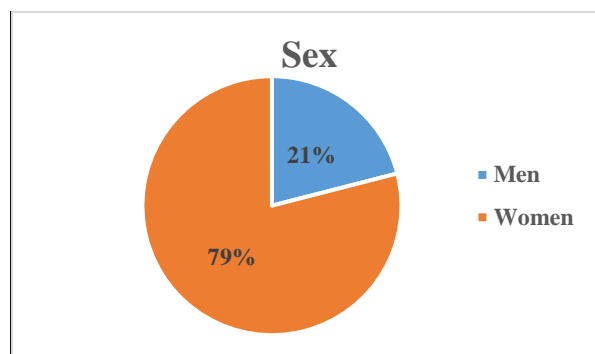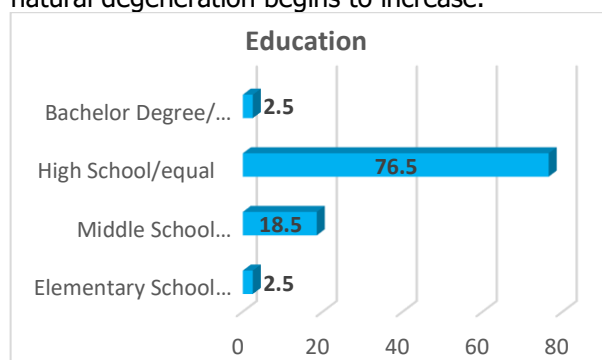

Figure 1
Distribution of Respondents Based on Gender

The distribution of respondents based on gender shows that the majority of respondents are women (79%). This may reflect the working population in Sukoharjo or the possibility that women are more likely to experience or report LBP than men.
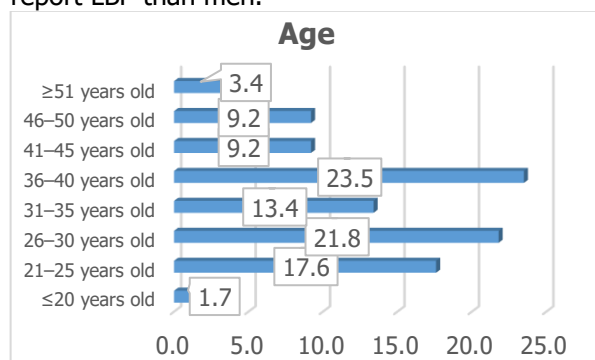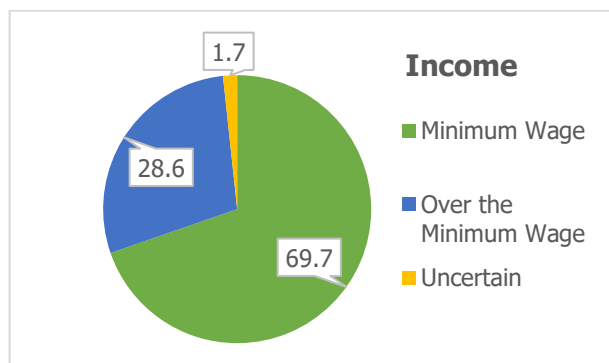

Figure 2
Distribution of Respondents Based on Age

The 36–40 year age group was the largest group (23.5%), which may indicate that LBP is more common in middle age, where the risk of work-related injury and natural degeneration begins to increase.

Figure 3
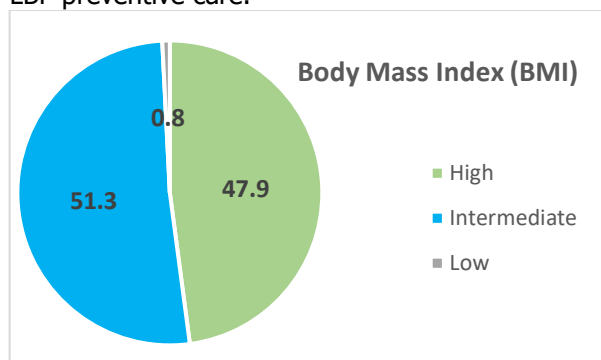Distribution of Respondents Based on Education

Most respondents had an education equivalent to high school (76.5%). This suggests that lower levels of education may be associated with occupations at higher risk for LBP.

Figure 4

Distribution of Respondents Based on Income

Most respondents had an income equivalent to the UMP (69.7%). This suggests that workers with lower incomes may have limited access to health facilities and LBP preventive care.

Figure 5

Distribution of Respondents Based on Body Mass Index (BMI)

The majority of respondents had a high (47.9%) or medium (51.3%) BMI. A higher BMI may increase the risk of LBP due to the additional load on the spine and supporting structures of the body.

