

Work Posture And Musculoskeletal Complaints Among Horticultural Farmers In Pinasungkulan Village

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Abstract - Farming is one of the occupations pursued by a group of people in Indonesia, where physical activities including manual shoveling, lifting heavy loads, repeated twisting of the body, prolonged standing and bending. This makes the agriculture sector as one of the high-risk occupations for musculoskeletal disorders due to improper or non-ergonomic work postures. This study aims to analyze the relationship between work posture and musculoskeletal complaints among horticultural farmers in Pinasungkulan village. The study employs a quantitative approach with a cross-sectional design involving 55 respondents gathered through purposive sampling. Work posture assessment was conducted using the Rapid Entire Body Assessment (REBA) method, while musculoskeletal complaints were measured using the Nordic Body Map (NBM) questionnaire. The result indicated that majority of the respondents (80%) had REBA scores in the moderate category indicating the need for evaluation and improvement of work posture. Meanwhile, NBM scores showed that majority of the respondents (63.6%) experienced musculoskeletal complaints in the moderate category indicating that most respondents experienced pain in several parts of the body, particularly those actively used during work. Pearson correlation test showed a significant but weak relationship between work posture and musculoskeletal complaints with $p= 0.042$ and $r= 0.276$ which is under a weak relationship category. This study recommends the importance of education on ergonomic work posture and the provision of appropriate work aids to minimize the risk of musculoskeletal complaints.

Keywords: Horticultural Farmers, Musculoskeletal Complaints, Nordic Body Map (NBM), Rapid Entire Body Assessment (REBA), Working Posture.

I. INTRODUCTION

Agriculture is a labor-intensive sector involving activities such as lifting heavy loads, bending, and performing repetitive movements, all of which present a high risk for musculoskeletal disorders (MSDs) (Salcha et al., 2021). MSDs are characterized by damage to or reduced function of muscles, ligaments, joints, tendons, and the spine, commonly resulting from non-ergonomic work postures (Wahyuni, 2021; Sumarni & Siwi, 2022). This condition occurs due to monotonous and repetitive work factors such as those experienced by farmers. These musculoskeletal disorders are classified as work-related illnesses resulting from non-ergonomic work positions such as manually lifting heavy objects which requires

significant muscle strength (Sumarni & Siwi, 2022).

Globally, MSDs affect an estimated 1.71 billion people, with low back pain and neck pain being the most prevalent conditions (GBD, 2020; WHO, 2022). The agricultural sector is among the most impacted, with prevalence rates among farmers reaching 60–80% in several Asian countries (Hesam et al., 2014; Suthakorn & Kaewboonchoo, 2015). In Indonesia, reported prevalence is 67.5% in Central Java (Astuti et al., 2020) and 74% in Bali (Yulianti et al., 2019).

According to the National Basic Health Research (Rikesdas, 2018), the most commonly reported complaints are joint diseases. Based on the prevalence of musculoskeletal disorders among individuals over 15 years, the rate is 7.3% and among occupational groups such as laborers and drivers, the prevalence of musculoskeletal disorders is 6.1%. It was further elaborated that approximately 713,783 people in Indonesia suffering from joint diseases, most of whom are from the productive age group and informal sector occupations such as farmers, laborers and drivers. According to the government data, the highest number of joint diseases cases in West Java Province reaching 131,846 people. This joint disease is highly disruptive due to the accompanying pain, stiffness, and swelling which may not be caused by trauma or accidents but rather by improper work posture (Rikesdas, 2018).

The National Basic Health Research (Rikesdas, 2018) also added that farmers represent the occupational group with the highest prevalence of MSDs (9.90%), with North Sulawesi ranked among the top ten provinces. Preliminary observations in Pinasungkulan Village indicate that shoveling is the most physically demanding and high-risk task, involving prolonged bending and repetitive movements that may contribute to musculoskeletal complaints.

Despite its significance, there is limited research specifically examining the association between shoveling work posture and MSDs in this region. Therefore, this study aims to investigate the relationship between work posture and musculoskeletal complaints among horticultural farmers in Pinasungkulan Village.

II. LITERATURE REVIEW

Work posture refers to the body position adopted by an individual while performing specific activities, whether in a static or dynamic condition (Tarwaka, 2015). Non-ergonomic postures can increase the mechanical load on muscles, ligaments, and joints, thereby triggering fatigue and the risk of injury (Restuputri, 2022). Agricultural activities, including shoveling soil, often involve bending, knee flexion, or trunk rotation, which may elevate the risk of musculoskeletal disorders (Astuti et al., 2020; Salcha et al., 2021).

