

A Study from a Highly Populated Country : Risk Factors Associated with Lower Back Pain in Middle-Aged Adults

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Objective : Low back pain (LBP) is a global health problem that affects the productivity of the patients. Several factors such as individual, occupational, and psychosocial factors increase the risk of LBP. However, only a few studies investigated those factors, especially in middle adulthood in Indonesia. Indonesia is a country with a young population that has been rapidly developing in recent years. This study was conducted to find out the factors associated with LBP in middle adulthood.

Methods : This study is a cross-sectional observational analytic study using a convenience sampling method with a total sample of 3005 respondents. Data were collected using a questionnaire which was then analyzed using the chi-square test, Kolmogorov-smirnov, Spearman's Rank, and logistic regression test.

Results : From the result of this study, it was found that the 12-month prevalence of LBP in middle-aged adults was 44,29%. Female (odds ratio [OR], 1.3; 95% confidence interval [CI], 1.098–1.545; $p=0.002$), lack of physical exercises (OR, 0.87; 95% CI, 0.794–0.959; $p=0.005$), high body mass index (OR, 1.09; 95% CI, 1.009–1.187; $p=0.002$), stress level (OR, 1.26; 95% CI, 1.088–1.458; $p=0.002$), and years of work experience (OR, 1.1; 95% CI, 1.001–1.225; $p=0.047$) were determined as risk factors that significantly associated with LBP.

Conclusion : LBP is quite common among middle-aged adults in Indonesia. Female gender, higher body mass index, lack of physical activity, stress level, and years of work experience were all potential risk factors for LBP in middle-aged adults. Middle-aged adults in Indonesia should be aware of LBP and avoid disabilities by identifying risk factors that may worsen LBP in the future.

Key Words : Low back pain · Middle aged · Risk factors.

INTRODUCTION

Low back pain (LBP) is the most common musculoskeletal complaints and the most frequent causes of life with disabilities. The prevalence is ranged from 20–33% in all patients with musculoskeletal pain complaints worldwide. LBP is a

complaint that is not only experienced by elderly people but also be found in all age categories including productive adults¹⁸⁾. A study in the United States shows that LBP occurs in one to three adults under the age of 65 each year, which indicates that middle adults (30–60 years) are likely to develop LBP²³⁾. Middle adulthood, also known as the transitional peri-

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od, is a period marked by physical and psychological changes, as well as a period of peak productivity, particularly for those aged 40–45^{21,22}. In terms of prevention, the most likely LBP occurs in middle age, and there are several consequences that include not only health burden, but also financial problems; therefore, it is critical to determine what risk factors are associated with LBP in those ages. This is especially true in countries with a high proportion of middle-aged people, such as Indonesia.

There are many risk factors that affect the prevalence of LBP in middle adulthood. These factors are namely divided into three categories; individual, occupational, and psychosocial factors. Age, gender, body mass index (BMI), family history of illness, smoking habits, alcohol consumption, being married, female, and lack of routine exercises are categorized as individual risk factors³⁵. Whereas, occupational risk factors, for examples 11–80% of these factors are involved in ergonomic factors such as sitting over, lifting weights, and bending over¹⁰. The population with the highest prevalence of LBP in small city in West Jawa, Jatinangor is the productive age (18–65 years). This is possibly due to the high physical and occupational loads that demanding a certain body position during work for prolonged period of time²⁷.

Although various studies have examined the incidence, prevalence, and risk factors for LBP in middle adulthood, only a few research has studied regarding the prevalence and risk factors of LBP especially among middle-aged adults in Indonesia, a country with the fourth rank of the number of population with the productive aged people is in the highest proportion of population (15–64 years, 70.72%)¹. In addition, LBP could cause economic losses and decreased productivity of the patients^{14,33}. Therefore, it is important to identify both modifiable and non-modifiable risk factors to prevent LBP. Based on the reasons mentioned above, this study was conducted to determine factors associated with LBP among middle-aged adults in Indonesia.