Bivariate Test Results
Variable personal factors and perceptions of the incidence of LBP

Table 2

Relationship Between Personal Factors and Perceptions of LBP Incidents

Variable	The perception of LBP incidents
Personal factors	r=0.549; p=0.000

The bivariate analysis of personal factors with perceptions of the incidence of LBP showed a positive and significant correlation (r=0.0549, p<0.001). The results of the bivariate analysis showed that individual elements consisting of demographics, personal risk, physical activity, and history of trauma/illness had a positive and significant relationship with the perception of LBP. Increasing personal factors will increase perceptions of LBP events.

Work factor variables with perceptions of LBP events

Table 3

Relationship Between Work Factors and Perceptions of LBP Incidents

Variable	The perception of LBP incidents
Work factors	r=0.680; p=0.000

Bivariate analysis results revealed a substantial and positive association (r=0.680, p<0.001) between personal characteristics and the feeling of LBP. The bivariate analysis's findings demonstrated a positive and substantial correlation between the work factor and the impression of LBP. The perception of LBP events will rise with an increase in work variables.

Multivariate analysis results

The results of multiple linear regression analysis of the influence of personal and work factors on the perception of NBP events can be seen in table 4. There is a positive and significant influence of personal and work factors on the perception of LBP events with R Square = 0.522 and Adjusted R Square = 0.483. It can be concluded that the influence of personal and work factors increased the perception of the incidence of LBP by 48.3%, while other factors influenced the rest.

Table 4

Perceptions of LBP Incidents Are Influenced by Personal and Work Factors

R Square	Adjusted R Square	Std. Error of the Estimate	*P*
0.522	0.483	3.80590	0.000

Discussion

According to the findings of the descriptive analysis, the sample was composed primarily of women, with a high school education, a moderate BMI, and the similar prevalence income as UMK. The sample was also prominent in the third and fourth decades. The sample shows that the potential for experiencing LBP is high, so action is needed according to the health beliefs model as a form of health promotion to control LBP.

This study found that most of the construction workers had a BMI in the moderate category (51.3%). Overweight and weak abdominal muscles can produce lumbar lordosis, which can shift a person's center of gravity forward and wear out the paravertebral muscles. This increases the chance of incident low back pain. Research in Islamabad, Pakistan, in 2011, sitting slouching is the main factor causing LBP, where 122 out of 173 patients suffer from LBP due to sitting slouching, and 78 out of 173 patients suffer from LBP due to working for 4-6 hours. Research in China in 2018, sitting hunched over is a risk factor for chronic LBP. In this study, 66 subjects suffered from chronic low back pain due to sitting hunched over for 26 years. Repeated work for a long time and

supported by non-ergonomic working conditions will put pressure on the spinal discs (intervertebral discs), which over time can thin or even tear and trigger LBP incidents in the world of work (Arshad et al., 2013). This is in line with the results of research by Crisanty et al. (2024) that the risk of LBP is closely related to incidents that occur in workers, carrying out repetitive tasks with unergonomic body postures while working.

The results of the analysis of this study are in line with the research of Grabovac & Dorner (2019) entitled "Association between low back pain and various daily activities Activities of Daily Living, Ability to Work and Sexual Function". It was reported that the subjective perception of patients with LBP is an important health variable associated with the occurrence of LBP that affects daily activities. So that individuals and perceptions are positively and significantly correlated with the incidence of LBP. The study entitled "Prevention of Low Back Pain: A Systematic Review and Meta-analysis" shows that physical activity in the form of sports combined with education as a demographic indicator significantly reduces the risk of LBP. Likewise, it was also reported that physical activity in the form of exercise alone also reduced the risk of LBP episode (Steffens et al., 2016). The study entitled "Prevention Strategies to minimize the future impact of low back pain: A Systematic Review and Meta-analysis" showed that physical activity in the form of exercise combined with education as an overall demographic indicator significantly reduces the risk of LBP events. Furthermore, it was reported that physical activity in sports alone can also reduce the risk of LBP episodes (de Campos et al., 2021). This shows that personal factors in education and physical activity are important indicators that influence work factor variables, in this case convection workers, to reduce the incidence of LBP as reality of perceived benefits..

According to Zhang et al. (2024), factors that affect LBP are personal factors and work factors, individual characteristics include age, gender, BMI and smoking. According to Khan et al. (2019), factors that affect LBP are personal and work factors. Individual factors include age, gender, BMI, family history, genetics, smoking, alcohol, and physical activity. Work factors include workload, repetition, vibration, and work attitudes such as bending, turning, lifting, and work posture as individual beliefs that can make changes towards health promotion. Tenure of work is an accumulation of one's work activities carried out in the long term, which if carried out continuously for years can result in health problems, one of the factors in LBP (Arifin, 2020).