According to Erlina (2021), factors influencing with work posture include duration, frequency, and the angles of body movement. In the context of horticultural farmers, shoveling activities are typically performed repeatedly and over extended periods, potentially increasing biomechanical stress on the body (Permata et al., 2023). This may lead to discomfort as the

body experience too much strain from the repetitive movements causing pain and discomfort on muscle and joints which lead to chronic condition such as musculoskeletal disorders (MSDs).

Musculoskeletal Disorders (MSDs) are conditions affecting muscles, bones, joints, tendons, or nerves due to prolonged exposure to ergonomic risk factors (WHO, 2022). These disorders may be acute or chronic, characterized by pain, stiffness, or restricted movement (Barone & Szychlinska, 2023). The global burden of MSDs is substantial; the WHO and ILO (2021) report that work-related musculoskeletal disorders are among the leading causes of reduced productivity in the agricultural sector. El-Tallawy et al. (2021) highlight that repeated incorrect body positioning can lead to soft tissue inflammation, joint degeneration, and chronic pain. Furthermore, factors such as age, muscle strength, and general health status may influence a worker's susceptibility to MSDs (Tsuboi et al., 2021).

In ergonomic research, work posture assessment is often conducted using the Rapid Entire Body Assessment (REBA) method developed by Hignett and McAtamney (2000). REBA is effective in evaluating injury risks associated with work postures by considering movement angles, load, and static activity. Several agricultural studies have demonstrated the effectiveness of REBA in identifying high-risk tasks such as hoeing, harvesting, and shoveling (Dewantari, 2021; Purnawinadi et al., 2022).

In addition to REBA, musculoskeletal complaints can be identified using the Nordic Body Map (NBM) questionnaire, which maps the location of bodily discomfort (Dewi, 2020; Wicaksono, 2019). The validity and reliability of NBM have been well established for detecting MSDs across various worker groups (Dewi et al., 2023). For body angle analysis, the Kinovea software is also used as it can accurately measure movement angles (Fernández-González et al., 2020; Kinovea, 2023).

Several studies have examined the relationship between work posture and musculoskeletal complaints among farmers. Astuti et al. (2020) found that 72% of farmers experienced MSDs, particularly in the lower back, due to prolonged bending postures. Salcha et al. (2021) also reported a significant correlation between non-ergonomic posture and lower back pain among rice farmers. Permata et al. (2023) identified that hoeing and lifting heavy loads increased the risk of shoulder and back complaints among farmers in North Toraja. A cross-country study by Chokthaweeapanich et al. (2024) in Thailand showed that working more than six hours per day in a bent posture significantly elevated MSD risk.

Previous research also emphasized that repetitive-motion tasks, such as shoveling soil, impose a high mechanical load on the musculoskeletal system (Hesam et al., 2014; Suthakorn & Kaewboonchoo, 2015). However, studies specifically focusing on shoveling activity in the horticultural sector remain scarce, highlighting an opportunity for more in-depth investigation.

Based on the literature review, although numerous studies have examined the relationship between work posture and musculoskeletal disorders in agriculture, most have addressed general tasks such as hoeing or harvesting. Few have specifically targeted soil shoveling activities, particularly among horticultural farmers. This research aims to address this gap by

providing a focused ergonomic risk analysis of shoveling activities.

III. MATERIALS AND METHODS

Study Design

This study employed a quantitative approach with a cross-sectional design to analyze the relationship between working posture and musculoskeletal complaints among horticulture farmers performing soil shoveling activities. This design was chosen because it allows the measurement of independent and dependent variables simultaneously at one point in time (Setiawan, 2021). The relationship between the two variables were analyzed with the use of correlation coefficients.

Population and Sample

The population of the study consisted of all horticulture farmers in Pinasungkulan village, who were involved in soil shoveling as part of their daily work. The sample comprised of 55 respondents gathered through a purposive sampling technique, with an inclusion criteria of active horticulture farmers, performing soil shoveling activities for at least 4 hours per day and willing to participate as respondents. As for the exclusion criteria involving respondents with a history of musculoskeletal injuries prior to the study period.