MATERIALS AND METHODS

This study was approved by Clinical Study Ethics Committee of Universitas Pembangunan Nasional Veteran Jakarta, Indonesia (57/I/2021/KEPK). The respondents had given the approval by informed consent to participate in this research. All methods were carried out in accordance with the Declaration of Helsinki.

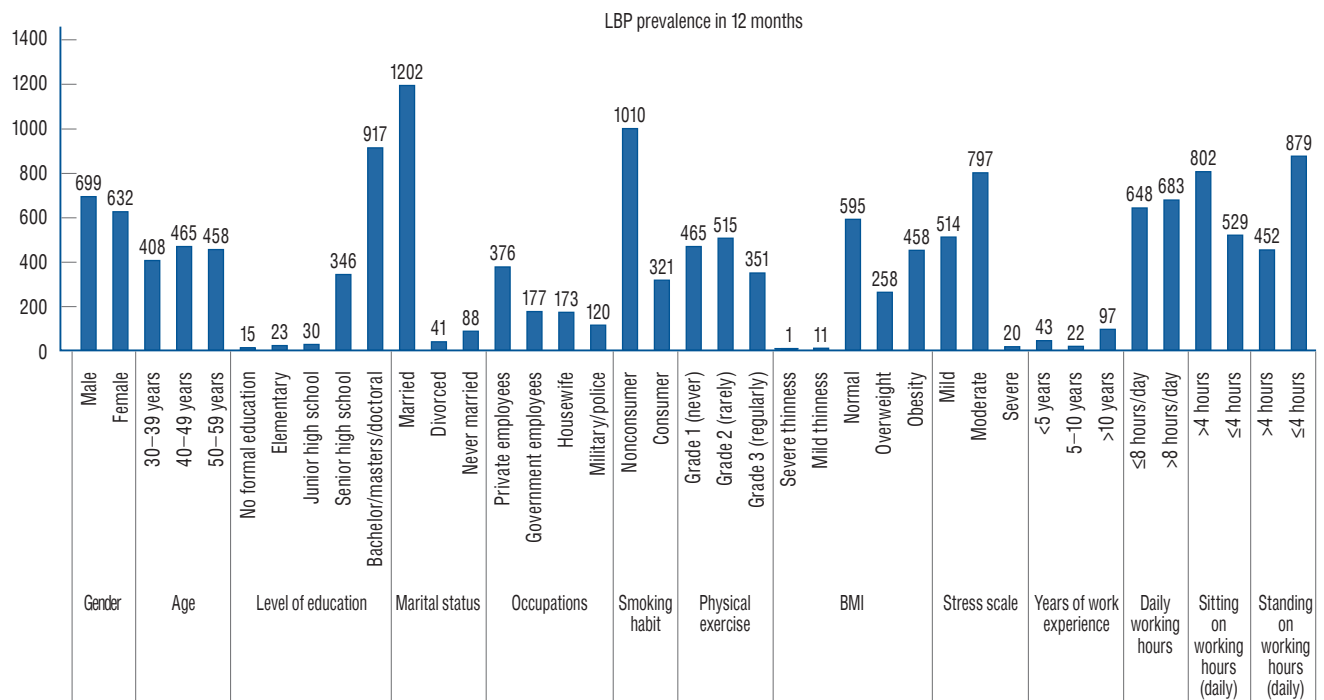


Fig. 1. Number of participants experienced low back pain events within the last 12 months were evaluated using low back part of Indonesian version of Standardized Nordic Musculoskeletal Questionnaire (n=1331). LBP : low back pain, BMI : body mass index.

