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EFFECT OF PROLONGED IMMOBILITY DURING THE COVID-19 PANDEMIC ON LOW BACK PAIN (LBP) IN THE COMMUNITY

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ABSTRACT

The COVID-19 pandemic significantly increased home-based activities due to lockdown policies. This shift was characterized by the establishment of work from home, leading to prolonged sitting durations and decreased mobility, which had negative effects on the spine. the majority of the Indonesian population remained unaware, with only a few studies examining the subject. The implementation of lockdown policies also caused a significant increase in Low Back Pain (LBP) cases, including Hernia Nucleus Pulposus (HNP) in the lumbar area. This study aimed to analyze the relationship between prolonged immobility during the pandemic and other risk factors with the incidence of Low Back Pain and Hernia Nucleus Pulposus in the community. A quantitative approach with a cross-sectional study design was used, and data were collected using an online questionnaire. The results showed that the majority of respondents were females aged 18-34 years and from the Javanese tribe. The prevalence of LBP and suspected HNP was 78.6% and 45.7%, respectively. Age, gender, employment status, smoking, sitting duration, exercise, and depression were significantly associated with LBP, with sitting duration as the strongest factor. Age, job status, sitting duration, lifting, and depression were linked to HNP, with depression as the dominant factor. The pandemic increased LBP and HNP risks due to prolonged sitting, inactivity, and psychological stress, highlighting the need for public awareness and prevention efforts.

KEYWORDS: The COVID-19 Pandemic; Low Back Pain; Suspected Nucleus Pulposus Hernia; Work from Home; Sitting Duration.

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1. INTRODUCTION

The global COVID-19 pandemic profoundly transformed daily human activities, with governments worldwide enforcing large-scale social restrictions and implementing work-from-home (WFH) systems to curb the spread of SARS-CoV-2. While these measures effectively promoted social distancing by reducing community mobility and physical contact, they also led to prolonged immobility and sedentary behavior across populations (Setiadi et al., 2021). Extended sitting duration, poor posture, insufficient exercise, unhealthy dietary habits, and elevated stress levels during lockdowns have collectively been identified as risk factors contributing to low back pain (LBP) (Setiadi et al., 2021). The restriction of outdoor activities has further diminished physical movement, influencing both the somatic and psychosocial components of chronic low back pain (CLBP) (Amelot et al., 2022).

Anatomically, the lumbar spine is a complex and highly coordinated structure composed of bones, joints, nerves, ligaments, and muscles that provide essential support, flexibility, and stability (Spine-Health, 2017). However, this complexity also renders it vulnerable to mechanical strain and injury. LBP is among the leading causes of disability worldwide and represents a major contributor to the global burden of disease (Licciardone, 2021). During the pandemic, studies reported a notable increase in the prevalence and intensity of LBP, primarily attributed to prolonged sitting and the lack of ergonomic support while working remotely (Papalia et al., 2022; Shariat et al., 2020).

Globally, over 80% of adults experience LBP at least once in their lifetime, with the majority of cases arising from muscle strain, repetitive movement, or degenerative spinal changes (Spine-Health, 2017). The prevalence of LBP varies across regions—from 1.4% to 20% in Saudi Arabia (Fatoye, Gebrye, & Odeyemi, 2019) to an estimated 37% in Indonesia (Kumbea, Asrifuddin, & Sumampouw, 2021). Several biomechanical and demographic factors, including repetitive lifting, twisting, advanced age, obesity, and stress, have been strongly linked to its onset (Fatoye et al., 2019).

LBP often begins as an acute episode but may progress into a chronic and disabling condition that significantly impairs quality of life. Chronicity is frequently associated with higher medical costs, psychological distress, and decreased productivity (Licciardone, 2021). Symptoms commonly include dull or radiating pain, numbness, and stiffness, particularly after long periods of sitting or immobility. Prolonged static posture alters the neuromuscular balance within the lumbopelvic hip complex (LPHC), causing compensatory biomechanical changes that increase the risk of recurrent pain episodes (Butte et al., 2022; Will, Bury, & Miller, 2018).

