

Workload and musculoskeletal complaints on cap tikus farmers

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Abstract

Submitted:

January 18th, 2023

Accepted:

October 20th, 2023

Published:

October 27th, 2023

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Objective: In general, farm workers use more muscle strength to work, so they are at a high risk of experiencing musculoskeletal complaints. Cap tikus farmers are also workers who use a lot of body muscle movements and receive a physical workload, which causes some cap tikus farmers to complain of musculoskeletal-related pain. This study aims to determine the workload and musculoskeletal complaints of cap tikus farmers. **Methods:** Descriptive research uses two research designs, namely a survey research design for the musculoskeletal complaints variable with 41 respondents and a case study research design for the workload variable with a total of two respondents. This research was conducted in Palamba Village, South Langowan Sub-district. The data were analyzed using univariate analysis. **Results:** Research on musculoskeletal complaints among cap tikus farmers found that 46.3% of respondents were at a low-risk level, 39% were at a moderate-risk level, and 14.65% were at a high-risk level. Based on the muscle parts, the most complaints of pain were felt in the right shoulder (58.5%), the right knee (48.8%), and the back (46.3%). Most painful complaints are felt in the back (22%). The results of the workload research were obtained at a moderate workload level of between >200-359 kcal/hour. **Conclusion:** Musculoskeletal complaints among cap tikus farmers were at a lower risk level. Based on the muscle parts, the most common complaints were on the right shoulder, the right knee, and the back. Meanwhile, the workloads were at a moderate level.

Keywords: cap tikus farmers; musculoskeletal complaints; workload

INTRODUCTION

In general, musculoskeletal complaints occur due to excessive muscle contractions that cause damage to joints, ligaments, or tendons when muscles receive repetitive static loads with a long duration of loading [1]. Work-related musculoskeletal complaints can develop in the work environment due to tasks that require workers' physical strength to do their jobs [2]. If complaints are not addressed, they can lead to decreased work productivity, increased health care costs, and disability [3].

Analysis of *Global Burden of Disease* (GBD) data in 2019 shows that musculoskeletal complaints are the largest contributor to *Years Lived with Disability* (YLD) in the world, which is around 149 million YLD [4]. These complaints also account for nearly 70 million hospital patient visits annually in the United States [3]. The statistical data on musculoskeletal complaints in the United Kingdom in 2021 shows that the number of people with musculoskeletal complaints is 470,000, contributing to 28% of occupational diseases [2]. In addition, 58% of workers suffer from one or more types of musculoskeletal diseases, so these complaints account for more than half of work-related health problems. These musculoskeletal complaints are the most common occupational diseases in the European Union [5].

In Indonesia, the prevalence of musculoskeletal complaints based on a doctor's diagnosis is 7.30%. This complaint is more commonly experienced by informal workers, especially farm workers or farm laborers, according to the Basic Health Research (Riskesmas) data in 2018, which is 9.90% [6]. Based on previous studies conducted on Indonesian farmers, complaints that cause farmers to be unable to work or hinder their work are complaints of low back pain (35%) and knees (38%) [7]. Musculoskeletal complaints in farmers are caused by work factors such as working in awkward positions, performing repetitive movements, and receiving heavy workloads [8].

The workload received by farmers is more physical in nature. Physical workload is always related to muscle movement and can cause changes in the function of the body's tools due to the physical work activities performed [9]. Based on research conducted on farmer groups in Rok-rok Village showed that the workload of these farmer groups came from work activities carried out in traditional ways, such as working on land, which required a lot of physical energy and resulted in as much as 50% of respondents experiencing heavy workload [10]. Another study conducted on farmers in Tumaratas Village found that

The workload of farmers was caused by the provision of long working hours, excessive work capacity, and the behavior of farmers who paid less attention to ergonomics, so the workload received by farmers was mostly heavy workload [11].

Each farmer has a different way of working depending on the crops they plant and manage, so differences in the activities can influence the musculoskeletal complaints they experience and the workload they receive. Cap tikus farmers also have work activities that require a lot of physical effort from the workers because they still use simple manual equipment to do their work. However, until now, there has been no research regarding workload and musculoskeletal complaints regarding cap tikus farmers. Cap tikus farmers process sugar palm trees into traditional drinks containing alcohol (cap tikus) from the fermentation and distillation of nira water (saguer). This job has been carried out for generations and is the main source of livelihood for the majority of the Minahasa people, who live in a reasonably large sugar palm tree farming area. One of them is in Palamba Village, South Langowan Sub-district, Minahasa Regency.