Table 1. Demographic characteristics

Characteristic	Value
Age (years)	
30–39	942 (31.4)
40–49	999 (33.2)
50–60	1064 (35.4)
Gender	
Male	1681 (55.9)
Female	1324 (44.1)
Level of education	
No formal education	23 (0.8)
Elementary school	50 (1.7)
Junior high school	79 (2.6)
Senior high school	857 (28.5)
Bachelor/masters/doctoral	1996 (66.4)
Marital status	
Married	2696 (89.7)
Divorced	89 (3.0)
Never married	220 (7.3)
Occupation	
Lecturer	179 (6.0)
Physician	28 (0.9)
Military/police	373 (12.4)
Government employees	346 (11.5)
State civil apparatus	100 (3.3)
Lawyer	10 (0.3)
Accountant	6 (0.2)
Consultant	7 (0.2)
Labor	81 (2.7)
Entrepreneur	163 (5.4)
Housewife	405 (13.5)
Private employees	887 (29.5)
State own corporation employees	38 (1.3)
Nurse	37 (1.2)
Farmer	71 (2.4)
Driver	19 (0.6)
Other	165 (5.5)
Retired	61 (2.0)
Unemployed	29 (1.0)
Smoking habit	
Non-consumer	2244 (74.7)
Consumer	761 (25.3)

Table 1. Continued

Characteristic	Value
Physical exercise	
Grade 1, never	954 (31.7)
Grade 2, rarely	1193 (39.7)
Grade 3, regularly	858 (28.6)
Body mass index	
Severe thinness	11 (0.4)
Mild thinness	25 (0.8)
Normal	1422 (47.3)
Overweight	599 (19.6)
Obesity	959 (31.9)
Stress scale	
Mild, score 0–13	1250 (41.6)
Moderate, score 14–26	1722 (57.3)
Severe, score 27–40	33 (1.1)
Chronic disease	
Yes	503 (16.7)
No	2502 (83.3)
Monthly income	
<Rp. 1000000	204 (6.8)
Rp. 1000000–3000000	461 (15.3)
Rp. 3000000–5000000	770 (25.6)
Rp. 5000000–10000000	827 (27.3)
>Rp. 10000000	749 (24.9)
Years of work experience	
<5 years	541 (18.0)
5–10 years	416 (13.8)
>10 years	2048 (68.2)
Daily working hours	
≤8 hours/day	1470 (48.9)
>8 hours/day	1535 (51.1)
Sitting on working hours (daily)	
>4 hours	1218 (40.5)
≤4 hours	1787 (59.5)
Standing on working hours (daily)	
>4 hours	1979 (65.9)
≤4 hours	1026 (34.1)

Values are presented as number (%). Rp. : Rupiah

Table 2. LBP prevalence in the last 12 months

Variable	LBP history		p-value	Correlation coefficient
	No (n=1674)	Yes (n=1331)		
Gender			0.001	0.061
Male	982 (58.4)	699 (41.6)		
Female	692 (69.9)	632 (47.7)		
Age (years)			0.213	-0.003
30–39	534 (56.7)	408 (43.3)		
40–49	534 (53.5)	465 (46.5)		
50–60	606 (57.0)	458 (43.0)		
Level of education			0.012	0.021
No formal education	8 (34.8)	15 (65.2)		
Elementary school	27 (54.0)	23 (46.0)		
Junior high school	49 (62.0)	30 (38.0)		
Senior high school	511 (59.6)	346 (40.4)		
Bachelor/masters/doctoral	1079 (54.1)	917 (45.9)		
Marital status			0.397	0.018
Married	1494 (55.4)	1202 (44.6)		
Divorced	48 (53.9)	41 (46.1)		
Never married	132 (60.0)	88 (40.0)		
Occupation			0.309	0.004
Lecturer	89 (49.7)	90 (50.3)		
Physician	14 (50.0)	14 (50.0)		
Military/police	253 (67.8)	120 (32.2)		
Government employees	169 (48.8)	177 (51.2)		
State civil apparatus	53 (53.0)	47 (47.0)		
Lawyer	4 (40.0)	6 (60.0)		
Accountant	4 (66.7)	2 (33.3)		
Consultant	4 (57.1)	3 (42.9)		
Labor	48 (59.3)	33 (40.7)		
Entrepreneur	73 (44.8)	90 (55.2)		
Housewife	232 (57.3)	173 (42.7)		
Private employees	511 (57.6)	376 (42.4)		
State own corporation employees	17 (44.7)	21 (55.3)		
Nurse	14 (37.8)	23 (62.2)		
Farmer	40 (56.3)	31 (43.7)		
Driver	10 (52.6)	9 (47.4)		
Other	85 (51.5)	80 (48.5)		
Retired	37 (60.7)	24 (39.3)		
Unemployed	17 (58.6)	12 (41.4)		
Smoking habit			0.175	
Non-consumer	1234 (55.0)	1010 (45.0)		
Consumer	440 (57.8)	321 (42.2)		