Emerging evidence has shown a strong association between the shift to remote work and the rising prevalence of musculoskeletal disorders among teachers, healthcare professionals, and office workers (Zyznawska & Bartecka, 2021; Meisha et al., 2019). In these populations, back pain intensity significantly increased following the transition to distance learning and extended computer use (Zyznawska & Bartecka, 2021). Other studies found that middle-aged adults, individuals with high BMI, and those experiencing psychological stress during lockdowns were particularly susceptible to CLBP (Šagát et al., 2020; Kalyoncu et al., 2015). A related condition, Hernia Nucleus Pulposus (HNP), or "pinched nerve," involves displacement of the intervertebral disc that compresses the spinal nerve root, producing radiating pain and neurological symptoms (Rumah Sakit Panti Rapih, 2023). HNP most frequently affects the lumbar region—especially at L4–L5 or L5–S1 levels—and shares overlapping risk factors with LBP, such as improper lifting, obesity, smoking, and repetitive twisting movements. Although less common in the cervical or thoracic areas, HNP can cause severe neurological impairment, including weakness or sensory deficits (Rumah Sakit Panti Rapih, 2023

Psychological factors, including social isolation, loneliness, and pandemic-related anxiety, may further intensify the perception of pain and somatic symptoms (Papalia et al., 2022). Therefore, interventions that combine physical rehabilitation with stress management and ergonomic education are crucial (Shariat et al., 2020; Amelot et al., 2022). Simple home-based exercises and proper workstation design have been recommended to prevent or reduce the severity of LBP and HNP during periods of prolonged confinement (Zyznawska & Bartecka, 2021).

Overall, the COVID-19 pandemic has redefined work patterns and lifestyle habits, with home environments often lacking the ergonomic facilities available in offices. The extended duration of sitting and the absence of proper posture maintenance during WFH settings increase the risk of both LBP and HNP. Despite numerous studies addressing work related musculoskeletal disorders, few have examined the combined influence of pandemic-induced immobility, ergonomics, and psychosocial

stressors on spinal health in Indonesia. Therefore, this study aims to analyze risk factors for LBP, enabling the government to formulate policies and avoid more severe negative impacts in the future.

2. METHODOLOGY

2.1. Design

This research applied an observational analytic design using a quantitative cross-sectional approach. The study aimed to examine the association between prolonged immobility and the incidence of Low Back Pain (LBP) and suspected Hernia Nucleus Pulposus (HNP) during the COVID-19 pandemic. The dependent variables were the presence of LBP and HNP symptoms, while the independent variables included sociodemographic factors, prolonged sitting duration, body mass index (BMI), physical activity, ergonomic practices, smoking status, and psychological stress levels. The analytical design was chosen to enable the exploration of relationships between multiple risk factors and spinal health outcomes at a population level.

2.2. Study Location and Time

Data collection was conducted online using a digital self-administered questionnaire developed via Google Forms and distributed through social media platforms such as Line, WhatsApp, Instagram, Twitter, and TikTok. The survey was carried out from March 2020, coinciding with the first COVID-19 case in Indonesia, until June 22, 2023, when the government officially declared the end of the pandemic (Decree on the Termination of COVID-19 Pandemic Status in Indonesia, 2023). Conducting the study online allowed for nationwide participation during the pandemic restrictions (Penetapan Berakhirnya Status Pandemi COVID-19 di Indonesia, 2023).

2.3. Population and Sample

The study population comprised Indonesian residents who engaged in Work From Home (WFH) activities during the pandemic, including both employees and students. The minimum sample size was determined using the Lemeshow formula for large populations (Lemeshow, 1997), adopting a prevalence of LBP at 56.25% from a prior study in Jambi City (Justitia et al., 2022), a 95% confidence level, and a 5% standard error. The minimum required sample size was 379 respondents, to which an additional 10% contingency was added to account for potential nonresponse, yielding a final target of 420 participants.

2.4. Instrument

Data were collected using a structured online questionnaire adapted from Šagát et al. (2020), consisting of 20 close-ended questions divided into six sections:

1. Demographic characteristics: age, gender, BMI, residence, employment, and education level.
2. Sitting duration: average daily hours spent sitting during the pandemic.
3. Physical activity: type, frequency, and duration of weekly exercise.
4. Daily activities: such as movement patterns, stretching, and lifting habits.
5. Pain assessment: location and intensity of LBP symptoms before and after the quarantine period.
6. Psychological aspects: self-reported stress or depression levels before and during lockdowns.

LBP was assessed through the question "have you ever experienced tension or pain in your lower back while working from home during the pandemic?"

