

# Prevalence of Musculoskeletal Disorders in Farmers of Kanpur-Rural, India

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## Abstract

**Background:** Musculoskeletal Disorders (MSDs) are prevalent and the impact is pervasive across a wide spectrum of occupations, as is evident from numerous studies conducted across the globe. However, there are very few studies that document the prevalence of MSDs in India, and there are hardly any studies that focus on the country's farming community, which constitutes more than 58 percent of the Indian work force. Thus in the present study an attempt has been made to analyze the prevalence of MSDs in farmers of Kanpur-Rural, India.

**Methods:** A sample of 300 farmers of Kanpur rural district, aged between 20-70 years, was selected. Nordic musculoskeletal questionnaire to measure the musculoskeletal disorders was given to all the farmers.

**Results:** Descriptive analysis of data identified four most common musculoskeletal disorders affecting the farmers of Kanpur-Rural: lower back pain (60%); knee pain (39%), shoulder pain (22%), and neck pain (10%); and a higher percentage of respondents indicated chronic affection persisting nearly a year as compared to those who were afflicted for around a week.

**Conclusion:** Finding of the present study shows that yearly prevalence of MSDs in farmers of Kanpur-Rural, India is alarmingly high and it suggests that nearly 60 percent of Indian cultivators could be afflicted by this disease, which urgently needs to be corroborated by similar studies at the national level. Low back pain is the most prevalent type of MSDs affecting the farmers. Knee, shoulder and neck pain are other important MSDs affecting farmers in the study area. Observations made during the present study suggest that poor postures and lack of ergonomic awareness in the farming community are the two principal causative factors contributing to the development of MSDs.

**Keywords:** Musculoskeletal disorders (MSDs); Prevalence; Farmers; Occupation

## Introduction

Musculoskeletal Disorders are prevalent in communities across the globe and their impact is pervasive [1]. It may affect people engaged in almost all the occupations, including healthcare & dental professionals, professionals working on computers or laptops for long hours, or laborers doing heavy manual work etc. Musculoskeletal Disorders are defined as a group of disorders that affect the musculoskeletal system including the nerves, tendons, muscles, and joints and supporting structures such as inter-vertebral discs etc [2]. Musculoskeletal Disorders could result in pain, injury, illness, poor quality of life and reduced productivity [3]. They are the most common cause of severe long term pain and disability, and are currently reported to be affecting hundreds of millions of people around the world [1,4,5].

India is primarily an agrarian economy as farming is one of the most important occupations in the country. It is generally perceived as a healthy outdoor occupation. However numbers of studies have classified farming as a risky and hazardous job [2,6]. Because of the nature of farm work, farm workers are at particular risk of developing musculoskeletal disorder, besides a large number of other health problems. Farming was rated as one of the most dangerous occupation in U.S. [7] way back in 1990, when the national safety council of the United States acknowledged agriculture as one of the three most hazardous sectors in the working world [8]. Studies conducted in Ireland and the eastern Mediterranean region of Europe have also corroborated the fact that MSD are the most commonly reported work-related health problems among agricultural farmers and dairy farm workers, with nearly 23 per cent of the workers reporting that they suffer severe and persistent aches and pains in the musculoskeletal system [2,9].

Farming being a physically laborious occupation, inevitably places

farm workers at potential risk of musculoskeletal disorders such as osteoarthritis (OA) of the hip and knee, low back pain (LBP), neck and upper limb complaints, and hand-arm vibration syndrome. There are various risk factors related to farming activities which may contribute to the development of musculoskeletal disorders among farmers. Some of these occupational risk factors include static positioning, forward bending, heavy lifting and carrying, kneeling, and vibration. According to a survey done on agricultural workers from Britain, a very high percentage of the sample workers reported musculoskeletal symptoms to their work, out of which a whopping 62.8 per cent reported with back pain, 23.2 per cent with upper limb or neck complaints, and 25.6 per cent with work-related musculoskeletal disorders (WMSDs) of the lower limb [2,10].