Table 2. Continued

Variable	LBP history		p-value	Correlation coefficient
	No (n=1674)	Yes (n=1331)		
Physical exercise			0.002	
Grade 1, never	489 (51.3)	465 (48.7)		
Grade 2, rarely	678 (56.8)	515 (43.2)		
Grade 3, regularly	507 (59.1)	351 (40.9)		
Body mass index			0.006	
Severe thinness	2 (18.2)	9 (81.8)		
Mild thinness	14 (56.0)	11 (44.0)		
Normal	827 (58.3)	592 (41.7)		
Overweight	330 (55.8)	261 (44.2)		
Obesity	501 (52.2)	458 (47.8)		
Stress scale			0.003	
Mild, score 0–13	736 (58.9)	514 (41.1)		
Moderate, score 14–26	925 (53.7)	797 (46.3)		
Severe, score 27–40	13 (39.4)	20 (60.6)		
Years of work experience			0.002	
<5 years	327 (60.4)	214 (39.6)		
5–10 years	204 (49.0)	212 (51.0)		
>10 years	1143 (55.8)	905 (44.2)		
Daily working hours			0.822	
≤8 hours/day	822 (55.9)	648 (44.1)		
>8 hours/day	852 (55.5)	683 (44.5)		
Sitting on working hours (daily)			0.433	
>4 hours	985 (55.1)	802 (44.9)		
≤4 hours	689 (56.6)	529 (43.4)		
Standing on working hours (daily)			0.851	
>4 hours	574 (55.9)	452 (44.1)		
≤4 hours	1100 (55.6)	879 (44.4)		

LBP : low back pain

Study design and participants

A total of 3005 Indonesia middle aged adults were included of whom 1681 were male and 1324 were female. All participants gave consent and approval before filling the questionnaires in google forms. Data were collected from February 4 to March 27, 2021. The sociodemographic and occupational related questions, LBP questions and perceived stress scale (PSS) questionnaire were included.

Outcome measures

Assessment of LBP

Participants' LBP events within the last 12 months were evaluated using low back part of Indonesian version of Standardized Nordic Musculoskeletal Questionnaire which was translated by Wicaksono⁴¹⁾. Reliability score of this questionnaire was tested by Wicaksono⁴¹⁾ with a result of cronbach's alpha score of 0.945. Therefore, all items in this questionnaire is valid and reliable.

Table 3. Logistic regression of risk factors associated with low back pain

Variable	OR (Exp B)	95% CI	p-value
Individual risk factor			
Gender	1.31	1.098–1.545	0.002*
Age	0.98	0.891–1.077	0.669
Level of education	1.08	0.971–1.203	0.155
Body mass index	1.09	1.009–1.187	0.002*
Smoking habit	1.02	0.838–1.231	0.872
Physical exercise	0.87	0.794–0.959	0.005*
Occupational risk factor			
Working time	1.11	1.001–1.225	0.047*
Psychosocial risk factors			
Stress level	1.26	1.088–1.458	0.002*

* $p < 0.05$. OR : odds ratio, CI : confidence interval

Assessment of psychosocial risk factors

Stress levels of participants were evaluated through PSS-10. PSS is a 10-item questionnaire which uses likert scale where “0=none and 4=very often” consisting six positive items and four negative items (number 4, 5, 7, and 8).

Reliability test of Indonesian version of PSS-10 was studied by Pin and Effendy³¹⁾ with a result of cronbach’s alpha score of 0.96. Our study also tested the validity and reliability of Indonesian’s version of PSS-10 which showed all items in this questionnaire is valid and reliable (Cronbach’s alpha score, 0.775). Total score of 0–13 demonstrates mild stress; 14–26 shows moderate stress and 27–40 shows severe stress.