Response options were Yes or No. Suspected HNP was evaluated based on reported symptoms consistent with nerve compression, including radiating pain, tingling, or weakness in the lower extremities, as used in prior validated studies (Ikhsanawati et al., 2015; Rusmayanti & Kurniawan, 2023).

2.5. Data Collection and Analysis

Primary data were collected directly through the questionnaire created using Google Forms. The questionnaire was distributed online to the public using social media platforms, including Line, WhatsApp, Instagram, Twitter, and TikTok, and a total of 420 respondents were selected. Subsequently, data analysis was carried out through various stages, such as cleaning and editing, coding, and processing using SPSS software.

Univariate analysis was carried out to examine the distribution of frequency and percentage of each variable, such as level of LBP, HNP symptoms, sociodemographic characteristics, and media exposure. Meanwhile, bivariate analysis was performed to examine the relationship between independent and dependent variables. This assessment was performed using the chi-square test and p-value. When the p-value was less than 0.05, H0 was accepted, showing a relationship between the two variables. In a case where the value was less than or equal to 0.25, it was included in multivariate modelling using multiple logistic regression. The

modelling results showed the p-value for each variable. Variables with a p-value > 0.05, particularly those with the largest values were removed from the process. After removing one variable, the testing process was repeated to refine the procedures. The final modelling results showed variables with a p-value <0.05 (95% CI), showing that these independent variables had a significant relationship with the dependent variable. Furthermore, the Exp(β) value was used to determine the extent of the effect of independent variables on the dependent variable.

3. RESULTS

Table 1: Frequency Distribution of Sociodemographic Characteristics.

Variable	f (n=420)	%
Age		
18 – 34 years	341	8.2
>34 years	79	18.8
Gender		
Female	318	75.7
Male	102	24.3
Location of Residence		
Urban	296	70.5
Rural	124	29.5
Ethnicity		
Java	218	51.9
Sunda	67	16.0
Betawi	28	6.7
Malay	21	5.0
Batak	23	5.5
Others	63	15.0
Employment		
Employed	177	42.1
Not yet or unemployed (students or housewife)	243	57.9
Education		
Senior High School or below	173	41.2
Diploma or above	247	58.8
Body Mass Index		
Obese	120	28.6
Non-obese	300	71.4

A total of 420 respondents participated in this study. Table 1 showed that most participants were female (75.7%), aged 18–34 years (81.2%), and resided in urban areas (70.5%). The majority belonged to the Javanese ethnic group (51.9%), were unemployed or students (57.9%), and had an educational level of diploma or higher (58.8%). In addition, 71.4% of respondents had a normal BMI, while 28.6% were classified as obese. In this study, LBP cases were relatively high during the pandemic, and several individuals experienced pain in low back. Moreover, some of them were suspected to have HNP based on the perceived symptoms. An overview of LBP and suspected HNP cases in the community is presented in Table 2.

Table 2: Frequency Distribution of LBP Cases and Suspected HNP.

Variable	f (n=420)	%
Low Back Pain		
Yes	330	78.6
No	90	21.4
Suspected HNP		
Yes	192	45.7
No	228	54.3
Total	420	100

The study found a notably high prevalence of Low Back Pain (LBP) and suspected Hernia Nucleus Pulposus (HNP) among the respondents. During the COVID-19 pandemic, 78.6% of participants reported experiencing LBP, while 45.7% exhibited symptoms suggestive of HNP (Table 2). This indicates that nearly half of those who experienced LBP also reported neurological symptoms consistent with nerve compression. LBP was associated with several risk factors, including smoking status, BMI, exercise habits, stretching, weight-lifting, ergonomic factors, and depression/stress level. In this study, a chi-square test was conducted on these variables to examine the relationship with LBP during the pandemic. The results of the analysis to identify the risk factors for LBP are presented in Table 3.

Table 3: Bivariate Analysis of LBP Cases during the Pandemic.

