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Prevalence of Pronator Teres Syndrome among farm workers

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Abstract
Background: pronator teres syndrome is common musculoskeletal disorder and medical condition that remains one of the most frequently forms of median nerve compression. Agricultural tasks, such as manual ploughing, hoeing, harvesting, and machinery operation, often involve repetitive forearm pronation, wrist flexion, and gripping actions. These activities can strain the pronator teres muscle and increase the risk of compressing the median nerve.
Methodology: Total 108 subjects were taken inclusion and exclusion criteria. Subject were assessed for pronator teres syndrome using the resistive pronation /supination test and visual analogue scale for pain. The data was then taken on Excel sheet and statistical analysis was done.
Result: The overall prevalence of Pronator Teres Syndrome Identified in the study population (N=108) was 25% (27 positive cases). The study population consisted of 61.10% males (n=66) and 38.90% females (n=42). Analysing the results by gender showed a marked difference in prevalence. The prevalence of PTS among male farm workers was 21 4.5% (n=3), while the prevalence among female farm workers was 57.1% (n=24).
Conclusion: This study concludes that farm workers were prone to develop pronator teres syndrome, with a markedly higher occurrence in females than males.

Keywords: Farm workers, pronator teres syndrome, resistive pronation supination test, VAS scale

Introduction

Musculoskeletal disorders (MSD) are defined as group of disorders that affect the musculoskeletal system including the muscle, bone, tendon, ligament, nerve and supporting structure intervertebral disc [1]. MSDs affect millions of people globally and are the leading cause of chronic pain and long term physical disability [1]. Prevalence of MSDs in upper limb 20-30%,Shoulder pain 20-50% Elbow pain 10-20% wrist-hand pain 10-30%, finger and hand 5-15% also prevalence of MSDs in Maharashtra agricultural work 84.3%of workers experienced some of MSDs, with low back pain most common complaint affecting 50.5% and other condition included shoulder pain 20%,upper back pain 18.5%etc [2]. MSDs it may occurs due to physical hazards and stress in daily living activity, lifting and carrying heavy loads, ergonomic and mechanical design of work. The work-related MSDs has been reported to among different occupational group [2].

Agricultural tasks, such as manual ploughing, hoeing, harvesting, and machinery operation, often involve repetitive forearm pronation, wrist flexion, and gripping actions.[3] These activities can strain the pronator teres muscle and increase the risk of compressing the median nerve. The chronic nature of these activities, combined with the lack of ergonomic equipment and improper body mechanics, makes farmers a vulnerable group for upper limb musculoskeletal disorders, including PTS. Farmers are may be susceptible for developing pronator teres syndrome due to the physical demand of their work. Pronator Teres Syndrome (PTS) is a rare but important condition where the median nerve compressed as it passes through the pronator teres muscle in the forearm. This condition is often confused with carpal tunnel syndrome due to similar symptoms, including pain, tingling, and numbness in the forearm and hand, particularly in the thumb, index, and middle fingers [4]. the primary difference lies in the location of nerve compression, with PTS involving compression at the forearm rather than the wrist. While the condition can affect anyone, who engages in repetitive forearm movements, there is growing recognition of its prevalence among individuals engaged in specific labour-intensive occupations, such as tennis players, mechanics, carpenters, weightlifters, and may be farm workers [4].

This is likely due to a combination of factors, including limited access to specialized healthcare, lack of awareness among healthcare known conditions like carpal tunnel syndrome. As a result, many farmers may continue to work through pain and discomfort, leading to worsening symptoms and long-term disability[5]. Understanding the prevalence of Pronator Teres Syndrome among farmers is critical for raising awareness and guiding preventative measures. The integration of preventive strategies into occupational health programs could play a pivotal role in minimizing the impact of PTS on farmers productivity and well-being [5].

