



# Prevalence of Work – related Musculoskeletal Disorders and Factors affecting it in Farmers: Evidence from a Cohort Study

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## ABSTRACT

**Aims:** Farmers are one of the high-risk occupational groups in terms of Work-related MusculoSkeletal Disorders (WMSDs). Many factors such as demographic and physical characteristics and lifestyle are effective in incidence of these disorders in farmers. The aim of this study is to investigating the prevalence of WMSDs and related factors among this target group.

**Method and Materials:** The data of this study was extracted from The Ravansar Non-Communicable Diseases (RaNCD) cohort study that was performed on 10,000 people aged 35 to 65 years in Ravansar, Iran. Version 23 of SPSS software was used for data analysis.

**Findings:** The prevalence of back pain in farmers was 31.3%, back stiffness was 17.7%, joint pain was 37.3%, joint stiffness was 12.3% and spinal disorder was 22% included lordosis (15%) and kyphosis (7.3%). There was a significant relationship between gender, age and all disorders. There was no significant relationship between marital status, sleep status, alcohol consumption, Body Mass Index (BMI), weight and height, and any of the disorders. There was no significant relationship between education level, the type of residence, smoking and drug use, type of home ownership, internet use and some of disorders but there was a significant relationship between these factors and the other disorders.

**Conclusion:** Considering the significant prevalence of WMSDs in farmers, it is necessary to perform ergonomic interventions in the form of occupational health training programs, in order to raising farmers' awareness and skills to prevent the disorders.

**Keywords:** Farmers, Work-related Musculoskeletal Disorders, Prevalence, Related Factor.

## Introduction

Work –related MusculoSkeletal Disorders (WMSDs) are one of the most common occupational disability in developing countries. These disorders are referred as the most important challenge. These disorders cause financial and medical expenses [1]. The International Labor Organization estimates that annual losses from work-related injuries and illnesses account for 10 to 15 percent of a country's gross domestic product. According to the International Labor Organization, WMSDs alone cause the most economic loss (40%) among other occupational injuries and diseases to countries. In Iran, WMSDs are ranked fourth in disability [2]. These diseases account for 78%

of all diseases in the community, 14% of doctor visits and 15% of hospitalizations. Also, according to Iranian medical statistics, 62% of patients with musculoskeletal diseases have some kind of limited mobility. WMSDs are mainly caused by factors such as repetitive movements, excessive force, poor posture during work and high pressure tolerance [3]. Agriculture is an important sector in the producing countries, paying attention to all aspects of this sector can lead to economic prosperity, independence and self-sufficiency of the country, followed by food security [4]. The agricultural sector accounts for almost half (about 1.3 billion workers) of the world's total labor force. Agriculture is one of the oldest occupations in Iran,

which accounts for more than 18% of the total labor force (more than 4 million workers) and accounts for about 11.7% of the country's total industrial production [5]. Therefore, the effect of WMSDs in farmers is significant and leads to long-term disability and loss of income [6]. Farmers are exposed to WMSDs and hand-arm vibration syndrome due to carrying and lifting heavy loads, repetitive movements, and body posture during work and vibration caused by agricultural tools and machines [7]. Some studies show that the prevalence of WMSDs in farmers is 50% higher than other people [4].

Socio-Economic Status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic access to resources and social position in relation to others [8, 9]. Lifestyle that sometimes called daily habits could affect WMSDs. Some organizations, such as the American Academy of Sleep Medicine (AASM) and Sleep Research Society (SRS) have published recommendations for the amount of sleep needed for adults (7 or more hours of sleep per night among adults aged 18 to 60 years.) which in turns might be effective on these disorders [10].

Given the high prevalence of WMSDs in farmers, more attention to the prevention and control of these disorders is necessary. Despite the employment of many people in the agricultural sector in Iran and the high prevalence of WMSDs in farmers, limited studies have been conducted on farmers, the prevalence of WMSDs and the factors affecting the prevalence of these disorders. Ravansar city is one of the most important cities in terms of agriculture in Kermanshah province of Iran and the main occupation of its people is agriculture. The aim of this study was to investigate the prevalence of WMSDs and factors affecting it in farmers.