Based on preliminary data obtained through observations and interviews with four cap tikus farmers, it is known that farmers who do not have vehicles will walk around 1-5 kilometers every day to the plantation. The work activities of cap tikus farmers are divided into two stages. The first stage is the tapping stage, which consists of climbing and descending trees, hitting, shaking, slicing Mayang bunches, and carrying and pouring the nira water. The second stage is distilling the nira water into a cap tikus drink, where the farmer must prepare fuel in the form of wood and bamboo to cook the nira water. Farmers also complain of pain in body parts such as the shoulders, back, and legs, which is more pronounced when they have just finished their work. Based on that, this research needs to be carried out to determine the condition of the workload received and the musculoskeletal complaints felt by cap tikus farmers in Palamba Village, South Langowan Sub-district, Minahasa Regency.

METHODS

This type of research is descriptive research, which has two research designs: a survey research design for musculoskeletal complaints variables and a case study research design for workload variables. This research was conducted in Palamba Village,

Langowan Selatan Subdistrict, with research time starting from June to October 2022.

The population of this study were farmers who only worked as cap tikus farmers in Palamba Village, Langowan Selatan District, totaling 47 people. The sampling technique on the variable of musculoskeletal complaints used total sampling, and 41 respondents were obtained based on the inclusion criteria: being domiciled in Palamba Village and being willing to become respondents. For exclusion criteria, namely having a history of injury or trauma not caused by work and a disease that attacks bones or joints. While sampling on workload variables, the purposive sampling technique with the number of samples taken totaling two people. The sample on this workload variable is part of the sample of musculoskeletal complaints, and the criteria taken are respondents who have musculoskeletal complaints at a high-risk level and are willing to become respondents.

Workload is respondents' energy to carry out work activities within a certain time. Musculoskeletal complaints are a condition in which respondents complain of pain ranging from very mild to very painful complaints in certain parts of the body in the musculoskeletal system. The measuring instrument used in this study is a workload assessment based on the level of calorie requirements according to energy expenditure [12] and the *Nordic Body Map* (NBM) questionnaire [1]. Data analysis was performed using univariate analysis to describe each research variable: workload variables and musculoskeletal complaints.

RESULTS

On the variable of musculoskeletal complaints, the distribution of respondents was entirely male with an age range ranging from 26–65 years, and the majority of farmers were 46–55 years old, totaling 17 people (41.5%), and the least were 26–35 years old, totaling 4 people (9.8%). Most respondents' working period is between 26–35 years, with a total of 15 people (36.6%), while those with a working period longer than 35 years have the least amount, with a total of 3 people (7.3%). Based on the level of education, the results obtained consisted of elementary, junior high school, and high school graduates, and the cap tikus farmers who became respondents were mostly elementary school graduates, with 17 people (41.5%). Based on injury history, 3 respondents (7.3%) had a history of injury while doing work, while 38 people (92.7%) did not have a history of injury while working.

Table 1. Distribution of respondents based on skeletal muscle complaints

Skeletal muscle section	Musculoskeletal complaints (%)			
	No pain	Rather pain	Pain	Very pain
Upper neck	56,1	14,6	19,5	9,8
Lower neck	46,3	17,1	26,8	9,8
Left shoulder	31,7	17,1	41,5	9,8
Right shoulder	26,8	12,2	58,5	2,4
Upper left arm	46,3	24,4	26,8	2,4
Back	12,2	19,5	46,3	22
Upper right arm	39	29,3	29,3	2,4
Waist	22	24,4	36,6	17,1
Hip	51,2	19,5	29,3	0
Bottom	85,4	7,3	4,9	2,4
Left elbow	41,5	29,3	29,3	0
Right elbow	41,5	29,3	29,3	0
Lower left arm	43,9	36,6	19,5	0
Lower right arm	41,5	34,1	24,4	0
Left wrist	51,2	36,6	12,2	0
Right wrist	51,2	29,3	14,6	4,9
Left hand	51,2	43,9	4,9	0
Right hand	48,8	36,6	14,6	0
Left thigh	73,2	17,1	9,8	0
Right thigh	68,3	19,5	12,2	0
Left knee	29,3	22	43,9	4,9
Right knee	24,4	19,5	48,8	7,3
Left calf	31,7	36,6	29,3	2,4
Right calf	36,6	36,6	24,4	2,4
Left ankle	61	17,1	22	0
Right ankle	56,1	19,5	24,4	0
Left foot	58,5	24,4	17,1	0
Right foot	53,7	26,8	19,5	0