Statistical analysis

Our research used SPSS ver. 22 for all analyses (IBM Corp, Armonk, NY, USA). Univariate analyses are reported as numbers and percentages. Independent variables were analyzed using chi-square test, Kolmogorov-smirnov test. Statistical significance was set at $p < 0.05$. Logistic regression method was used in this study as the multivariate analysis to determine the risk factors of LBP.

RESULTS

This study included 3005 middle-aged adults, with 35.4% of respondents aged 50–60 years. Males made up 55.9% of them. The 66.4% of respondents held a bachelor’s, master’s, or doctoral degree. The 89.7% of respondents were married. The

majority of jobs were held by private employees (29.5%). The vast majority of respondents (74.7%) did not smoke. Although 39.7% of respondents rarely exercised, 47.3% of respondents had a normal BMI.

According to stress scale calculations, the majority of respondents (53.7%) had moderate stress with a total stress scale value of 14–26. The 83.3% of respondents did not have a chronic disease. The majority of respondents earned between Rupiah (Rp.) 5000000 and Rp. 10000000 (27.3%). The majority of respondents (68.2%) had worked for more than 10 years. The 51.5% of respondents spent more than 8 hours per day working, with the majority sitting 4 hours per day (59.5%) and standing more than 4 hours per day while working (65.9%) (Fig. 1 and Table 1).

Univariate analysis revealed that factors such as gender ($p=0.001$), level of education ($p=0.012$), physical exercise ($p=0.002$), BMI ($p=0.006$), stress scale ($p=0.003$), and years of work experience ($p=0.002$) were significantly associated with LBP in the previous 12 months (Table 2). In terms of occupation, nurses had a 62.2% prevalence of LBP in a 12-month period. Other occupations include lawyer (60.0%), state-owned corporation (55.3%), entrepreneur (55.2%), government (51.2%), lecturer (50.3%), and physician (50.0%).

In multivariate analysis, the following factors were significantly associated with LBP : female gender (odds ratio [OR], 1.31; 95% confidence interval [CI], 1.098–1.545; $p=0.002$), lack of physical exercise (OR, 0.87; 95% CI, 0.794–0.959; $p=0.005$), higher BMI (OR, 1.09; 95% CI, 1.009–1.187; $p=0.002$), stress level (OR, 1.26; 95% CI, 1.088–1.458; $p=0.002$), and years of

work experience (OR, 1.11; 95% CI, 1.001–1.225; $p=0.047$) (Table 3).

DISCUSSION

LBP has a negative impact on productivity and an individual's overall well-being²⁴. The prevalence of LBP is extremely high, and it is a major cause of disability¹¹. Several factors influence the occurrence of LBP, including sociodemographic, ergonomic, and psychosocial factors²⁵.

LBP prevalence in Indonesia middle age adult

Our findings revealed that the prevalence of LBP in middle-aged adult Indonesia was 44.29% at 12 months. This study confirmed previous findings that LBP is most common in people aged 40 to 80 years old, with a prevalence of $23.2\% \pm 2.9\%$ ¹⁸. As matter of fact, The prevalence of LBP varies between countries²⁷. According to other systematic cohort studies, the prevalence of LBP in the general population ranges 15–45%³⁰. In Saudi Arabia, the prevalence of LBP in the general population is 18.8%³. According to a study on the prevalence of LBP in Japan, the 1-month prevalence is 35.7% and the lifetime prevalence is 83.4%¹³.

Risk factors of LBP in middle age adult

Gender was found to be associated with LBP in our study. In line with previous research, we discovered that the prevalence of LBP was higher in females than in males^{7,19,27,35}. Females have a lower pain threshold than men, so they are more likely to report LBP symptoms than men^{28,32}. Other research has found that females are at a higher risk of LBP due to hormonal imbalances. The hormonal imbalances that occur during pregnancy cause the spinal ligaments to loosen, reducing the strength of the lower back muscles and increasing the risk of LBP. Females tend to have a lower pain threshold than men, therefore they often report the symptoms of LBP than men^{8,10,15}. Fernández-de-las-Peñas et al.¹² proposed that menopausal osteoporosis caused LBP in women, while another study concluded that obesity is associated with LBP in women³⁴. Housework²⁷, and menstruation were two other factors that contributed to females having more LBP menstruation^{37,39,40}.