The farming occupation has its own unique characteristics. It is not an organized sector and is subjected to various uncertainties like changing weather, ergonomics stress, and viruses associated with weather and new forms of chemical fertilizers and insecticides. Environmental and lifestyle factors for disease prevalence among farmers are likely to vary between countries [11]. Complaints of musculoskeletal pain and/or discomfort are associated with physical

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disability, and severely affect the health-related quality of life. The disorder takes on a more serious dimension when it becomes chronic; nearly 25 percent of the affected adults are identified as having chronic Musculoskeletal (MS) impairment pain, which is equally prevalent in both developed as well as developing countries [3,12]. If we examine studies conducted worldwide to determine the nature of chronic MSD among farmers, we find that the most common disorder is low back pain (LBP). The incidence of chronic low back pain MS impairment among farmers, pain and disorder prevalent for 1-year or more, was to the extent of 47 per cent in Sweden, 23 percent in Finland, and 37 percent in the US. The major work-related risk factors associated with LBP have been identified as poor/awkward work postures, bending, lifting and physical strenuous work [4,13,14].

Studies related to risk factors for low back injury and low back pain have been carried out in several high risk occupations. For example, a study conducted on steel workers in Iran also concludes that MSDs constitute the most prevalent occupational disorder and disability in developing countries [15]. Similarly other studies confirm farming as an occupational group at increased risk for low back injury and low back pain [16].

In Indian agriculture human workforce contributes substantially for crop production. The prevalence of musculoskeletal discomfort (MSD) among Indian farm workers is not well documented. Thus in the present study; an attempt has been made to examine the prevalence of musculoskeletal disorders in farmers of rural Kanpur, India and also to identify the specific body regions that are most commonly affected by it.

## Methods

This study was an epidemiological survey. The study was approved by research committee of Saaii College of Medical Science and Technology, Kanpur University, India. After conducting a preliminary review at the Kanpur rural block development office, six high population density areas (Chaubeypur, Bandimata, Sonaura, Maryani, Ghabraha, and Jagatpur) were selected for the present study. Farmers were recruited from their individual homes using quota sampling technique. A sample of 301 full time farmers aged between 20 and 70 years and able to read and understand the local dialect Hindi, were included in the present study [9,10]. Part-time farmers who were also involved in jobs other than farming were excluded from the study. Farmers who were diabetic or had any known neurological, psychiatric or cardiovascular problems were also excluded. Care was also taken not to include in the study those farmers who were known to have spinal fracture resulting from tumors, infection, or any major trauma to the spine.

To answer the research questions on prevalence of musculoskeletal discomfort in farmers of Kanpur-rural, India an appropriate scale: Nordic musculoskeletal questionnaire (NMQ) was selected. Since Hindi is language used in rural areas of Kanpur, Hindi version of the scale was used in the present study. NMQ Hindi translation was done using forward and backward translation method. Face and content validity was established for the Hindi version of NMQ. The NMQ can be used as a questionnaire or as a structured interview. In very explicit and simple terms respondents were asked if they had experienced any musculoskeletal discomfort in any of the joints in their body which prevented them from performing normal activity during the past 12 months or for a short and temporary period of 7 days [17]. Compilation of the responses was aided by an illustrative body map to indicate the major nine symptom sites -- neck, shoulder, upper back, elbow, low back, wrist/hands, hip/thighs, knees, and ankles/feet.

After explaining the need and purpose of the study, a duly signed consent form was obtained from each participant. Those who fulfilled the inclusion and exclusion criterion were then asked for their demographic details, about present and past medical history, family history and surgery undergone if any, and so on. Patients were then given clear-cut instruction for responding to the Nordic musculoskeletal questionnaire; there was no any further assistance or prompting to the respondents. Data was recorded on the assessment sheets and data collection forms. Analysis of the data was done by using SPSS software (version 14.0).

## Results

The study was conducted to find the prevalence of musculoskeletal disorders in the farmers of the Kanpur-rural. The descriptive statistical analysis of data (N=301, Farmers), showed that the mean age was 42.44 ± 11.36.

### Body region wise analysis of weekly (short-term) and yearly (chronic) prevalence of musculoskeletal discomforts

**Neck:** Descriptive analysis of data reveals that a total of 10% of the farmers experienced neck pain, which included both weekly and yearly prevalence. Out of 301 respondents 31 Farmers reported episodes of neck pain and 270 reported no episodes of neck pain (Table 1).

**Shoulder:** Descriptive analysis of data reveals that 22% farmers experienced shoulder pain, which again included both weekly and yearly prevalence. Out of 301 respondents, 66 farmers reported episodes of shoulder pain. 235farmers reported no episodes of shoulder pain (Table 1).

**Lower back:** Descriptive analysis of data reveals that 60% of the farmers suffered low back pain, which included both weekly and yearly prevalence. Out of 301 respondent farmers 180 reported episode of low back pain and 121 reported no episodes of low back pain (Table 1).

