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Prevalence, Pattern and Associated Risk Factors of Musculoskeletal Disorders among Agricultural Workers

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Abstract:
Background - Because of their heavy lifting, repeated motions, extended bending, and awkward postures, agricultural labourers are particularly vulnerable to musculoskeletal disorders (MSDs). The lower back, knees, shoulders, and neck are frequently affected by these conditions.
Objective - To ascertain the frequency, trend, and risk factors of musculoskeletal conditions in agricultural labourers.
Methods - The Nordic Musculoskeletal Questionnaire (NMQ) was used in a cross-sectional observational study involving 100 rural Nashik agricultural workers.
Results - Musculoskeletal pain was reported by almost 88% of workers, and 76% indicated it interfered with their ability to do their jobs. The most affected area was the lower back (59%), followed by the knees (42%) and shoulders (39%). Prolonged bending and heavy lifting were two of the main risk factors for MSDs.
Conclusion - MSDs are closely linked to occupational activities and are very common among agricultural workers. To lessen the burden of MSDs, ergonomic awareness, preventative measures, and physiotherapy interventions are required.

Keywords: Agricultural laboures, ergonomics, low back discomfort, musculoskeletal problems and risk factors.

Introduction:

One of the most prevalent occupational health issues in the world is musculoskeletal disorders (MSDs), which mostly affect workers in physically demanding occupations like agriculture. Heavy lifting, repetitive motions, extended bending, and uncomfortable postures are among the risk factors that agricultural workers are regularly subjected to and which greatly raise the chance of acquiring MSDs. The lower back, knees, shoulders, and neck are frequently affected by these disorders, which result in pain, diminished functional ability, and decreased productivity. According to studies, farmers have a high frequency of MSDs (between 60% and 90%), underscoring the significant burden of these disorders in this demographic. Lack of ergonomic awareness and restricted access to healthcare services also make the

issue worse, particularly in underdeveloped nations. Therefore, creating effective prevention and management measures requires an understanding of the prevalence, pattern, and related risk factors of MSDs among agricultural workers.[1]

According to the 2019 Global Burden of Disease report, the most common musculoskeletal disorder-related cause of disability was low back pain, with important contributing ailments including neck pain, osteoarthritis, gout, and rheumatoid arthritis. As the population ages, musculoskeletal disorders become more common, and the resulting social and financial cost of disability continues to be a global concern.[2]Rapid work speed and repetitive motion, violent exertions, non-neutral body postures, and vibration are among the physical ergonomic aspects of work that are commonly mentioned as risk factors for MSDs. Musculoskeletal disorders (MSDs) are a common problem in the general population. MSDs are characterized as a feeling of discomfort, difficulty, or pain in the musculoskeletal system (joints, muscles, tendons) or soft tissues of the body. Pain and other symptoms at particular anatomical locations are included in musculoskeletal disorders and symptoms. Between 11% and 50% of people in general suffer from chronic MSDs. Additionally, MSDs are thought to be the primary source of absenteeism and the leading cause of occupational injury and disability worldwide .[3] Because they impair functional abilities and physical and mental capacities, musculoskeletal illnesses represent serious risks to healthy aging and have a significant financial and medical cost to individuals, families, and governments. The Global Burden of Disease Study demonstrates that the prevalence and burden from musculoskeletal illnesses are unusually high throughout the world.[4]

Musculoskeletal diseases (MSDs) have a significant impact on society and are the most common cause of severe long-term pain and physical disability. Even if distinct MSDs are often overlapping the category does nonetheless include a wide spectrum of illnesses with different disease specific
characteristics. Low back pain has been reported to produce large amounts of work impairment for the overall population, mostly due to its high prevalence, while studies of more chronic illnesses, like rheumatoid arthritis, instead reports more long term job disability in persons affected.[5]

Numerous distinct (combinations of) variables can result in MSDs. These include organizational and psychosocial factors in addition to physical ones (mechanical load applied to the musculoskeletal tissues can cause MSDs). The term "musculoskeletal disorders" is used in different countries with slightly different meanings; in the Czech Republic, we understand it as a general term covering a group of diseases affecting various parts of the locomotor system and originating from overuse/misuse of the locomotor system. Any illness brought on by the harmful effects of chemical, physical, biological, and other variables is considered an occupational disease as long as it started under circumstances listed in the List of Occupational Diseases. Numerous distinct (combinations of) variables can result in MSDs. These include organizational and psychosocial factors in addition to physical ones (mechanical load applied to the musculoskeletal tissues can cause MSDs). The term "musculoskeletal disorders" is used in different countries with slightly different meanings; in the Czech Republic, we understand it as a general term covering a group of diseases affecting various parts of the locomotor system and originating from overuse/misuse of the locomotor system. Any illness brought on by the harmful effects of chemical, physical, biological, and other variables is considered an occupational disease as long as it started under circumstances listed in the List of Occupational Diseases.[6]