Research Instruments

The instruments used in this study were the Rapid Entire Body Assessment (REBA), supported by Kinovea software, and the Nordic Body Map (NBM) questionnaire. REBA was employed to assess ergonomic risks based on respondents' working posture during soil shoveling. Posture evaluation was conducted through direct observation supported by photo and video documentation using a smartphone camera, with subsequent analysis assisted by Kinovea an open-source motion analysis software capable of measuring body joint angles (neck, back, arms, and knees) with high accuracy. Kinovea has demonstrated excellent reliability, with intra-rater correlation coefficients greater than 0.85 and inter-rater correlation coefficients greater than 0.90 (Fernández-González et al., 2020). Since its development by Hignett and McAtamney (2000), REBA has been widely applied in ergonomics research and has shown high inter-rater reliability, with reported coefficients above 0.80 in various studies, confirming its credibility as an ergonomic risk assessment tool. The NBM questionnaire was used to identify the location and intensity of musculoskeletal complaints across 27 body regions, rated on a 4-point Likert scale. Previous research by Wicaksono (2019) demonstrated that NBM possesses excellent validity and very high reliability, with Cronbach's Alpha values of 0.954 for the first administration and 0.945 for the second, indicating its robustness as a musculoskeletal symptom assessment instrument. The integration of REBA, Kinovea, and NBM in this study provided a comprehensive and highly reliable approach to evaluating both working posture and musculoskeletal complaints among horticultural farmers during soil shoveling activities.

Research Procedure

This study applied a descriptive correlational design (Indrawan & Kaniawati Dewi, 2020) with a cross-sectional approach (Abduh et al., 2022), in which data on independent and dependent variables were collected simultaneously during a specific period. Data collection was conducted in Pinasungkulan Village over four consecutive days, from June 16 to 19, 2025. Prior to data collection, the researcher obtained an official research permit from the Faculty of Nursing and, upon arrival at the study site, introduced themselves to local farmers while explaining the objectives, benefits, and procedures of the research. Farmers who met the inclusion criteria were invited to participate and asked to sign an informed consent form. Data collection began with direct, real-time observation of farmers' working posture while performing soil shoveling in their usual working environment, during which photos and short video clips were taken from multiple angles using a smartphone camera to document body positions. These recordings were carried out before any questionnaire was administered to ensure that the captured postures were natural and unaffected by prior assessments. The recorded images and videos were later analyzed using the Rapid Entire Body Assessment (REBA) method, assisted by Kinovea software for accurate joint angle measurement. Immediately after the observation and posture documentation, each respondent completed the Nordic Body Map (NBM) questionnaire in the work area so that any musculoskeletal discomfort reported reflected their actual working conditions, with the researcher remaining on-site to provide clarification if needed. At the same time, demographic and work-related data—including age, gender, years of farming experience, and duration of shoveling activity—were recorded. This procedure was repeated for each respondent according to their availability during the four-day data collection period, after which all questionnaires were collected, and the researcher expressed appreciation for the participants' cooperation.

Data Analysis

Data were analyzed using the Chi-square test to determine the relationship between REBA scores and musculoskeletal complaints. The analysis was conducted using SPSS software version, with a significance level of $p < 0.05$.

IV. RESULTS AND DISCUSSION

The analysis of work posture among horticultural farmers in Pinasungkulan Village showed that the majority of respondents (80%) fell into the moderate risk category according to the Rapid Entire Body Assessment (REBA) method, while 18.2% were in the high-risk category and only 1.8% in the low-risk category (Table 1). This distribution suggests that most farmers perform agricultural activities, particularly shoveling, with non-ergonomic postures such as frequent bending and prolonged standing. Improper posture can induce tension in muscles and joints, place excessive strain on the musculoskeletal system, and increase the likelihood of injury. Dewantari (2021) explains that work posture refers to the body's alignment during task execution, and deviations from ergonomic principles can heighten the risk of musculoskeletal disorders (MSDs). These findings are consistent with Purnawinadi et al. (2022), who reported that farmers with higher REBA scores tend to experience more MSD complaints. Tarwaka

(2014) also emphasized that maintaining a natural body position is essential, as unsafe postures over time can lead to increased muscle tension and potential long-term health problems.

Table 1. Distribution of Respondents Based on Work Posture (REBA)

REBA Score Category	Frequency (n)	Percentage (%)
Low risk	1	1.8
Moderate risk	44	80.0
High risk	10	18.2
Total	55	100.0

The analysis of musculoskeletal complaints revealed that 63.6% of farmers reported moderate complaints, 25.5% reported high complaints, and 10.9% reported low complaints (Table 2). These discomforts are strongly associated with repetitive physical activities in non-ergonomic postures, such as bending, trunk rotation, and lifting during shoveling, which strain the back, shoulders, and wrists. Boy et al. (2023) and Barone & Szychlinska (2023) identify shoveling as a high-risk task for MSDs and stress the importance of maintaining proper posture to prevent them. The long working hours observed in this study—6 to 8 hours per day with minimal breaks—exacerbate fatigue and muscle pain. Permata et al. (2023) noted that prolonged work without sufficient rest increases the risk of musculoskeletal damage. In the early stages, discomfort may manifest as mild pain that subsides with short breaks, but without corrective measures, it can progress into chronic pain (Jahn et al., 2023).