In **Table 1**, the results of research on musculoskeletal complaints show that most respondents complained of pain in the right shoulder in as many as 24 people (58.5%), the right knee in as many as 20 people (48.8%), and the back in as many as 19 people (46.3%). For respondents who felt very pain, the most were in the back, totaling 9 people (22%). Based on the observation, the work activities at risk of causing complaints on the right shoulder can be caused by carrying heavy loads in the form of wood and gallon for a long time. On the right knee, this can be caused by the tendency to rest on the right leg in a standing or walking position while supporting heavy loads continuously for a long time. As for the back, complaints can occur when splitting and arranging firewood and picking up or lifting wood or gallons in a bent position.

Based on **Table 2**, it can be known that the risk level of musculoskeletal complaints in respondents is mostly at a low-risk level of complaints totaling 19 people (46.3%), a moderate-risk level of complaints

totaling 16 people (39%) and a high-risk level of complaints totaling 6 people (14.6%).

The results of research on musculoskeletal complaints based on the characteristics of respondents show that respondents with a high-risk level of complaints are found more in the age range 56–65 years, totaling 3 people (7.3%), while those with a moderate-risk level of complaints are found more in the age range 46–55 years, totaling 9 people (22%). Respondents with a high-risk level of complaints were more experienced in the working period between 26–35 years, totaling 4 people (8%), followed by respondents with a working period between 16–25 years, totaling 2 people (4.9%). Based on the level of education, respondents who graduated from elementary school had the highest risk level of complaints, totaling 3 people (7.3%). In comparison, at the junior high school level, there were 2 people (4.9%), and at the high school level there was 1 person (2.4%). Among the respondents injured at work, 2 people (4.9%) had a moderate-risk level of complaints, and 1 person (2.4%) had a high level of complaints.

In the workload variable, two people were used as research respondents. Respondent A is 44 years old, weighs 64 kg, and has 26 years of working experience. The level of education of respondent A is junior high school graduate. Meanwhile, respondent B is 53 years old with 57 kg of body weight. Respondent B has a longer working period of 35 years and a high school education level.

Table 3 shows that the observations' results show that the workload experienced by respondents A and B is the same, at a moderate level. The respondents' work activities cause this during the distillation and tapping processes. The distillation consists of activities such as sharpening knives, cutting, carrying, and splitting wood into smaller parts, lifting gallons that contain nira water to be poured into iron barrels used for distillation, and controlling the fire to cook the nira water. During the tapping process, farmers perform work activities such as climbing and descending the palm trees using a bamboo pole, beating, shaking, and slicing the bunches, taking the gallons that contain the nira water, pouring the nira water from the container gallons into empty gallons and then lowering them using a rope, and carrying the gallons that contain the nira water to the distillery. In addition, this research's respondents usually carry the gallons that contain the cap tikus drink to the motorcycle parking lot, which is approximately 500 meters away from the distillery because the road access is difficult to pass using a motorcycle.

Table 2. Distribution of respondents based on risk level of complaints

Risk level of musculoskeletal complaints	n	%
Low	19	46,3
Medium	16	39
High	6	14,6
Total	41	100

Table 3. Distribution of workload on respondents

Respondents	Total workload (Kcal/Hour)	Workload level
A	335,6	Moderate
B	339,1	Moderate

