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Forward Bending Posture and Workload as Predictors of Low Back Pain: A Cross-Sectional Study

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Abstract

Introduction: Farming remains one of the most common occupations in Indonesia, particularly in Bali. Rice cultivation requires repetitive bending postures and heavy physical effort, both of which increase the risk of developing low back pain. This study investigated the associations between forward bending posture, workload, and low back pain among rice farmers in Bukian Village, Gianyar Regency.

Methods: A cross-sectional observational analytic design was employed involving 94 rice farmers recruited through purposive sampling. Independent variables included work posture and workload, while age, gender, and years of service were considered control variables. Work posture was assessed using the Rapid Entire Body Assessment (REBA), workload was measured using Cardiovascular Load Percentage (CVL%), and low back pain was evaluated using the Pain and Distress Scale questionnaire. Data were analyzed using Spearman's rho correlation test.

Results: Workload showed a strong positive correlation with low back pain complaints ($r=0.625$, $p<0.001$). A stronger positive correlation was observed between forward bending posture and low back pain complaints ($r=0.718$, $p<0.001$). Age ($p<0.001$) and years of service ($p<0.001$) were significantly associated with low back pain, whereas gender was not ($p=0.418$).

Conclusion: Forward bending posture and workload were significant predictors of low back pain among rice farmers. Years of service also contributed substantially to the occurrence of low back pain, highlighting the importance of ergonomic interventions and preventive measures in agricultural work.

Keywords

low back pain, workload, posture, occupational health, farmers

Introduction

Farmers are individuals who produce food and raw materials by utilizing available environmental and biological resources to meet daily needs. Farmers play a vital role in maintaining, nurturing, and managing the environment through plant care and ensuring that the crops grow well and yield high production results.[1] According to the agricultural census data (SUTAS) quoted from BPS (Central Statistics Agency) in 2018, there were a total of 33,487,806 active farmers in Indonesia, with 477,439 farmers in Bali Province, consisting of 364,322 men and 113,117 women.[2] The 2013 agricultural census showed that the number of agricultural businesses in Gianyar Regency reached 48,704 individuals. Although many farmers are now assisted by modern technology, a significant number still rely on traditional methods and the use of their bodies to perform their tasks.[3] The activities carried out by farmers generally include planting, tilling, weeding, plowing, and irrigating rice fields. The demands of these tasks often cause farmers to neglect their body posture, resulting in a tendency to bend while working for extended periods. This can lead to fatigue and muscle spasms in the back due to maintaining a static position, which can cause lower back pain among farmers.[3]

Work posture refers to the physical position adopted by an individual to perform work-related activities. Common work postures, such as sitting, standing, and bending, vary depending on the type of work each individual performs. Poor or awkward postures can increase the risk of injuries to muscles and bones. Various types of work postures include: sitting, which causes the thighs to pull the hips, tilting the pelvis backward, and flattening the lumbar curve, increasing pressure on spinal discs and leading to rapid fatigue and back pain; the use of back support can help maintain the lumbar curve and reduce pressure.[4] Standing posture requires balance, with weight on both feet, allowing for faster and more precise work. However, prolonged standing can increase the risk of venous swelling due to blood flow working against gravity.[4] Bending posture is an awkward and uncomfortable position if maintained for long periods, decreasing balance as the body leans forward, compressing the lumbar intervertebral discs, which can cause pain and muscle stiffness.[4]

Ergonomic posture refers to the science of human work aimed at improving safety, health, and work efficiency.[5] Ergonomic posture maintains the body's natural alignment with the standard S-curve of the spine, minimizing pressure,

especially in the lumbar region.[4] Conversely, non-ergonomic posture refers to positions that should be avoided, such as sitting for prolonged periods, which creates a C-curve in the spine and puts pressure on the lumbar area, and bending, which forms an inverted-V curve and exerts greater pressure on the back than sitting.[4,6] When working in the fields, farmers often adopt a non-ergonomic bent posture while planting, tilling, plowing, or weeding, causing pain and stiffness due to the lower back muscles working hard to support the body's weight. This static activity reduces the stretch capacity of tissues in that area.[7]

Workload refers to an individual's physical effort to fulfill job responsibilities and complete tasks. It represents the physical load on an individual's body to meet and finish work assignments.[8] An individual's ability to handle work can be measured based on the workload level matching their capacity.[9] The heavier the workload, the faster an individual can sustain the task without experiencing physiological disruption or fatigue. Conversely, if the workload is too light, the individual can sustain the task longer without fatigue.[10] Generally, workload includes repetitive movements, awkward postures, and forceful exertion, all of which strain muscles, ligaments, and other back structures, increasing the risk of injury and pain.[1]