In line with previous findings^{17,35}, our findings indicated that BMI was a significant risk factor for LBP. Şimşek et al.³⁵

discovered that people with higher BMI had 0.9 times more LBP. A study of healthcare workers found that having a high BMI was associated with LBP^{2,5}. Possible explanations include (1) increasing mechanical compression in the lumbar spine during movements in obese people possibly enhances mechanical burden, (2) the likelihood of having of an accident thus possibly increasing the risk of LBP, and (3) adipose tissues produce produces some proinflammatory cytokines (e.g., tumor necrosis factor- α , interleukin-6) that trigger the release of C-reactive protein (CRP), and this statement was supported by the fact that females with normal waist circumference and high CRP have tendency to report LBP than females with low CRP^{5,34}.

Consistent with other studies, we discovered that LBP is more common in people who rarely or never exercise^{5,10,20,32,35}. LBP is caused by shortened and weakened back muscles, which causes spinal misalignment. Exercise reduces the occurrence of LBP by (1) lengthening the back muscles, which support and keep the spine in proper alignment. Regular exercise increases blood supply to the muscles, joints, and intervertebral discs of the spine, reducing injury and promoting repair^{10,32}. And (2) exercise lowers stress and the level of cortisol, which rises in stressful situations^{6,29,38}. Other studies have found that strengthening the spinal muscles through exercises like stretching or aerobic training reduces LBP by 30% in terms of intensity and disability³⁴.

According to the findings of this study, the severity of stress had a significant correlation with LBP. This study agreed with a Korean study that found severe stress was associated with a 2.8-fold increase in the risk of chronic LBP compared to the general population⁹. Stress causes cortisol to be secreted in the bloodstream. Cortisol is a powerful anti-inflammatory hormone, and repeated high levels of cortisol promote cortisol defect. As a result, oxidative stress, free radical release, and cellular injury occur, resulting in chronic pain¹⁶. Higher cortisol levels are associated with a lower strength of lumbar muscles, resulted in LBP^{6,10}.

In our study, years of work experience were found to be significantly related to LBP. This finding is consistent with a study that discovered nurses with 5 years of experience were three times more likely to suffer from LBP^{4,26,36}. This is because nurses are more likely to face physical and psychological hazards throughout their careers²⁶. This fact corroborated our findings that nurses have the highest prevalence of LBP in the

last year. Other studies in Slovenia³⁶⁾ and Eastern Ethiopia²⁶⁾ have found similar results.

The study's limitations were (1) the sampling method, which did not use probability (random) sampling due to the COVID-19 pandemic, and thus the results could be biased. However, we present a large number of population to a local survey. (2) The data on height and body weight may not be entirely accurate because, due to the pandemic, measurements of height and body weight were not possible. (3) We did not ask about other pathologies that cause symptoms similar to LBP, such as urinary tract infections or urolithiasis. This high prevalence may have obscured the presence of additional pathologies. And (4) we did not ask about previous spine pathologies, which could have resulted in back pain at the time.

CONCLUSION

In Indonesia, LBP is quite common among middle-aged adults. As country with a high proportion of middle-aged adults, this emphasizes the importance of disease prevention in order to reduce economic and family burden. Female gender, a high BMI, a lack of physical activity, a high stress level, and years of work experience are all risk factors for LBP. Individual, occupational, and psychosocial risk factors that may exacerbate LBP in the future should be identified and avoided by middle-aged adults in Indonesia.

AUTHORS' DECLARATION

Conflicts of interest

No potential conflict of interest relevant to this article was reported.

Informed consent

This type of study does not require informed consent.

Author contributions

Conceptualization : FM; Data curation : TAS; Formal analysis : TAS; Methodology : FM; Project administration : NK; Visualization : TAS; Writing - original draft : TAS; Writing - review & editing : FM, NK

Data sharing

None

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