**Knee joint:** Descriptive analysis of data reveal that 39% farmers reported knee pain, which included both weekly and yearly prevalence. Out of 301 respondent farmers 117 farmers reported episode of knee pain and 184 reported no episodes of knee pain (Table 1).

## Discussion

Pain due to musculoskeletal discomfort is a multi-factorial phenomenon. It can affect almost all parts of body depending upon the physical movement characteristics and work setup. Present study has successfully identified four of the most common musculoskeletal disorders affecting the farmers of the study area - lower back pain (60%), knee pain (39%), shoulder pain (22%), and neck pain (10%) (Figure 1). Reported percentage of discomfort in other body regions was found to be insignificant (Figure 2).

India has traditionally been an agricultural country. It is been

Prevalence of MSDs	Response	Frequency (n)	Percentage (%)
NMQ Response: Neck	NO	270	90
	YES	31	10
NMQ Response: Shoulder	NO	235	78
	YES	66	22
NMQ Response: Lower back	NO	121	40
	YES	180	60
NMQ Response: Knee	NO	184	61
	YES	117	39

Table 1: Body region wise analysis of prevalence of musculoskeletal discomfort.

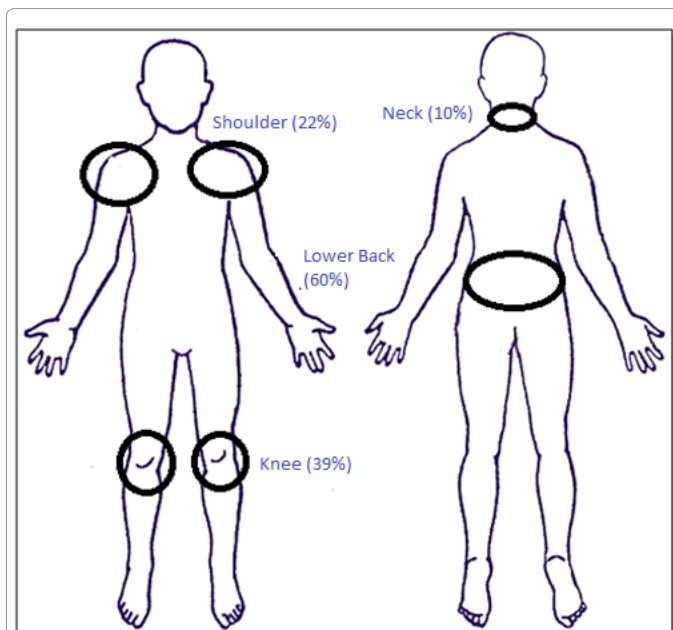


Figure 1: Most prevalent joints affected by musculoskeletal disorders in Farmers of Kanpur.

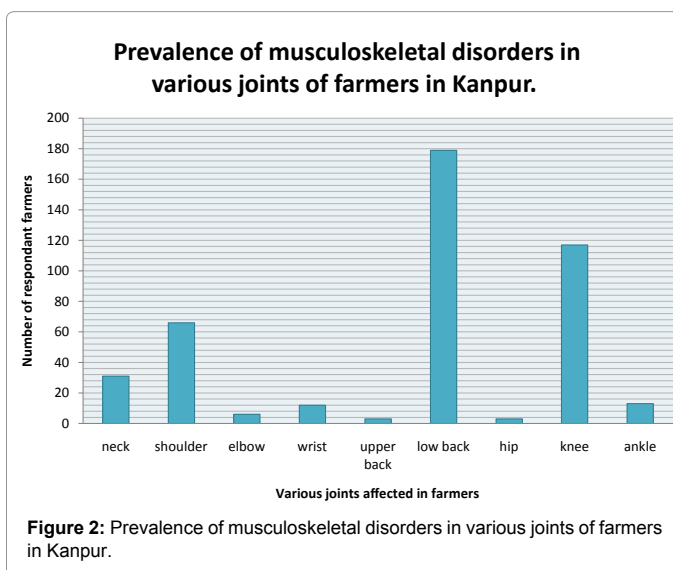


Figure 2: Prevalence of musculoskeletal disorders in various joints of farmers in Kanpur.

the main occupation, providing employment to about 58 per cent of working population [18]. There are many researches which document the prevalence of various musculoskeletal discomfort in occupation like mine workers, stone cutters, sanitary workers, military personnel, aircrew workers, shoe factory workers, goldsmiths, etc. [19-24]. But much less has been documented about musculoskeletal discomfort in farmers of India. As the occupational exposure in farming is quite different from other physically demanding occupations, the results of those studies could not be generalized to the farmers, as evident from findings in this study.