Lower back pain (LBP) is pain in the back area that can be caused by issues with muscles, tendons, bones, joints, or nerves, often due to muscle strain and stiffness in the paraspinal muscles caused by static postures such as bending, which farmers commonly experience during activities like tilling, planting, and plowing rice fields.[11] Pain is the body's response to prevent further injury by triggering protective mechanisms such as increased muscle tone, leading to stiffness or spasms.[12] Pain can also be caused by inflammation or neuropathic pain due to nerve injury, where mechanical, chemical, or thermal stimuli are received by sensory nerve fibers and transmitted to the pain center through fast (neospinothalamic) or slow (paleospinothalamic) pathways for quick or poorly localized pain responses.[4]

The primary aim of this study is to investigate the relationship between forward bending posture and workload with lower back pain complaints among farmers in Bukian Village, Payangan, Gianyar Regency in 2023. The specific objectives of this study are to understand the impact of farming conditions and the resulting complaints of lower back pain due to work posture and workload among farmers.

Methods

The research design used in this study is a descriptive analytical study with a cross-sectional approach to analyze the relationship between work posture, workload, and lower back pain complaints among rice farmers. This study was conducted in Bukian Village from September to November 2024, involving 94 rice farmers aged 30-65. A purposive sampling technique was employed to ensure that the subjects met the appropriate occupational and health characteristics. The inclusion criteria for the study were rice farmers who planted rice and were willing to participate by signing an informed consent form. The exclusion criteria included individuals with congenital abnormalities, such as scoliosis, and those unable to read or write.

The independent variables in this study are work posture and workload. Work posture was assessed using the Rapid Entire Body Assessment (REBA), which evaluates the condition of the neck, back, waist, upper and lower extremities, coupling variables, work activities, and load. The assessment is divided into two groups: Group A (back, neck, and legs) plus the load value, and Group B (upper arms, lower arms, and wrists) plus the coupling variables. These two groups are combined to form Group C. The Group C score is then added to the activity score to determine the work risk of the individual. The scoring system is as follows: 1 (very low), 2-3 (low), 4-7 (moderate), 8-10 (high), and 11+ (very high).

Workload measurement can be performed by measuring the heart rate using a pulse oximeter, followed by comparing the maximum heart rate with the increase in heart rate during work activity using the %CVL (Cardiovascular Load) formula. The scoring system is: >30% indicates no fatigue, 30-60% means the need for improvement, 60-80% suggests working for a short period, 80-<100% requires immediate action, and >100% is not allowed for activity.

The dependent variable in this study is lower back pain complaints, which were measured using the Pain and Distress questionnaire. This questionnaire consists of 20 questions with a completion time of approximately 10-15 minutes. Each question has four value columns: 4 (always), 3 (often), 2 (rarely), and 1 (never). The maximum score for the questionnaire is 80, with the following interpretation: 68-80 (very high), 56-67 (high), 44-55 (moderate), 32-43 (low), and 20-31 (very low).

The study began by submitting an ethical approval application and requesting research permission from the Bukian Village office. Data collection was conducted after explaining the informed consent procedure to each subject. After the procedure was explained, baseline heart rate measurements were taken, and work posture during the task, heart rate after work, and lower back pain complaints were recorded. The collected data were analyzed using univariate analysis to describe the characteristics of the study subjects, and bivariate analysis with Spearman's Rho and Chi-Square tests to examine the relationships between variables. The study received ethical approval from the Research Ethics Committee of the Faculty of Medicine, Udayana University, with approval number 1288/UN14.2.2.VII.14/LT/2024.

Results

In this study, the sample consisted of farmers from Gianyar Regency. The sampling method used was purposive sampling, with 94 participants who met the criteria. Out of 110 farmers invited to participate, 16 did not meet the inclusion criteria due to age and other medical complaints, leaving a final sample of 94 participants. The characteristics of the participants in this study include age, gender, years of work experience, work posture, workload, and lower back pain complaints, as shown in Table 1 below.