Musculoskeletal disorders (MSDs) are particularly prevalent in agriculture, a physically taxing profession where employees are regularly exposed to a range of work-related health issues. These issues are

particularly common in industries like agriculture, construction, and handicrafts that mostly rely on human labor and have little access to technology. These jobs frequently require extended stooping, repetitive motions, and persistent physical effort, all of which greatly raise the risk of acquiring MSDs. In general, the elements that contribute to these diseases can be divided into three categories: tool-related aspects, work-related conditions, and individual traits. Farmers are particularly vulnerable to the development of MSDs when harvesting by hand. Repetitive uncomfortable actions, frequent trunk bending, lifting and carrying heavy loads, and maintaining bad working postures like crouching and kneeling for extended periods of time are all major contributing factors to the high prevalence of musculoskeletal disorders in this occupation. Farmers frequently assume forward-bent positions with their heads and trunks tilted to make handling or cutting crops easier throughout a variety of agricultural tasks, such as sowing, weeding, cutting, and harvesting. According to earlier research, these activities put a significant amount of physical strain on the musculoskeletal system, which raises the risk of MSDs in agricultural workers. In order to avoid and lessen these illnesses, it is crucial to identify the underlying risk factors. In India, region-specific research is especially crucial because different states differ greatly in terms of farming practices, physical traits, and cultural customs. Agriculture is the main driver of Rajasthan's economy, which is situated in a low-middle-income area of India.[6]

Musculoskeletal disorders (MSDs) are widespread among farmers because of the exceedingly labor-intensive workload in agriculture.1-3 MSDs' estimated lifetime prevalence has been observed to be 90.6% among farmers and 76.9% after a year. Compared to less physically demanding non-farmer employment, MSDs were more common among farmers in population-based research, with more severe symptoms affecting the hands and forearms, low back, and hips. MSDs have a significant impact on farmers, leading to long-term disability and lost revenue. However, whereas MSDs in farmers are the cause of significant health problems and result in loss of productivity, previous research have only showed the greater frequency of MSDs and the impact of workload on MSDs in farmers and have only observed participants for limited durations. Validated longitudinal information about overall agricultural work-related health status and risk variables related to MSDs is critically needed to enhance the health status of farmers. We hypothesized that there might be serial changes in MSDs that are affected by agricultural and work-related factors.[7]

Low back and other regional discomfort are examples of MSDs that can negatively impact everyday activities, social relationships, and work. The development and maintenance of musculoskeletal disorders and pain-related illnesses are significantly influenced by occupation, according to evidence from high-income nations. It is impossible to develop and put into practice preventative measures to help agricultural workers with their musculoskeletal problems without understanding how common pain is in this demographic health to guarantee sustained output and promote economic expansion.[8]

Based on occupational mortality, non-fatal injury, and occupational sickness rates, agriculture is the world's largest employment sector and one of the riskiest. In most nations, when compared to other occupations, farming has a number of distinctive features, including worker characteristics and behaviors, environment, and/or organizational structure. Furthermore,agricultural workers are exposed to a wide range of occupational dangers, such as ergonomic stressors, sunshine, viruses, inorganic dust, pesticides, and other chemicals.[9]

The Asian farmers are increasingly reporting musculoskeletal ailments affecting the upper limbs, shoulders, and trunk. Numerous studies conducted in India have shown that agricultural laborers have a

high incidence of MSDs; rates of upper limb diseases due to work have been found to range from roughly 63% to 98%. Despite this, there is still a dearth of studies explicitly examining the prevalence of MSDs and the risk factors that contribute to them among farmers who harvest by hand.[10]
A descriptive cross-sectional study was conducted at El-Ismailia village attached to Minia district at Minia governorate in Upper Egypt; involving 346 subjects selected using systematic random sampling. Two instruments were used to gather data: the Nordic Musculoskeletal Questionnaire (NMQ) was used to measure M, and a structured questionnaire was used to measure demographic, physical, work-related, psychological, and behavioral traits.[11]