## Method and Materials

In this study, the data were randomly extracted from The Ravansar Non-Communicable Diseases (RaNCD) cohort study that was done on 10,000 people aged 35 to 65 years in Ravansar city under the supervision of Kermanshah University of Medical Sciences, Kermanshah, Iran. The RaNCD cohort study is part of the PERSIAN (Prospective Epidemiological Research Studies in Iran) Cohort study. The dependent variables in this study were WMSDs which include back pain, back pain stiffness, joint pain, joint stiffness and spinal disorders (lordosis and kyphosis) and the independent variables included lifestyle, socioeconomic status and demographic characteristics. Lifestyle variables in this study included sleep status (less than 7 hours, between 7 and 8 hours, more than 8 hours), alcohol use, smoking, and drug use. Variables related to socio-economic status include type of home ownership (landlord or tenant), type of residence (urban or rural) and internet use. Demographic variables include age, gender, level of education (illiterate, elementary, middle school, high school, diploma and university education), marital status (single, married, widow), height, weight and Body Mass Index (BMI).

In this study inclusion criteria were male and female farmers with at least one year of agricultural experience. The reason for having one year or more work experience is that WMSDs are cumulative and they are developed over time, so after one year of employment, a person is prone to WMSDs. Exclusion criteria were less than 12 months of work experience. Data were statistically analyzed using SPSS software version 23. In order to report the rate of WMSDs, the prevalence rate was used. The frequency of qualitative variable and the mean and standard deviation of quantitative variables were calculated. Shapiro-Wilk test was used

to check the normality of data. Chi-square test was used to examine the relationships between group variables. Significance value in all tests was less than 0.05.

## Findings

The number of farmers participating in this study was 300 individuals, of which 260 (86.7%) were male and 40(13.3%) were female. The mean age of the participants was  $49.7 \pm 8.29$ . Table 1 shows the rest of demographic characteristics.

**Table 1)** Demographic characteristics of the Participants

Quantitative Variable	Mean	Standard Deviation
Age (Years)	49.7	8.29
Body Mass Index (MIKg2)	25.71	3.64
Weight(Kg)	72.89	12.11
Height(Cm)	168.03	6.79
Duration of Sleep (Hours)	7.063	1.32
Qualitative Variable	Variables' level	Frequency (percentage)
Gender	Male	260(86.7)
	Female	40(13.3)
Level of Education	Illiterate	90(30)
	Primary school	95(31.7)
	Guidance school	67(22.3)
	High school	21(7)
	Diploma	22(7.3)
	College education	5(1.7)
Type of residence	Urban	189(63)
	Rural	111(37)
Marital status	Married	276(92)
	Single	12(4)
	Widow	12(4)
Smoking	Yes	111(37)
	No	189(63)
Alcohol consumption	Yes	54(18)
	No	246(82)
Drug use	Yes	28(9.3)
	No	272(90.7)
Type of home ownership	Homeowner	239(79.7)
	Tenant	61(20.3)
Using Internet	Yes	49(16.3)
	No	251(83.7)

In this study the prevalence of back pain was 31.3% and the prevalence of back pain stiffness was 17.7%. Table 2 shows the rest WMSDs

**Table 2)** The prevalence of work–related musculoskeletal disorders in farmers

Musculoskeletal Disorder	Frequency (percentage)
Back pain	94 (31.3)
Back pain stiffness	53 (17.7)
Joint pain	112(37.3)
Joint stiffness	37(12.3)
Spinal disorder	66(22)

According the findings of this study, one of the most common disorder was back pain, that these disorders were more prevalent in men. There was a significant relationship between gender and all disorders. The highest rate of WMSDs in people with primary education was related to joint pain (14.7%). There was a significant relationship between joint pain and education level. Joint pain was the most prevalent (20.3%) and joint stiffness was the least prevalent disorders (5.7%) in people living in urban areas. There was a significant relationship between joint pain and joint stiffness with living area ( $P < 0.05$ ). This study also showed the highest rate of WMSDs in married people were joint pain (33.7%). The highest rate of WMSDs in non-smokers were stiffness (5.7%). There was a significant relationship between smoking and back pain, back stiffness and joint stiffness. Moreover, the highest rate of WMSDs in people who did not use drugs was joint pain (32%). There was a significant relationship between drug use and back pain, back pain stiffness and joint stiffness ( $P < 0.05$ ).