Methods

Ethical statement

The study received approval from the Institutional Ethics Committee. It was conducted following the ethical guidelines of the Declaration of Helsinki (updated 2013) for medical research involving human subjects, as well as the 2017 National Ethical Guidelines for Biomedical and Health Research involving Human Participants from the Indian Council of Medical Research.

Design

A total of 108 sample were selected on the basis of inclusion criteria who were farm workers. Subject were assessed for pronator teres syndrome using the resistive pronation

/supination test and visual analogue scale for pain. The result of test were collected and analysed to find out prevalence of Pronator Teres Syndrome in farm workers.

Participants

Total 108 participants were chosen on the basis of inclusion criteria of the study. The inclusion criteria of study included farmers having elbow pain. The analysis of study was done by using MS excel sheet. Person Correlation was used to find prevalence of Pronator teres syndrome in farm workers using resistive pronation /supination test and visual analogue scale.

Outcome Measure

1. Resistive Pronation/Supination Tests 2.Visual Analogue Scale

Procedure

Ethical Committee approval was obtained from the institutional ethical committee. Total 108 subject was screened as per inclusion and exclusion criteria. Subject was informed consent from in language understood by participants.

Written Consent was obtained from the subject. Procedure was explained the subject. At the starting of the study, demographic data was collected and Resistive Pronation/Supination Tests was performed.

Resistive Pronation/Supination Tests

To assess the presence of PTS among participants, patients were instructed position their elbow at a 90-degree flexion. While maintaining this posture, the therapist, in a stabilizing role, held the patient in a handshake position. The therapist then attempted to supinate the patient's forearm while extending the elbow. The outcome of this test was classified, with patients experiencing pain, tingling, and numbness in volar forearm during the procedure identified as positive for PTS, while the absence of these symptoms denoted a negative result [6].

Visual Analogue Scale

The VAS is a straight horizontal line, usually 10 cm long, anchored by two descriptors at each end. Left end (0): "No pain" or "No symptom"

Right end (10): "Worst imaginable pain" or "Most severe symptom"

Data Analysis

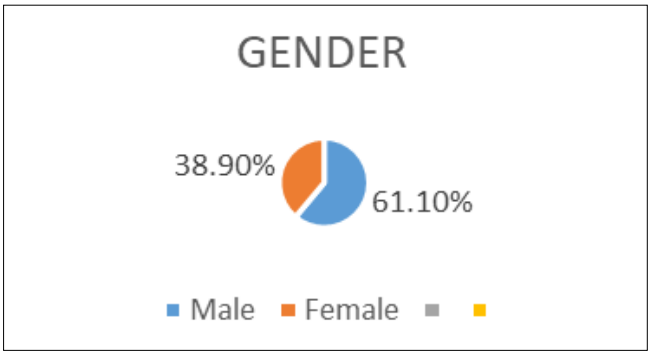
The data is collected and analysed using descriptive statistics using percentage in MS Excel sheet.

Result

A Total of 108 participants were assessed for prevalence of pronator teres syndrome among farm workers using resistive pronation /supination test and visual analogue scale.

Table 1: Depicts Frequency and percentage of frequency distribution of gender

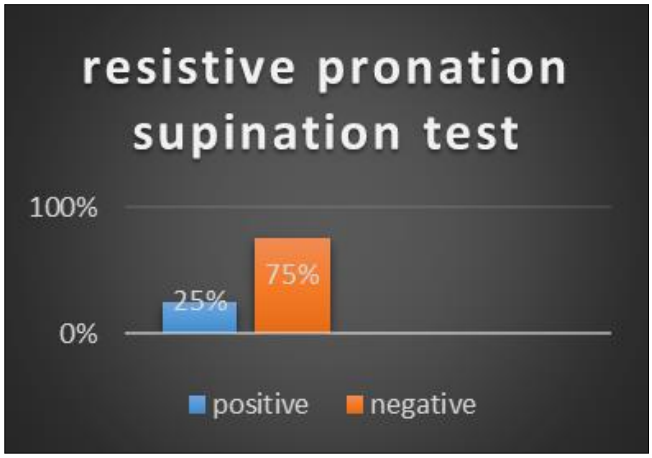
Gender	Frequency(n)	Percentage (%)
Male	66	61.1%
Female	42	38.9%
Total	108	100%



Interpretation-Graph- 1 it shows that frequency and percentage Frequency distribution with gender group,61.10% were male and 38.90% were female.