Methodology:
Study Design:
A cross-sectional observational study
Study Setting:
The study will be conducted in selected rural agricultural areas of Nashik where farming is the primary occupation.
Study Population:
Adult agricultural workers involved in farming activities such as planting, harvesting, lifting loads, pesticide spraying, and manual field work.
Sample Size:100.
Inclusion Criteria:
Agricultural workers aged 18–60 years.
Individuals actively involved in agricultural work for at least 1 year.
Workers willing to participate and provide informed consent.
Exclusion Criteria:
Workers with recent traumatic injuries unrelated to farming activities.
Individuals with known congenital musculoskeletal deformities.
Workers unwilling to participate in the study.
Sampling Technique:
Participants will be selected using a convenience sampling technique, where agricultural workers who meet the inclusion criteria and are available during the data collection period will be included in the study.
Outcome Measures:
Nordic Musculoskeletal Questionnaire (NMQ).

Result:
Objective 1: Musculoskeletal Disorders' Prevalence

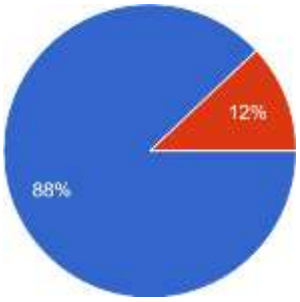

Figure 1: Musculoskeletal pain (Yes/No).

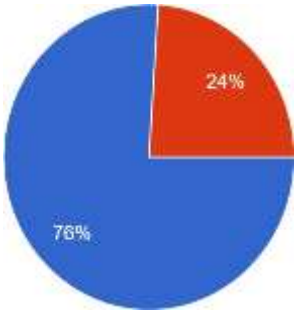

Figure 2: Musculoskeletal pain affecting work (last 12 months) (Yes/No).

- Just 12% of the 100 agricultural workers reported having no symptoms, whereas 88% reported having musculoskeletal pain or discomfort.This suggests that MSDs are extremely common among agricultural workers.
- Moreover,76% of respondents said that discomfort interfered with their regular job, demonstrating the substantial impact MSDs have on day-to-day functioning.
- Only 51% of people sought medical advice despite this high frequency, showing a low level of healthcare-seeking behaviour.