Variable	LBP				Total	%	p-value	OR (95% CI)
	n	%	n	%				
Age								
18-34	287	84.2	54	15.8	341	100	0.000	4.450 (2.620–7.557)
>34	43	54.4	36	45.6	79	100		
Gender								
Female	260	81.8	58	18.2	318	100	0.007	2.049 (1.236 – 3.399)
Male	70	68.6	32	31.4	102	100		
Location of Residence								
Urban	232	78.4	64	21.6	296	100	0.985	0.962 (0.576 – 1.607)
Rural	98	79.0	26	21.0	124	100		

Employment								
Unemployed	201	82.7	42	17.3	243	100	0.021	1.781 (1.114 – 2.848)
Employed	129	72.9	48	27.1	177	100		
Education								
Senior High Scl	136	78.6	37	21.4	173	100	1.000	1.004 (0,625 – 1,613)
Diploma or above	194	78.5	53	21.5	247	100		
Body Mass Index								
Obese	89	74.2	31	25.8	120	100	0.208	0.703 (0.427 – 1.157)
Non-obese	241	80.3	59	19.7	300	100		
Smoking status								
Non-smoker	315	79.9	79	20.1	394	100	0.015	2.924 (1.293 – 6.614)
Smoker	15	57.7	11	42.3	26	100		
Ergonomics								
Not Ergonomic	292	78.5	80	21.5	372	100	1.000	0.961 (0.459 – 2.012)
Ergonomic	38	79.2	10	20.8	48	100		
Weight-lifting								
Yes	67	81.7	15	18.3	82	100	0.534	1.274 (0.688 – 2.358)
No	263	77.8	75	22.2	338	100		
Sitting duration								
More than 8 hours a day	71	93.4	5	6.6	76	100	0.001	4.660 (1.822 – 11.923)
0-8 hours a day	259	75.3	85	24.7	344	100		
Stretching Frequency								
Rarely	218	76.8	66	23.2	284	100	0.238	0.708 (0.421 – 1.190)
Often	112	82.4	24	17.6	136	100		
Exercise Frequency								
0 – 1 time a week	237	81.7	53	18.3	290	100	0.026	1.779 (1.097 – 2.885)
More than 1 time a week	93	71.5	37	28.5	130	100		
Depression/Stress								
Depression	232	87.5	33	12.5	265	100	0.000	4.089 (2.506 – 6.671)
Mild or No Depression	98	63.2	57	36.8	155	100		

Bivariate analysis was carried out to observe the relationship between independent and dependent variables using the chi-square test. The results showed that age, gender, employment status, smoking status, sitting duration, exercise frequency, and depression were associated with LBP during the COVID-19 pandemic. Subsequently, multivariate analysis was performed using multiple logistic regression to identify the dominant variables influencing LBP. The final results of the multiple logistic regression modeling are presented in Table 4.

Table 4: Final Multiple Logistic Regression Multivariate Analysis of LBP Cases during the Pandemic.

Variable	β	Sig	Exp (β)	95% CI for Exp (β)	
				Lower	Upper
Depression	1.105	0.000	2.758	1.598	4.761
Sitting more than 8 hours a day	1.426	0.004	4.161	1.582	10.944
Aged 18-34 years	0.970	0.001	2.637	1.456	4.776
Constant	-3.265	0.000	0.038		

Multiple Logistic Regression Model (Table 4) in this study explained the odds ratio (ExpB) for each variable. This logistic regression model was a multivariate or multiple analysis, showing that the odds ratio for each variable was controlled (adjusted) by other variables included in the model. The multivariate analysis results found that stress or depression (p=0.000) (OR=2.758, 95% CI=1.598-4.761), age (p=0.001) (OR=2.637, 95% CI=1.456-4.776), and sitting duration (p=0.004) (OR=4.161, 95% CI=1.582-10.944) were significantly associated with LBP cases. The determination of the most dominant

or influential variable on the dependent variable could be seen from the Exp(β) value. Therefore, the variable sitting duration (Exp(β)=4.161) was the most influential in this study. The assessment of HNP was based on symptoms commonly experienced by patients. Respondents suspected of having HNP could be diagnosed by being subjected to Magnetic Resonance Imaging (MRI). Therefore, categorizing respondents as definitively having or not having HNP was not feasible, but the presence of certain symptoms could suggest a potential or suspected occurrence of the condition. In this study, the chi-square test was conducted on independent variables to assess the relationship with suspected HNP during the pandemic. The results of the analysis to identify risk factors for suspected HNP in respondents are presented in Table 5.

Table 5: Bivariate Analysis of Cases of HNP Symptoms during the Pandemic.