Wami et al. (2019) research entitled Work "Related Risk Factors and Prevalence of Low Back Pain in Low Paid Workers": Results of a Cross Sectional Study states that workers in hotel maids in Gondar City have an LBP prevalence of 58.1%. The most important risk factors that lead to the development of lower back pain are work variables where bending movements predominate. However, LBP has less of an impact on workers who are content with their positions. Most of the hotel housekeepers in this study reported experiencing LBP. Work patterns, breaks taken, reaching/ stretching, repeated bending, job satisfaction, training related to health and safety, and amount of bed-making work are some of the factors associated with LBP. Therefore, perceived benefits for awareness of equipment changes with health motivation in ergonomic measures that focus on improving workstation layout, downtime, and replacement of some equipment are important cues to action for controlling LBP.

Furthermore, research conducted by Wami et al. (2019) with the title "Work Related Risk Factors and the Prevalence of Low Back Pain Among Low-Paid Workers": Results of a Cross-Sectional Study said that workers in hotel maids in Gondar City had a prevalence of LBP of 58.1%. However, employees who are satisfied with their works are less affected by LBP. Likewise, the results of Ekinci & Şevgin (2024) it was found that it was discovered that the degree of pain and the strength of pain beliefs increased with age. Likewise with the results of Ali et al. (2020), entitled "Prevalence and associated work factors of low back pain among the bank employees in Dhaka City" states that indirectly the basic perception of the level of sports activity has a relationship with the incidence of LBP.

Personal traits are modifying elements associated to perceptions of LBP occurrences, and they have an impact on personal factors related to those perceptions. A pilot study by Andrade & Chen (2022) examined the relationship between biopsychosocial factors and chronic LBP. Aspects from the biological domain (age, sex, BMI, smoking habits, and history of chronic disease), psychological (depressive symptoms), and social (educational history, income, marital status, and place of residence) are associated with the prevalence of chronic LBP in the population in Brazil.

In the Health Belief Model (HBM), personal factors which include demographics, individual risk factors, physical activity, and history of trauma/ illness influence health promotion behavior. These factors can directly or indirectly influence the perception of LBP incidence. Therefore, communication, information and education media are needed to change treatment as an action on perceived barriers solutions in the form of work health and safety and ergonomic behavior according to the characteristics of each factor dimension.

The study entitled "Prevention of Low Back Pain: A systematic Review and Meta-analysis" shows that physical activity in the form of exercise combined with education as a demographic indicator significantly reduces the risk of LBP. Likewise, it was also reported that physical activity in the form of exercise alone also reduced the risk of LBP episode (Steffens et al., 2016). The study entitled "Prevention Strategies to minimize the future impact of low back pain: A Systematic Review and Meta-analysis" showed that physical activity in the form of exercise combined with education as an overall demographic indicator significantly reduces the risk of LBP events.

Similarly, it was also reported that physical activity in sports alone can reduce the risk of LBP episodes (de Campos et al., 2021). This shows the importance of education and behavior change according to the HBM concept which influences healthy behavior, in this case convection workers, to control the incidence of LBP.

Individual perceptions differ from each other and will influence individuals in perceiving LBP events, even though the object is the same, namely LBP events. Convection workers' perceptions of LBP occurrences are shaped by their familiarity with and understanding of these incidents. So that knowledge related to education, experience related to symptoms, plus information media in the surrounding environment is a cue to act from the HBM concept.

Additionally, even when the circumstances are the same, one individual or group of industrial workers may perceive things very differently from another individual or group of factory workers. Perception discrepancies can be attributed to individual variances in motivation, personality, attitude, and perception. An individual forms this perception, but experience and understanding of LBP episodes as indicators of activity toward HBM also have an impact on perception. Using mechanisms of trust, motivation, and confidence, LBP therapy exercise adherence and engagement as well as clinical outcomes can be maximized (Wood et al., 2024). Self-initiated training strategies were the most successful in participants' perceptions. This shows the role of knowledge as input towards behavior change in the form of long-term training according to the HBM concept.

According to a study titled "Prevalence and Factors Associated with Low Back Pain among Healthcare Workers in Two Hospitals in Yaoundé-Cameroon: A Cross-Sectional Study" by Gweha et al (2024), concluded that the prevalence of low back pain among healthcare providers is remarkably high. The study's findings on LBP-related factors were consistent with those generally acknowledged in the literature. A significant number of healthcare professionals experience low back pain-related functional impairment that interferes with their capacity to operate in social and professional contexts. Multilevel interventions are required to prevent and manage low back pain in this extremely susceptible occupational population. A study comparing LBP in relation to nurse education was conducted in Greece, which found that the high prevalence among registered nurses and nursing assistants was due to the fact that nurses had fewer hours of training, thereby not allowing enough time to discuss issues related to musculoskeletal injury prevention and patient management manual during training (Gweha et al., 2024).