Objective 2: Pattern and Most Affected Body Regions

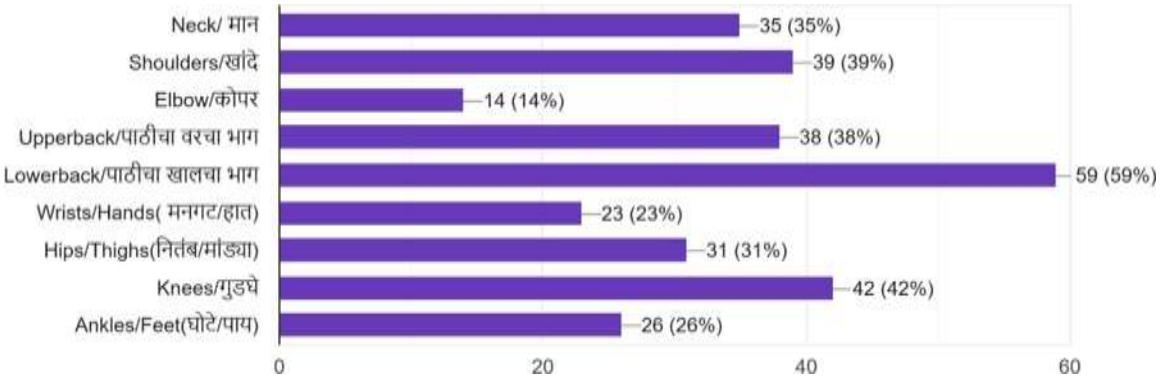

Figure 3: Body regions with pain or discomfort

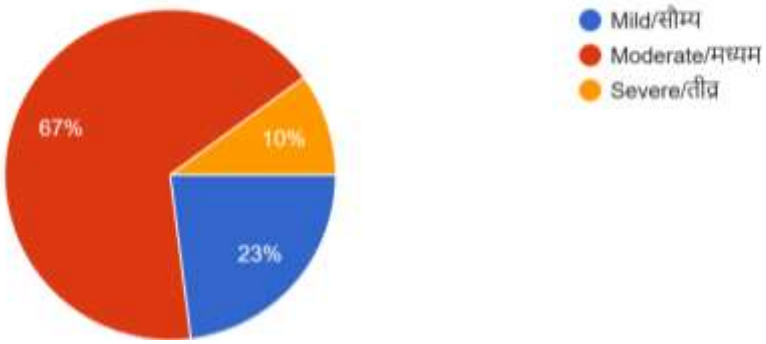

Figure 4: Musculoskeletal pain intensity

- The lower back was the most often impacted body part (59%), followed by Knees (42%), the upper back (38%), Shoulders (39%), Neck (35%)
- This indicates that the areas most impacted are those related to posture and weight bearing.
- Among the less impacted areas were: Hands and wrists (23%), Feet and ankles (26%), (14%) of elbows.
- In terms of severity: 67% said they were in moderate pain. 23% mild discomfort and 10% had significant discomfort.
- This implies that rather than experiencing severe pain, the majority of workers endure persistent, moderate discomfort.

Objective 3: Association with Occupational Risk Factors

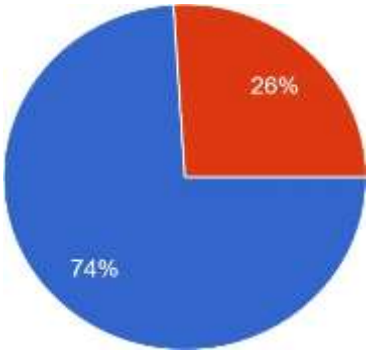

Figure 5: Frequency of heavy load lifting (Yes/No).

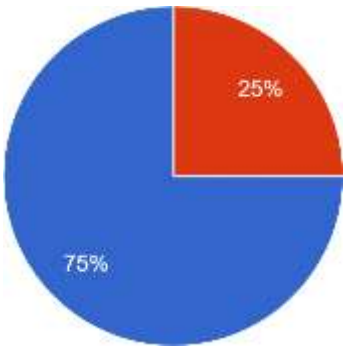

Figure 6: Prolonged bending or stooping posture (Yes/No)

- Many employees said they were exposed to physical risk factors:
  - 74% of people regularly lifted large objects.
  - 75% of workers bent over for extended periods of time.
  - After extended bending, 83.8% reported experiencing pain.
- This clearly shows that physical workload and MSDs are positively correlated.
  The pattern of pain:
  - 39.4% reported feeling uncomfortable after work.
  - 33.3% both at and after work.
- Indicates a build-up of stress from work-related tasks.
  Other risk factors:
  - 51% had prior injuries from their jobs.
- Despite the high prevalence of MSDs, 78% of respondents reported taking rest periods.

Discussion:

The purpose of the current study was to evaluate the frequency, trends, and risk factors of musculoskeletal diseases (MSDs) among agricultural workers. The high frequency of MSDs (88%) found in this study suggests that musculoskeletal issues are a significant occupational health concern among agricultural workers. These results are in line with earlier research that found a high prevalence of MSDs among farmers worldwide, ranging from 60% to 90%.[12] The substantial burden found in the current study is further supported by a comprehensive review that found a lifetime prevalence of 90.6% and a 1-year prevalence of 76.9%. The results of this study are in close agreement with another study that found an MSD prevalence of 87.17% among agricultural workers.[13]

The physically taxing nature of agricultural employment, which entails awkward postures, heavy lifting, prolonged bending, and repetitive motions, can be blamed for the high prevalence seen. These work-related exposures put more mechanical strain on joints and muscles, which might result in musculoskeletal issues.[14] Additionally, the lack of ergonomic gear and mechanization among agricultural labourers in poorer nations raises the risk of MSDs.[15]

The lower back was the most frequently affected area, followed by the knees, shoulders, and upper back, according to the current study's analysis of the pattern of MSDs. These results are consistent with earlier research showing that the most common musculoskeletal complaint among farmers is low back discomfort. Research has indicated that prolonged postures, lifting, and frequent bending during farming chores may be the cause of lower back involvement.[16] Additionally, repetitive upper limb motions, carrying loads, and squatting are major causes of knee and shoulder pain. According to earlier studies, agricultural labourers are most likely to have problems with their weight-bearing and spinal joints.[17]

The majority of patients in the current study reported moderate discomfort, whereas fewer reported severe symptoms. This result is in line with recent research that indicates agricultural labourers frequently carry on with their jobs in spite of discomfort, which results in modest but persistent pain. However, if untreated, even mild discomfort can have a major negative influence on quality of life and productivity.[18]