Table 1. Frequency Distribution of Sample Characteristics

Variable Characteristics	Frequency (n)	Percentage (%)
Age		
30–40 Years	1	1.1%
41–50 Years	34	36.2%
50–60 Years	49	52.1%
>60 Years	10	10.6%
Gender		
Male	39	41.5%
Female	55	58.5%
Years of Work		
<5 Years	28	29.8%
5–10 Years	15	16%
11–20 Years	42	44.7%
21–30 Years	9	9.6%
Work Posture		
Very Low	0	0%
Low	0	0%
Moderate	32	34%
High	50	53.2%
Very High	12	12.8%
Workload		
No Fatigue	6	6.4%
Requires Improvement	32	34%
Short Work Duration	24	25.5%
Immediate Action Needed	20	21.3%
Not Allowed to Work	12	12.8%
Lower Back Pain Complaints		
Very Low	0	
Low	13	13.8%
Moderate	33	35.1%
High	42	44.7%
Very High	6	6.4%

Most of the study participants were aged 50–60 years (52.1%) and predominantly female (58.5%). Most participants had between 11 and 20 years of work experience (44.7%), followed by those with less than 5 years of experience (29.8%). Most participants had a high work posture category (53.2%), followed by those in the moderate category (34%), with a small percentage in the very high category (12.8%). The majority of participants reported a workload that required improvement (34%), followed by those working for a short duration (25.5%) and those requiring immediate action (21.3%). Most participants experienced lower back pain complaints in the high category (44.7%), followed by the moderate category (35.1%), with a smaller percentage in the low (13.8%) and very high (6.4%) categories. No missing data was observed in any of the analyzed variables. Next, bivariate data processing was conducted using Spearman's Rho test, which is used to analyze ordinal data, i.e., data that has been ranked or categorized, as shown in Tables 2 and 3 below.

Table 2. Relationship Between Workload and Lower Back Pain Complaints

Variable Correlation	Correlation	p Value
Lower Back Pain Complaints Workload	0.625	0.000

The Spearman's Rho test showed a positive and strong correlation (0.625, p=0.000) between workload and lower back pain complaints, indicating that higher workload is associated with higher complaints of lower back pain. The significant p-value (0.000 < 0.05) suggests that workload has a statistically significant relationship with lower back pain complaints in the respondents.

Table 3. Relationship Between Work Posture and Lower Back Pain Complaints

Variable Correlation	Correlation	p Value
Lower Back Pain Complaints Work Posture	0.718	0.000

The Spearman's Rho test indicated a positive and robust correlation (0.718, p=0.000) between work posture and lower back pain complaints, suggesting that poor work posture is associated with increased lower back pain complaints. The significant p-value (0.000 < 0.05) shows that work posture has a statistically significant influence on lower back pain complaints in the respondents.

Next, bivariate data processing was performed using the Chi-Square test, which is used to analyze numerical data and compare the distribution of categorical variables across different groups to see if proportions are similar (homogeneous). This test is also commonly used to determine statistically significant relationships between two or more categorical independent variables. The results are shown in Tables 4 to 6 below.

Table 4. Relationship Between Age and Lower Back Pain Complaints

Age Group	Total	p Value
30-40 Years	1	0.000
41-50 Years	34	
51-60 Years	49	
>60 Years	10	

The analysis showed that age has a significant (p=0.000) and statistically meaningful relationship with the level of lower back pain complaints among the respondents. The majority of respondents with high to very high lower back pain complaints were over 50 years old, while those aged 41-50 years generally reported mild to moderate complaints. The data suggests that increasing age, particularly over 50, tends to increase lower back pain complaints due to physical decline, cumulative workload, and long-term neglect of ergonomic considerations.

Table 5. Relationship Between Gender and Lower Back Pain Complaints

Gender	Total	p Value
Male	39	0.418
Female	55	

The analysis showed no significant statistical relationship (p=0.418) between gender and the respondents' lower back pain complaints. The distribution of lower back pain complaints between male and female respondents was relatively balanced across various levels. However, females reported slightly higher complaints, which were not statistically significant.

Table 6. Relationship Between Years of Work Experience and Lower Back Pain Complaints

Work Experience	Total	p Value
<5 Years	28	0.000
5–10 Years	15	
11–20 Years	42	
21–30 Years	9	

The analysis of the relationship between work experience and lower back pain complaints showed a p-value of 0.000, less than 0.05. This indicates a statistically significant relationship between years of work experience and the respondents' lower back pain complaints. Respondents with more than 10 years of experience reported high complaints, particularly those with 11–20 and 21–30 years of work. In contrast, those with less than 5 years of experience reported low to moderate complaints. Longer work experience, especially in environments with ergonomic risks, tends to increase the likelihood of lower back pain complaints due to accumulated physical stress, poor posture, or inadequate workload adjustments.