Studies on the connection between job factor attributes and perceptions of the prevalence of low back pain have been conducted. According to a 2019 study by Alnaami et al. (2019), health professionals in southwest Saudi Arabia are frequently exposed to health issues, such as lower back pain (LBP), which can be detrimental to their well-being and capacity to earn a living. Elevated back trauma, advanced practice nursing, and little physical activity are risk factors that can lead to lower back pain (LBP). The execution of an individual belief - creating an ergonomic working environment through a work health and safety program - minimizes the physical burden of the hospital and effectively reduces it through the recruitment of new staff and proper hospital administration. It should also motivate healthcare professionals to promote physical activity as a means of controlling low-back pain episodes. Critical Examination of Study Limitations and Their Impact on Findings

One significant limitation of this study is its cross-sectional design, which captures a snapshot of the sample population at a single point in time. This design inherently restricts the ability to infer causality between the observed variables and the incidence of low back pain (LBP). For example, while the study indicates a high prevalence of moderate BMI and LBP among construction workers, it cannot conclusively determine whether the BMI directly contributes to LBP or if both are influenced by other unmeasured variables, such as physical activity levels or specific job tasks. Furthermore, the reliance on self-reported data may introduce response biases, as participants might underreport or overreport their symptoms and behaviors due to recall bias or social desirability bias. This limitation could potentially skew the findings, leading to either an underestimation or overestimation of the true prevalence and associated factors of LBP.

Another notable limitation is the sample's demographic homogeneity, primarily consisting of females with a high school education and moderate BMI. This lack of diversity limits the generalizability of the study's findings to other populations with different characteristics, such as males, individuals with varying educational backgrounds, or those with different BMI categories. Additionally, the study's focus on a specific occupational group (construction workers) further constrains the applicability of the results to other work environments. The narrow scope might overlook occupational-specific factors that could influence LBP prevalence differently in other settings, such as healthcare or office-based work. As a result, while the study provides valuable insights into LBP within the context of construction workers, its findings may not be wholly applicable to broader or more varied populations. This limitation underscores the need for future research to employ more diverse samples and longitudinal designs to better understand the multifaceted nature of LBP and its determinants.

CONCLUSION

The main findings of this study highlight the significant impact of both personal and occupational factors on the perception of low back pain (LBP) incidence among workers in Sukoharjo, Central Java. The key conclusions are as follows:

There is a positive and significant correlation between personal factors and the perception of LBP incidence (r=0.549, p<0.001). This indicates that individual characteristics such as age, gender, and BMI play a crucial role in shaping workers' perceptions of their susceptibility to LBP.

Occupational factors also show a positive and significant correlation with the perception of LBP incidence (r=0.680, p<0.000). This suggests that work-related variables, including the nature of the job, physical demands, and ergonomic conditions, significantly influence workers' awareness and experience of LBP.

When analyzed together, personal and occupational factors simultaneously affect the perception of LBP incidence, with a combined contribution of 48.3% to the variation in LBP perception (p=0.000). This demonstrates that both sets of factors are important determinants of how workers perceive and experience LBP.

SUGGESTION

Personal factors that have a positive and significant relationship influence perceptions of LBP events. In the HBM concept, an increase in personal factors as a modifying factor will increase the perception of LBP events. Individual perceptions differ from each other and will influence individuals in perceiving LBP events, even though the object is the same, namely LBP events. Convection workers' individual perceptions of LBP occurrences are shaped by their understanding and involvement in such events, which serves as an investigation into the perceived advantages and severity of such events. So that knowledge related to education, experience related to symptoms, plus information media, education in the surrounding environment is a cue to action from the HBM concept.

Work-related factors have a favorable and significant impact on perceptions of the prevalence of LBP. Ergonomic behavior change as an action step that focuses on improving work position, work duration, and rest time is an important potential target for action to control the incidence of LBP as well as the possibility of engaging in health-promoting behavior. Personal factors and work factors influence perceptions of changes in LBP control behavior according to the HBM concept.

Further research is needed to explore other factors that influence the perception of LBP events. This is important to deepen understanding of the various aspects that can affect an individual's perception of LBP, including environmental, psychosocial, and lifestyle factors. More comprehensive research can provide deeper insights and help in designing more effective interventions to prevent and manage LBP among workers. In addition, longitudinal studies with larger and diverse samples are also recommended to validate these findings and evaluate changes in LBP perception over time.

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