Table 2. Distribution of Respondents Based on Musculoskeletal Complaints

Complaint Level	Frequency (n)	Percentage (%)
Low	6	10.9
Moderate	35	63.6
High	14	25.5
Total	55	100.0

The Nordic Body Map (NBM) results identified musculoskeletal complaints in almost all body regions of horticultural farmers. The three locations with the highest percentages were the waist (90.9%), back (87.3%), and right wrist (87.3%). The high prevalence of complaints in the lower back is related to farmers' work activities, which are often performed in a bent posture, lifting loads, and carrying out repetitive shoveling movements. Meanwhile, complaints in the wrist are associated with repetitive hand movements and gripping activities during farming tasks.

Table 3. Distribution of Complaints Based on Body Location (NBM)

Body Location	Frequency (n)	Percentage (%)
Waist	50	90.9
Back	48	87.3
Right wrist	48	87.3
Left wrist	46	83.6
Right upper arm	45	81.8
Left upper arm	44	80.0
Upper neck	37	67.3
Lower neck	37	67.2
Right shoulder	39	70.9
Left shoulder	38	69.1
Right forearm	45	81.8
Left forearm	44	80.0
Right knee	40	72.7
Left knee	35	63.6
Right calf	36	65.5
Left calf	33	60.0
Right hand	45	81.8
Left hand	44	80.0
Right thigh	27	49.1
Left thigh	20	36.4
Right foot	28	50.9
Left foot	27	49.1
Buttocks	30	54.5
Right ankle	27	49.1
Left ankle	26	47.3
Abdomen	18	32.7
Head	18	32.7
Chest	15	27.3

Table 4. Correlation Between Work Posture and Musculoskeletal Complaints

Variabel	Musculoskeletal Complaints		
	r	p	Interpretation
Work Posture	0,276	0,042	Significant

The correlation analysis revealed a statistically significant but weak positive relationship between work posture and musculoskeletal complaints ($r = 0.276$, $p = 0.042$) (Table 4), indicating that less ergonomic postures are associated with higher levels of musculoskeletal complaints. This is in line with Salcha et al. (2021), who found a significant correlation between work posture and MSDs among rice farmers in South Sulawesi. Frequent bending, twisting, and lifting during shoveling engage the back, shoulders, upper arms, and wrists, which, when performed without proper technique, lead to excessive strain. Barone and Szychlinska (2023) explain that repetitive mechanical stress on joints, muscles, and connective tissues can result in chronic fatigue and localized pain.

Although the correlation strength is weak, the findings highlight the clear implication that sustained shoveling without ergonomic consideration negatively impacts musculoskeletal health. Preventive measures such as posture training, ergonomic tool provision, and the implementation of scheduled rest breaks are essential to mitigate these risks. This aligns with Chokthaweepanich et al. (2024), who demonstrated that reducing workload duration and incorporating rest breaks significantly alleviates MSD symptoms among farmers. Without early intervention, these conditions may progress into chronic disorders, reducing work productivity and affecting farmers' overall quality of life.

V. CONCLUSION

This study examined the relationship between working posture and musculoskeletal complaints among 55 horticultural farmers in Pinasungkulan Village. The *Rapid Entire Body Assessment* (REBA) revealed that most respondents were at a moderate risk level, with shoveling activities performed in non-ergonomic postures. The *Nordic Body Map* (NBM) indicated that the majority experienced moderate musculoskeletal complaints, particularly in the back, shoulders, and arms. Statistical analysis demonstrated a significant positive association between working posture and musculoskeletal complaints, although the correlation strength was weak.

These findings highlight the importance of applying ergonomic principles in agricultural work to reduce the risk of musculoskeletal disorders. Future research should expand the study area, include various agricultural activities, and employ longitudinal designs to better understand the long-term effects of working posture on workers' health.

AUTHORS' CONTRIBUTIONS

Priscilla Komaling and Ailine Sanger was solely responsible for conceptualization, methodology, investigation, data analysis, and writing (original draft and revision). The researchers also conducted literature review, supervised the entire research process, and the final manuscript.

ACKNOWLEDGEMENT

The authors would like to express sincere gratitude to the Faculty of Nursing, Klabat University, for academic guatitute and support throughout this research. Special thanks are also extended to the local government and farmers of Pinasungkulan Village for their cooperation and participation, which made this study possible.

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