Discussion

This study investigates the relationship between workload, work posture, age, gender, and length of service with lower back pain (LBP) complaints among rice farmers. The results of this study generally support this objective, showing a significant relationship between most variables and complaints of LBP.

The majority of respondents were in the 50–60-year age range (52.1%), followed by those aged 41–50 years (36.2%), >60 years (10.6%), and only one individual aged 30–40 years (1.1%). Age is a risk factor for lower back pain associated with decreased tissue elasticity and muscle-bone stability. Tissue degeneration begins around age 30, and initial complaints usually emerge around age 35. A study by Nurcahyani et al. also found that respondents aged >35 years experienced more LBP than those aged ≤35.[13]

In terms of gender, females dominated the respondents (58.5%). Physiologically, women tend to have lower muscle strength than men, making them more susceptible to muscle fatigue. This is consistent with the study by Mambu (2022), which stated that women are more likely to experience LBP.[14]

The majority of respondents had a length of service of 11–20 years (44.7%), followed by <5 years (29.8%), 5–10 years (16%), and 21–30 years (9.6%). Longer tenure correlates with a higher risk of LBP due to exposure to repetitive movements, non-ergonomic work positions, and accumulated physical strain.[15,16] Nurcahyani et al. also found that workers with a length of service >5 years were more likely to experience LBP.[13]

Work posture was predominantly categorized as high (53.2%), followed by medium (34%), and very high (12.8%). Non-ergonomic work postures, such as prolonged bending, exert pressure on the lower back structure. Amalo & Lestari also reported that most farmers exhibit high-risk postures.[11]

Workload was predominantly categorized as "needs improvement" (34%), "work in a short period" (25.5%), "needs immediate action" (21.3%), "not allowed to be active" (12.8%), and "no fatigue experienced" (6.4%). Tiasna & Wahyuningsih's study revealed that respondents with high workload had a higher prevalence of LBP than those with low-risk workload.[17]

The most common LBP complaints were in the high (44.7%) and moderate (35.1%) categories, followed by low (13.8%) and very high (6.4%). No respondents were categorized as having very low complaints. Workers with non-ergonomic postures and long working hours generally experience these complaints.[18] This aligns with the findings of Amalo & Lestari and Juliani et al., who stated that approximately 75% of farmers experience LBP.[11]

Spearman's Rho test results showed a strong and significant relationship between workload and LBP (r = 0.625; p = 0.000). This indicates that the severity of LBP complaints increases as the workload increases. Activities such as bending, lifting heavy loads without proper technique, and maintaining static positions for prolonged periods lead to excessive pressure on the lower back. Repetitive activities like rice planting can cause muscle fatigue and soft tissue injuries.[19] Tiasna & Wahyuningsih also reported that high workload correlates with increased LBP complaints, with workers who have a %CVL >60% tending to experience more severe complaints.[17]

Analysis revealed a robust correlation between work posture and LBP (r = 0.718; p = 0.000). Poor work posture, such as continuous bending or non-ergonomic positions, significantly increases LBP complaints. Incorrect posture exerts pressure on the spinal support tissues, triggering pain.[20] Research by Amalo & Lestari supports this finding, where most farmers in Kupang had high-risk work postures and experienced LBP complaints in the moderate to severe categories.[11]

There was a significant relationship between age and LBP complaints (p = 0.000). The age groups 51–60 years and >60 years predominantly experienced high and very high LBP complaints, while the 41–50-year age group mainly reported moderate to low complaints. As age increases, muscle strength and tissue elasticity decrease. Structural degeneration, including intervertebral disc deterioration, also increases over time.[21] This strengthens the findings of Nurcahyani et al., that individuals aged >35 years are more prone to LBP.[13]

Analysis showed no significant relationship between gender and LBP (p = 0.418). While women experienced more severe complaints overall, the distribution was not significantly different from that of men. This suggests that work posture, age, or workload influence LBP more than gender. However, from a physiological standpoint, women are at a higher risk due to lower muscle strength, hormonal changes (menstruation, menopause), and postural changes during pregnancy, which may affect spinal stability. Though not always statistically significant, Mambu (2022) also observed a predominance of LBP complaints in women [14]