While working farmers are exposed to various potentially dangerous situations like excessive bending, twisting, kneeling, carrying load, squatting, extremes of temperature, vibration from transport and equipments, exposure to dust, static and awkward stoop postures, repetitive and monotonous work, etc. All these are the predisposing

risk factors associated with various musculoskeletal disorders. The risk of slipping, tripping and fall on uneven fields is also associated with farming and these could also lead to development of musculoskeletal discomfort in farmers [8,9,25].

The data in the present study was collected from a region where the main crops cultivated by farmers were - potato, wheat, rice and watermelon. Farmers are involved in multiple crop farming through the year. Still we observed that the farmers who were mainly involved in potato cultivation reported more of knee pain, farmers of wheat and rice crop reported more of lower back pain and farmers of watermelon reported relatively more pain in neck and shoulder region. The possible reason of this variation in discomfort region as per nature of crop is pretty evident from the difference in nature of posture adapted or repetitive movement done by the farmers. For example farmers who do watermelon farming, they need to use spade for preparing land. This involves repetitive shoulder and neck flexion and extension movement. Moreover these farmers also need to carry heavy fruit baskets and sacks of crop at the time of harvest. These all could explain the involvement of neck and shoulder joint in these farmers.

Farmers who are mainly involved in potato cultivation need to stay in squatting position for most of the time in the fields. This type of posturing puts excessive pressure on knee joints. Activities like squatting involve eccentric contraction of quadriceps muscles group. A report on agriculture health by Wisconsin University reported that eccentric contraction leads to non-uniform lengthening of sarcomere. Many other studies have observed more ultra structural abnormalities in eccentric contraction groups but not in concentric, isometric contraction or passive stretch groups [7]. This assuming of repetitive and prolonged squatting posture could possibly explain the development of knee pain in most of the potato cultivators.

Forward bending, twisting movements or exposure to vibration while driving tractors for long hours predispose the wheat and rice farmers to various physical stresses. Tissue stress induced by heavy load carrying may affect the spinal disc and the damage may be in both mechanical and biological pathways. Excessive bending injures the ligament of neural arch and additional twisting or lateral bending could result in disc prolapsed. Disc tissue can also be injured through prolonged working hours causing fatigued. Modern machinery like tractors, harvesters etc. may overtly seem to ease the work but in fact they only reduce the workforce while putting the farmer to additional disadvantages like excessive whole body vibration. Vibration is transmitted across the body through seat or feet while riding the vehicle. Walker-Bone and Palmer in their study on MSDs in farmers and farm workers concluded that tractor drivers are especially at high risk of low back pain. Heavy loading of joints and whole body vibration are the important risk factors associated with occurrence of low back pain [10].

Observation of the data also gave an insight to the health trend in farmers -- that once the pain is developed in any body region, it tends to persist for a year or more. Thus farmers in the study area showed tendency to develop chronic musculoskeletal disorder in various body regions. The possible reason of occurrence of chronic pains in farmers could be that there is a lack of healthcare and ergonomic education among farmers of the study area.

Although in the present study blinding of investigation was not done and the data collection was not done using random sampling method, findings of the present study provide important information regarding the presence of MSDs in farmers of Kanpur-rural, India. These results provide a backdrop for future researches both nationally

or internationally. Nearly 60 per cent of the farmers are affected with low back pain, which emerged as the most prevalent body region to be affected by MSDs. Healthcare system should give emphasis on providing the necessary support services for the primary prevention and secondary prevention of MSDs in Indian farmers. Findings of the present study suggest that yearly prevalence of MSDs in farmers of the study area is high. Low back pain is the most prevalent of MSDs affecting the farmers. Knee, shoulder and neck pain are the other important MSDs which are affecting the farmers in Kanpur-rural, India. Observations made during the present study suggest that poor postures and lack of ergonomic awareness in the farmers are the causative factors contributing to the development of MSDs. It is suggested that future studies should examine the effect of educational level and other socio-psychological factors on MSDs. Future studies should especially focus on the effect of health education and adherence to ergonomic measures and postures on prevalence of MSDs.

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