Variable	Suspected HNP				Total	%	p-value	OR (95% CI)
	n	%	n	%				
Age								
18-34	165	48.4	176	51.6	341	100	0.031	1.806 (1,083 – 3,010)
>34	27	34.2	52	65.8	79	100		
Gender								
Female	148	46.5	170	53.5	318	100	0.627	1.148 (0.732 – 1.799)
Male	44	43.1	58	56.9	102	100		
Employment								
Unemployed	122	50.2	121	49.8	243	100	0.039	1.541 (1.041 – 2.282)
Employed	70	39.5	107	60.5	177	100		
Body Mass Index								
Obese	50	41.7	70	58.3	120	100	0.345	0.79 (0.518 – 1.219)
Non-obese	142	47.3	158	52.7	300	100		
Smoking status								
Non-smoker	183	46.4	211	53.6	394	100	0.332	1.638 (0.713 – 3.764)
Smoker	9	34.6	17	65.4	26	100		
Ergonomics								
Not Ergonomic	169	45.4	203	54.6	372	100	0.864	0.051 (0.496 – 1.652)
Ergonomic	23	47.9	25	52.1	48	100		
Weight-lifting								
Yes	46	56.1	36	43.9	82	100	0.048	1.680 (1.033 – 2.733)
No	146	43.2	192	56.8	338	100		
Sitting duration								
>8 hours a day	48	63.2	28	36.8	76	100	0.001	2.381 (1.426 – 3.977)
0-8 hours a day	144	41.9	200	58.1	344	100		
Exercise Frequency								
0 – 1 time a week	137	47.2	153	52.8	290	100	0.405	1.221 (0.804 – 1.854)
>1 time a week	55	42.3	75	57.7	130	100		
Depression/Stress								
Depression	151	57.0	114	43,0	265	100	0.000	3.683 (2.391 – 5.672)
Mild or No Depression	41	26.5	114	73,5	155	100		

The results showed that age, employment status, sitting duration, weight-lifting activity, and depression were associated with HNP symptoms during the COVID-19 pandemic. Furthermore, multivariate analysis was performed using multiple logistic regression to identify the most dominant variables affecting HNP symptoms during this period. The final results of the multiple logistic regression modeling are presented in Table 6.

Table 6: Final Results of Multiple Logistic Regression Multivariate Analysis of HNP Symptoms during the Pandemic.

Variables	(β)	Sig	Exp (β)	95% CI for Exp (β)	
				Lower	Upper
Depression	1.265	0.000	3.542	2.290	5.476
Sitting more than 8 hours a day	0.771	0.005	2.162	1.268	3.688
Aged 18-34 years	-0.899	0.000	0.407		
Constant	1.265	0.000	3.542	2.290	5.476

Based on the multivariate analysis results, the variables that were significantly associated with HNP symptoms included stress or depression (p=0.000) (OR=3.542, 95% CI=2.290-5.476) and sitting duration (p=0.005) (OR=2.162, 95% CI=1.268-3.688). The determination of the most dominant or affective variable on the dependent variable could be seen based on Exp(β) value. Therefore, the stress or depression (Exp(β)=3.542) was the most influential variable in cases of HNP symptoms during the pandemic.

4. DISCUSSION

Several reports showed that the prevalence of LBP in Indonesia during the COVID-19 pandemic was relatively high, with a significant proportion of the community having complaints. Furthermore, the incidence of the COVID-19 pandemic forced governments in several countries to implement lockdowns, which increased the prevalence of the condition (Šagát et al., 2020). The prevalence of LBP in developing countries was estimated at 33%, with 7.6% to 37% of the Indonesian population experiencing the condition (Kumbea, Asrifuddin and Sumampouw, 2021). In this study, a high rate of 78.6% was obtained during the COVID-19 pandemic due to a significant increase in LBP cases in the community caused by WFH. A study in Japan also showed similar results, where an increase in WFH was associated with LBP (Minoura et al., 2021).

Age was one of the factors affecting LBP, with complaints of skeletal muscle being felt during working age between 25-65 years (Widiyasari, Ahmad and Budiman, 2014). In this study, age was related to the occurrence of the condition, where individuals aged 18-34 years were four times more at risk compared to those who were over 34 years old. Previous studies also reported results where the variable affected LBP (Br Silitonga and Utami, 2021). As age increased, bones began to degenerate, starting around the age of 30. Aged individuals were likely to experience reduced stability in bones and muscles, as well as decreased bone elasticity, thereby increasing the risk of back pain (Andini, 2015). However, a study conducted among young medical students aged 19-23 years showed a prevalence of LBP was 75% (Farid, Siahaan and Usman, 2023). This indicates that addressing the issue of LBP in the community should not only focus on age but also the management of other risk factors.