Relationship Between Length of Service and Lower Back Pain Complaints

A significant correlation was found between length of service and LBP complaints (p < 0.001). Respondents with >10 years of service, especially those with 11–20 years, tended to experience LBP in the high to very high categories. In contrast, respondents with <5 years of service only reported low to moderate complaints. Prolonged exposure to ergonomic risk factors, such as poor work posture, repetitive movements, and lack of rest, accumulates pressure, leading to muscle fatigue and mechanical spinal disturbances.[22] This is consistent with the findings of Nurcahyani et al., who showed that workers with >5 years of service experience have more frequent LBP complaints.[13] Length of service also reflects the duration of exposure to farming traditions passed down since a young age, increasing the cumulative risk of LBP.[23]

This study has several limitations. First, the cross-sectional design limits causal conclusions between variables. Second, self-reported questionnaires may introduce recall bias and subjectivity in pain assessment. Third, the study was conducted in a single region and focused only on rice farmers, so the results may not be generalizable to other populations. Additionally, other variables that could influence LBP complaints, such as nutritional status, physical activity outside of work, and medical history, were not controlled for in the analysis.

Although the results indicate significant correlations, the interpretation should be done cautiously. Varying farming techniques, assistive tools, and different rest schedules among individuals may introduce confounding factors that were not controlled for. Therefore, these results reflect trends within a specific context and may not fully represent the entire farming population in Indonesia.

These findings are most relevant to rice farmers with similar characteristics, especially in rural areas that still rely on manual labor. Generalizing populations using modern technology or other physical labor professions should be done cautiously. Further studies across different locations and using a longitudinal approach are needed to extend the applicability of these results.

The findings of this study have important implications for occupational health and community physiotherapy. Ergonomic interventions such as posture training, the introduction of simple farming tools, and work schedules that include active rest periods could help reduce the risk of LBP. Health education emphasizing muscle flexibility, core strengthening, and regular stretching is also recommended for working-age and elderly populations. Local governments and healthcare providers in rural areas can use these findings to design context-specific promotive and preventive programs.

Conclusion

This study was conducted with rice farmers aged 30–65 years. Based on the findings and the chi-square and Spearman's rho analysis, it was found that there is a significant relationship between the forward-bending posture and workload with complaints of lower back pain (LBP). These findings align with previous studies indicating that forward-bending posture and heavy workload are major risk factors for lower back pain in agricultural workers.

Differences in findings can also be found in several other studies that highlight the role of psychosocial factors and the ergonomics of the work environment as additional components that can influence musculoskeletal complaints, which were not fully addressed in this study.

Further research is needed to explore effective ergonomic interventions to reduce workload and non-ergonomic postures and assess the impact of other factors, such as the work environment and assistive devices, in preventing lower back pain among farmers.

Based on the implementation and results of this study, the following recommendations can be made. It is advised that individuals, particularly those aged 50–60, avoid heavy activities in static positions for extended periods, which can

lead to lower back pain, and maintain proper posture while performing daily work activities. Additionally, it is recommended that individuals engage in regular physical exercise outside of working hours to maintain muscle and bone health.

Author Contribution

Putu Yoga Sudarmaja: Conceptualization, Methodology, Data Collection, Formal Analysis, Writing – Original Draft, Writing – Review & Editing.
Anak Agung Gede Eka Septian Utama: Supervision, Validation, Methodology, Writing – Review & Editing.
I Putu Gde Surya Adhitya: Data Curation, Investigation, Formal Analysis, Writing – Review & Editing.
Govinda Vittala: Resources, Project Administration, Visualization, Writing – Review & Editing.
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Conflict of Interest Statement

The authors declare no conflict of interest related to this study.

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Ethics Statement

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Research Ethics Committee of the Faculty of Medicine, Udayana University (Approval No. 1288/UN14.2.2.VII.14/LT/2024). Written informed consent was obtained from all participants prior to their enrollment in the study.