The study also evaluated the relationship between occupational risk factors and MSDs, and the findings demonstrated a high correlation between MSDs and repetitive work, heavy lifting, and extended bending. The majority of individuals reported working in bending positions and lifting heavy objects frequently, both of which are known risk factors for musculoskeletal problems. Similar correlations have been shown in earlier research, emphasizing that manual labour, repetitive motions, and awkward postures all play a major role in the development of MSD. The idea that MSDs in agricultural workers are mostly work-related and avoidable is supported by these findings.[19]

Additionally, the development of MSDs is significantly influenced by demographic characteristics including age and years of work experience. Due to accumulated strain and deterioration of musculoskeletal structures, older workers and those with longer exposure times are more likely to have musculoskeletal issues. This explains why middle-aged and older workers in agricultural contexts have a higher incidence.[20]

The fact that a sizable percentage of workers did not seek medical attention despite being in pain is another crucial conclusion of this study. Lack of knowledge, budgetary limitations, or restricted access to medical facilities could be the cause of this. Similar findings have been reported in previous studies, indicating

poor health-seeking behavior among agricultural workers. This emphasizes the necessity of improving healthcare service accessibility and awareness in rural communities.[21]

The Timed Up and Go (TUG) test was used in this study to assess functional mobility and fall risk in addition to occupational exposure. According to the results, most individuals had good mobility, but a smaller percentage had moderate to high fall risk. This implies that while many agricultural workers continue to be functionally independent, a sizable portion are vulnerable to falls and mobility restrictions, which could exacerbate musculoskeletal disorders. Prior studies have demonstrated that among manual labourers, poor balance and decreased mobility are linked to a higher risk of falls and workplace accidents. Additionally, the finding that the majority of subjects had mild to moderate functional performance difficulties suggests the existence of early functional impairment. Despite discomfort, workers frequently carry on with their everyday tasks, which can result in cumulative trauma and chronic strain. Similar results have been documented in occupational investigations, where a persistent physical workload causes a progressive reduction in functional capacity.[22]

In agricultural contexts, ergonomics have a particularly significant influence. Workers are often subjected to uncomfortable positions including squatting, extended bending, and repetitive lifting, all of which greatly increase musculoskeletal strain. Research has shown that MSDs among agricultural workers, particularly in developing nations, are largely caused by poor ergonomics and a lack of mechanisation. The incidence of MSDs can be decreased by putting ergonomic interventions into practice, such as appropriate body mechanics, the use of supportive items, and posture correction procedures.[23]

The impact of socioeconomic and healthcare-related factors is another significant discovery. Despite being in discomfort, a significant percentage of workers chose not to seek medical assistance, which could be because of a lack of knowledge, financial limitations, or restricted access to medical services. Similar findings have been shown in earlier research, suggesting that agricultural workers frequently ignore early symptoms, which exacerbates conditions.[24]

Therefore, workplace changes and health education should be the main emphasis of preventive initiatives. It is crucial to have training programs that emphasize safe lifting practices, sufficient rest periods, and early symptom management. Additionally, community- based rehabilitation programs and physiotherapy therapies can significantly improve mobility and lessen disability among impacted workers. However, it is important to take into account some of the study's limitations. The cross- sectional study design restricts the capacity to demonstrate cause-and-effect linkages, and the use of self-reported data may introduce recollection bias. To gain a better understanding of how musculoskeletal problems develop in this population, future research should incorporate objective clinical evaluations and longitudinal studies. The development of MSDs is significantly influenced by demographic characteristics, including age and years of work experience. Older workers are particularly susceptible due to accumulated mechanical stress and degradation caused by increased exposure over time.

Previous studies have demonstrated that long-term work exposure considerably raises the risk of musculoskeletal problems.[25] The results of this study highlight the necessity of comprehensive intervention measures from a preventive standpoint. Physical strain can be greatly decreased by ergonomic changes, such as the use of tools, mechanization, and appropriate lifting techniques. Physiotherapy therapies and health education initiatives can also aid in the early detection and treatment of MSDs. Research indicates that regular exercise regimens and workplace ergonomics might effectively lessen the burden of MSDs.[26]

Conclusion:

Musculoskeletal disorders were found to be highly prevalent among agricultural labourers. Repetitive tasks, awkward postures, and heavy physical work were the major contributing factors, highlighting the need for preventive and ergonomic interventions.

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