The LBP prevalence tended to be higher among females, primarily due to the presence of weaker muscles compared to males. Females were also more likely to complain of muscle problems (Widiyasari, Ahmad and Budiman, 2014). Furthermore, this study showed that females was 2 times more at risk of LBP with a high prevalence of 81.8%. The results were consistent with a previous study, which also obtained similar results (Minoura et al., 2021). Therefore, females should pay attention to LBP issues due to the higher susceptibility compared to males. To overcome this high prevalence, education targeting females, including housewives, was also necessary and very important.

In a previous report in Japan, unemployment rates were found to have a significant relationship with LBP cases, particularly among females (Minoura et al., 2021). This study showed that unemployed individuals were 2 times more at risk of the condition compared to those who were already working. Students and housewives were categorized as unemployed, with students constituting the majority of respondents. This suggested that these individuals engaged in remote learning during the pandemic. Housewives were also at significant risk due to the nature of the activities at home, which comprised standing and assuming inappropriate positions (Nugraha, Respati and Rachmi, 2020). During the pandemic, most workers and students in Indonesia were working or studying from home due to Large-Scale Social Restrictions (PSBB) policies (Peraturan Pemerintah Republik Indonesia Nomor 21, 2020). Therefore, it could be suspected that another effect of PSBB was the increase in LBP cases in the community, and this should be addressed in the future occurrence of the pandemic concern.

This study showed that a smoking history was associated with LBP, with non-smokers being 3 times more likely to experience the condition. The result was because the proportion of non-smokers to smokers among the participants was highly imbalanced, with more than 90% being non-smokers. Furthermore, this suggested that smoking was not the main factor for LBP due to the absence of significant results in the multivariate analysis. A study in Serbia showed that this variable was significantly associated with LBP (Ilic et al., 2021). This difference could be due to variations in the characteristics of participants. The study in Serbia was conducted among medical students, while this current report comprised the general public, who tended not to smoke. Another report in South Africa also showed that smoking increased the risk of LBP (Kahere and Ginindza, 2021). Smoking was an unhealthy habit that could cause various health problems, including decreased mineral content in bones, increased osteoporosis, micro-injuries, elevated frequency of coughing that could compress low back, and disrupted blood flow in the lower spine (Kahere and Ginindza, 2021).

The COVID-19 pandemic, which forced the community to perform most of the activities at home, was associated with prolonged immobility. Prolonged sitting, combined with poor posture and environmental factors in the workplace, had been reported to be related to LBP (Minoura et al., 2021). PSBB led the community to study and work from home, and this could have positive effects, such as improving concentration and productivity (Gunawan, Kusnawan and Hernawan, 2021). However, WFH also had negative impacts on the musculoskeletal system due to poor posture and prolonged sitting. Ergonomic factors did not show significant results because the prevalence of LBP in the community who were in ergonomic and non-ergonomic conditions tended to be the same with no difference. In this study, the results showed that prolonged sitting during WFH was significantly related to LBP, and it was the most dominant variable. Individuals who sat for more than 8 hours a day were 4 times more at risk of the condition compared to others. The results were consistent with a previous study in Riyadh, Saudi Arabia, showing that prolonged sitting had a significant association (Šagát et al., 2020). With the relationship between prolonged sitting during WFH and LBP, there was a need for ergonomic guidelines to prevent the occurrence of the condition among workers or individuals performing the tasks from home.