References

1. Hakim A. Pengaruh biaya produksi terhadap pendapatan petani mandiri kelapa sawit di Kecamatan Segah. J Ekon STIEP. 2018;3(2):31–8.
2. Noor RM, Suwandana E. Ancaman krisis petani di Indonesia berdasarkan hasil Sensus Pertanian 2023. J Litbang Sukowati. 2024;8(2):226–34.
3. Faujiyah F. Studi prevalensi keluhan muskuloskeletal pada petani Indonesia. Firdhani Faujiyah TEDC. 2020;14(2):113–9.
4. Setyowati DL, Fathimahhayati LD. Pelatihan sikap kerja ergonomis pada perajin manik-manik di Desa Budaya Pampang Samarinda. JMM J Masyarakat Mandiri [Internet]. 2021 [cited 2025 Apr 22];5(5):2548–55. Available from: http://journal.ummat.ac.id/index.php/jmm
5. Prayogo D, Saputri J, Sutikno, Sadu B, Wicaksono U, Pahaga BA. Faktor risiko terjadinya non-spesifik low back pain pada petani di Desa Banyu Hirang. J Innov Res Knowl. 2012;1(9814):1039–42.
6. Saputra A. Sikap kerja, masa kerja, dan usia terhadap keluhan low back pain pada pengrajin batik. HIGEIA J Public Health Res Dev. 2020;4(1):147–57.
7. Purnawinadi IG, Rumegang A. Evaluasi sikap kerja sebagai risiko nyeri punggung bawah. J Skolastik Keperawatan. 2019;5(1):48–55.
8. Abdul Samad AG, Azizan MA, Khairuddin MH, Johari MK. A review on the mental workload and physical workload for aircraft maintenance personnel. 2022;1:627–35.
9. Entjaurau E, Akili R, Langi FLFG. Hubungan antara sikap kerja dan beban kerja dengan keluhan muskuloskeletal pada petani kelapa di Desa Essa Kabupaten Talaud. J Lentera Penelit Pengabdi Masy. 2022;3(1):16–21.
10. Ahmed S, Babski-Reeves K, DuBien J, Webb H. A proposed relationship between time and load to quantify fatigue. Proc Hum Factors Ergon Soc Annu Meet. 2014;58(1):1556–60.
11. Amalo AC, Lestari DI. Hubungan sikap kerja dengan keluhan nyeri punggung bawah pada petani di wilayah Kota dan Kabupaten Kupang. J Darma Agung. 2023;30(3):1270.
12. Purnamasari KD. Nyeri punggung bawah pada ibu hamil trimester II dan III. Midwifery J Galuh Univ. 2019;1(1):9–15.
13. Nurcahyani AD, Ekawati E, Jayanti S. Hubungan usia, masa kerja, waktu kerja, sikap kerja dan aktivitas pekerjaan dengan kejadian nyeri punggung bawah pada petani padi Desa Semen. J Kesehat Masy. 2024;12(2):180–8.
14. Mambu' ED. Faktor penyebab low back pain myogenic di Rumah Sakit Stella Maris Makassar. FISIO MU. 2022;3(2):98–103.

15. Kurniyawan EH, Nabila AF, Purwanto GJ, Maharani ND, Nilasari I, Afandi AT, et al. The relationship between work length and work position with the rate of low back pain among rice farmers. J Noncommunicable Dis. 2023;3(2):109.
16. Asfara JZ, Paskarini I, Wahyudiono YDA. Factors associated with low back pain (LBP) complaints in workers: A literature review. World J Adv Res Rev. 2024;21(2):796–9.
17. Tiasna RK, Wahyuningsih AS. Keluhan low back pain pada pekerja di sentra pembuatan garam. HIGEIA J Public Health Res Dev. 2023;7(1):19–31.
18. Dianat I, Afshari D, Sarmasti N, Sangdeh MS, Azaddel R. Work posture, working conditions and musculoskeletal outcomes in agricultural workers. Int J Ind Ergon. 2020;77:102941.
19. Das B. Ergonomic and psychosocial risk factors for low back pain among rice farmers in West Bengal, India. Work. 2022;72(3):967–77.
20. Suryadi I, Rachmawati S. Work posture relations with low back pain complaint on partners part of PT "X" manufacture of tobacco products. J Vocational Health Stud. 2020;3(3):126.
21. Ekşi MŞ, Orhun Ö, Yaşar AH, Dursun AT, Berikol G, Börekci A, et al. At what speed does spinal degeneration gear up?: Aging paradigm in patients with low back pain. Clin Neurol Neurosurg. 2022;215:107187.
22. Park J, Kim Y. Association of exposure to a combination of ergonomic risk factors with musculoskeletal symptoms in Korean workers. Int J Environ Res Public Health. 2020;17(24):9456.
23. Lee HJ, Oh JH, Yoo JR, Ko SY, Kang JH, Lee SK, et al. Prevalence of low back pain and associated risk factors among farmers in Jeju. Saf Health Work. 2021;12(4):432–8.