DISCUSSION

The results of this study showed that the level of musculoskeletal complaints experienced by cap tikus farmers was mostly at a low level of complaint, which is influenced by the rest time between work activities, the body's adaptation to work, which increases the body's resistance to complaints of pain, good body condition and a strong physical condition. This is different from previous research on palm sugar farmers in Rumoong Atas Village, which found that the level of complaints experienced by respondents was mostly at a high level of complaints [13]. However, despite this, cap tikus farmers still have the risk of experiencing musculoskeletal complaints. Based on the muscle parts of the body, the ones that complain most about are the right shoulder, right knee, and back. The results of this research are in line with previous research conducted on salak farmers in Turi, Sleman, Yogyakarta has the highest complaint results on the back, shoulders, and knees [14]. Other research conducted on rubber farmers in South Perangat Village, Kutai Kartanegara Regency, East Kalimantan, explained that complaints on the right shoulder and back were caused by repeated transportation of loads weighing 10–15 kilograms. As for complaints of the knee caused by the activity of walking from one tree to another on uneven land [15]. In this research, cap tikus farmers also had to walk to the distillery while carrying loads like gallons that contained cap tikus or wood as fuel for the distillation process because they were hampered by road access, which was difficult to pass by vehicle. In addition to work activities, factors such as age, length of working period, education level, and history of injury can also affect musculoskeletal complaints.

In middle age, muscle strength and endurance decline, so the risk of muscle complaints increases [1]. Research conducted on farmers in the Adiluwih Sub-district, Pringsewu Regency, showed that respondents aged 35 years and over experienced more musculoskeletal complaints. These results prove that the older a person is, the greater the risk of musculoskeletal complaints [16]. Working period is also a risk factor for musculoskeletal complaints because heavy work is carried out repeatedly in a day, resulting in workers with a long working period being exposed to these dangers longer than workers with a new working period [17]. Based on education level, more pre-primary or primary school-level workers experienced more musculoskeletal complaints. In contrast, the prevalence of musculoskeletal complaints at higher education levels tended to decrease. This is due to the lack of knowledge received by workers about how to do their work correctly to prevent and treat musculoskeletal complaints [5]. Besides that, the lack of information and outreach from the government and related agencies regarding occupational health and safety (OHS) for farmers impacts their lack of knowledge and awareness of implementing OHS while working. The data also shows some farmers have a history of falling (injuries) while working. The results of previous research conducted on palm tree tapping farmers in Banyumas Regency concluded that work accidents such as falling from palm trees can be caused by various factors like fatigue, traditionally taking nira, not using safety equipment, attitudes when climbing palm trees that are not ergonomic, and slippery footing [18]. Therefore, it is necessary to implement ergonomics when farmers climb to collect nira water to reduce accidents and occupational diseases. This application increases worker comfort, safety, work efficiency, and productivity [19].

Physical strength at work can also result in energy expenditure, so in this study, a workload assessment is used based on the level of calorie requirements according to energy expenditure [12]. One of the common needs in muscle movement is the need for oxygen carried by the blood to the muscles for the burning of substances to produce energy, and this unit of energy is called a calorie. In this study, both respondents experienced moderate workload. In line with this, previous research on nurses in the isolation room at Hospital X also received a moderate workload because most of the work was carried out using the hands in a standing position as measured using a workload estimation table based on the level of calorie requirements according to energy

expenditure by the National Standardization Agency in 2009 [20]. The harder the work done, the greater the energy expended, and overstress will occur, thereby reducing the quality of life (fatigue) and quality of work (high error rate). It can affect the person's work safety and health. On the other hand, a loading intensity that is too low can cause feelings of boredom [1]. Therefore, every workload a person receives must be appropriate or balanced to the physical, and cognitive abilities and limitations of the person receiving the load [9].

The overall results of this research are used to provide an overview of the condition of musculoskeletal complaints and the workload of cap tikus farmers so that later, this research can become a basis for further research. The findings from this research can also be input for the government to improve infrastructure, such as road access to plantations, to make it easier for farmers to get to work and reduce the workload they receive. Through this research, it is hoped that health agencies such as community health centers can provide outreach about OHS and consider establishing an Occupational Health Effort Post as a forum for health services for farmers.

CONCLUSION

Based on the results of the research conducted, it can be concluded that musculoskeletal complaints among cap tikus farmers in Palamba Village, Langowan Selatan sub-district are mostly at a low-risk level, with a percentage of 46.3%, followed by a moderate-risk level of complaints of 39%, and a high-risk level of complaints of 14.65%. Complaints based on muscle parts are mostly felt on the right shoulder, right knee, and back. For the results of research on workload in cap tikus farmers found that both respondents were at the same level of workload, which is moderate.

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