According to the results of this study, the most prevalent WMSDs in homeowners were joint pain (32%). There was a significant relationship between type of home ownership and joint pain and joint stiffness ( $P < 0.05$ ). Furthermore, the highest rate of WMSDs in people who used the internet was joint pain (35%). There was a significant relationship between internet use and back pain, joint pain and spinal disorder ( $P < 0.05$ ). The highest rate of WMSDs were in the age group of 45-60 years and they were joint pain (24%). There was a significant relationship between age and all disorders ( $P < 0.05$ ). This study showed the highest rate of WMSDs were joint pain in people with BMI of 29.9-25 (19.3%). Moreover, the highest rate of WMSDs were joint pain in people with weight range of 65-80 kg (16.7%). Furthermore, the highest rate of WMSDs were joint pain and in people with a height of 165-180-cm (24%). The highest rate of WMSDs were related to joint pain in people who sleep duration less than 8 hours a day (13.7%).

### Discussion

The results of this study showed that joint area is the highest risky area for WMSDs in farmers and there was a significant relationship between gender and all WMSDs so that men are more high risk than women. This result is inconsistent with previous studies that revealed men are more susceptible to these disorders compared to women [8,9,11]. One reason that in the present study the rate of WMSDs is higher in men is that in Ravansar city the number of male farmers was more than female farmers. However, the results of an existed study showed that there was no significant relationship between back pain and gender [10] and another study showed that, with the exception of the upper arm, there was a significant relationship between other WMSDs and gender so that the rate

of WMSDs was higher in women than men [7]. Furthermore, one evidence showed that among all demographic variables, gender was the only variable that had a significant relationship with the prevalence of WMSDs [5]. According to the results of this study, people with primary education were more suffering from joint pain, but people with university education were rarely suffered by WMSDs. In this regard, the previous study verified that in people with higher education, the prevalence of WMSDs was lower [8]. Accordingly, an existed study showed that there was a significant relationship between education level and WMSDs in farmers [4]. The present study showed that there was a significant relationship between smoking and back pain, back stiffness and joint stiffness. In this regard, the previous document also showed that there was a positive correlation between smoking and carpal tunnel syndrome [12]. In addition, this study showed, there was a significant relationship between drug use, back pain, back stiffness and joint stiffness. Also, there was a significant relationship between type of home ownership and joint pain and joint stiffness. Furthermore, there was a significant relationship between internet use, back pain, joint pain and spinal disorders. There was a significant relationship between age and all disorders. All these results are consistent with the previous studies [8,9,11]. However, the results of a previous study showed that clinical back problems are more common in young people than older people [12], but another study showed that there was no significant relationship between the development of WMSDs and the age group of farmers [2]. In this study it was revealed that there was no significant relationship between WMSDs and BMI that is consistent with the results of the existed studies [2,4] but inconsistent with the results of other studies [7-8]. In this study it was revealed that there

was no significant relationship between WMSDs with weight and height. However, the results of previous study showed that the prevalence of back pain was higher in people with shorter height than 168 cm and taller than 176 cm <sup>[13]</sup>.

Although this study has own strong points like studying on a large sample of farmers with different demographic characteristics. In addition the findings of this study were consistent with many other previous studies <sup>[14-16]</sup>. However, self-reporting of some data might be a limitation of this study that in future studies should be considered.

### Conclusion

According the findings of this study, properly interventions based on ergonomic principals for correcting work-related postures, designing proper agriculture tool and flexibility exercise at regular intervals, raising farmers' awareness in the form of occupational health training programs for farmers are strongly recommended.

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**Authors Contribution:** FMT was the main investigators, collected and analyzed the data and wrote the first draft of the manuscript. FG supervised the study. SSK contributed to drafting, editing and interpretation of data. All authors read and approved the final manuscript.

**Conflicts of Interests:** The authors declare that they have no competing interests.

**Ethical Permission:** This cohort study was obtained ethical approval by the Ethics Committee of Kermanshah University of Medical Sciences (ethic approval number: KUMS.REC.1394.318)

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