Stretching during WFH was needed to reduce the risk of LBP (Minoura et al., 2021), but this study showed that there was no significant relationship between its frequency of stretching and LBP. However, the frequency of exercise per week was related to the condition, where individuals who did not exercise or only did once a week were 2 times more at risk compared to those who engaged in sports more than once a week. This result was consistent with a study in Saudi Arabia, where the frequency of physical activity could reduce the level of LBP during the pandemic (Šagát et al., 2020). Exercise frequency during the ongoing pandemic also enhanced the body's immunity, which played a role in preventing COVID-19 (Nopiyanto et al., 2020). A lack of physical activity or exercise could also lead to weight gain, leading to obesity. During the COVID-19 pandemic, the number of obese individuals increased significantly, making the condition another issue stemming from the pandemic (Setyaningrum, 2020). In this study, obesity was not significantly related to LBP, but this result was inconsistent with previous studies (Sari et al., 2023). Obese individuals, with excess abdominal circumference, had limited upper body movement, as well as reduced joint flexibility, and mobility, leading to pain in the spinal area. Therefore, exercise and physical activity were crucial to maintaining an ideal body and reducing the risk of LBP. Various exercises could be performed, such as walking, jogging, or indoor exercises with sets of movements, including squat jumps, planks, push-ups, and sit-ups, or by following videos available on the internet (Setyaningrum, 2020). Engaging in sport activities also reduced stress or depression due to the release of endorphins by the body (Andalasari and Berbudi BL, 2018).

This study showed that stress level was related to LBP during the pandemic, where individuals experiencing depression were 4 times more at risk compared to those who were not depressed or only had mild levels. Stress also became one of the variables with a significant association with LBP after multivariate analysis, showing that it was a relatively dominant factor. Previous studies reported that the level of depression positively correlated with the intensity of this condition (Šagát et al., 2020). The COVID-19 pandemic was known to increase stress levels, with a reported prevalence of up to 33% (Papalia et al., 2022). This could serve as a lesson for future pandemics, showing the need to conduct socialization related to stress management to prevent depression.

HNP was a subgroup of LBP, characterized by the rupture of the annulus fibrosus, accompanied by the

displacement of nucleus pulposus from the intervertebral disc space, causing symptoms due to inflammation and compression of the nerve roots (Howay, Sutarto, and Larasati, 2021). The most common symptom of HNP was sciatica, a radiating pain along the sciatic nerve (low back extending to the hips, buttocks, and legs) (Ikhsanawati et al., 2015). In this study, factors related to suspected HNP were depression and prolonged sitting. This result was obtained after conducting multivariate analysis of significant variables in bivariate analysis. Individuals experiencing depression were 3 times more likely to exhibit symptoms of HNP compared to those who were not depressed. Furthermore, individuals sitting for more than 8 hours or engaging in prolonged sitting were 2 times more at risk. A previous study identified obesity as a risk factor for suspected HNP (Desyauri, Aritonang and Simanjuntak, 2021). Medical diagnosis of HNP must conducted using MRI to avoid mistakes. Factors affecting HNP among respondents included age or degenerative processes, gender, habits or occupations, and health history. The natural degenerative process could occur with age, rendering the spinal structures more susceptible to injury. This could also decrease the elasticity of the annulus, making the annulus fibrosus prone to tearing. Males were more susceptible to HNP, possibly due to habits or occupations that could cause trauma and damage to the annulus, such as lifting heavy loads and assuming inappropriate positions. In this study, smoking, associated with various diseases, was also linked to HNP risk (Hatlah, 2021). The results showed that prolonged sitting and depression were related to the symptoms or suspicion of the condition in the community. Therefore, further study on HNP risk factors was needed due to the limitations of this current report.

The strengths of this study were in its exploration during the pandemic period, addressing LBP and suspected HNP issues in Indonesia with numerous variables, thereby serving as a reference for future reports. The results could also be used as a basis for policymaking when future pandemics occur, minimizing the side effects of the situation, specifically LBP. However, there were some limitations in this study, including the use of a cross-sectional design, which prevented the explanation of causal relationships. Online questionnaire data collection could pose a risk of bias, but efforts were made to minimize the occurrence. Furthermore, there was no information regarding medical diagnoses of LBP and HNP, leading to the sole reliance on symptom assessments without MRI verification. Future studies were suggested to incorporate proper medical diagnoses for a clearer outcome. Despite these limitations, this study showed that the COVID-19 pandemic significantly impacted depression and LBP cases in the community.

5. CONCLUSION

In conclusion, the COVID-19 pandemic had a significant effect on the Indonesian community, with unavoidable social and psychological consequences during the bleak lockdown period. The pandemic forced the community to stay at home, leading to prolonged sitting, reduced movement, depression, and increased LBP risk. Therefore, other related effects of the pandemic, such as depression, obesity, LBP, and HNP, needed further investigation to develop better policies for future use.

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