Table 2: Depicts frequency and percentage of frequency distribution of Resistive pronation supination test in study population

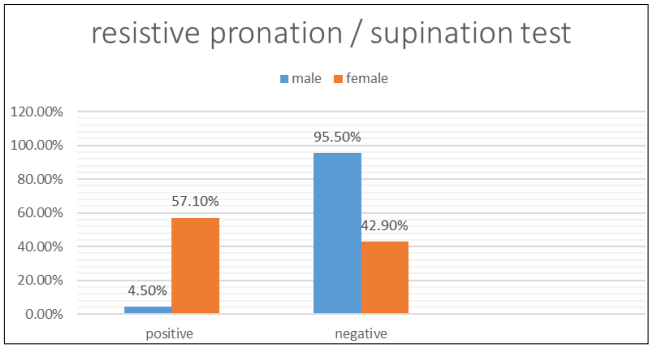
Resistive pronation supination test	Frequency (n)	Percentage (%)
Positive	27	25%
Negative	81	75%



Interpretation-Graph 2- It show that about 25% population is positive and 75% population is negative in resistive pronation supination test in pronator teres syndrome.

Table 3: Distribution of resistive pronation supination test Result among farm workers

Gender	Total (n)	Positive(n)	Negative(n)	Prevalence%
Male	66	3	63	4.5%
Female	42	24	18	57.1%
Total	108	27	81	25%



Interpretation- Graph 3-It shows that about male positive is 4.5% and male negative 95.5%, female positive 57.1% and female negative 42.9% population in resistive pronation supination test.

Discussion

The present study assessed the prevalence of pronator teres syndrome (PTS) among farm workers using the resistive pronation-supination test, and analysed the results across gender distribution. Out of 108 participants, 61.1% were males and 38.9% were females, reflecting the predominance of men in farm workers. However, the findings also highlight the considerable involvement of women in farming activities, consistent with existing rural workforce reports in India where women equally contribute to manual farming tasks (Patel *et al*., 2020).

When evaluated with the resistive pronation-supination test, 25% of the study population tested positive for pronator teres syndrome, while 75% were negative. This suggests that a significant subset of farm workers may be predisposed to PTS, highlighting the occupational risk associated with repetitive forearm activities.

Agricultural tasks such as sowing, weeding, and harvesting involve repetitive forearm pronation-supination, sustained gripping, and handling of heavy tools. These biomechanical stressors contribute to compression of the median nerve at the pronator teres muscle, leading to pain, weakness, and sensory disturbances. Similar occupational links have been documented in earlier studies. For instance, Werner *et al*. (2012) [12] reported that workers engaged in repetitive manual labor have a higher risk of forearm and wrist neuropathies. Likewise, Campbell (2008) noted that repetitive forearm motions and forceful gripping are major contributors to pronator teres syndrome.

The 25% prevalence rate observed in the present study is comparable to the findings of Kumar *et al*. (2019), who documented a higher incidence of median nerve entrapment among individuals engaged in repetitive and forceful manual tasks. Another study by Sailer *et al*. (2017) emphasized that occupational groups requiring repetitive wrist and forearm activity demonstrated increased vulnerability to compressive neuropathies.

At the cellular level, repetitive muscle use leads to hypertrophy and fibrosis of the pronator teres muscle, while biomechanically, repeated pronation and gripping increase intramuscular pressure, contributing to median nerve entrapment. These mechanisms support the positive findings among farm workers in the present study.

Thus, the study confirms that one-fourth of the farm worker population is at risk for pronator teres syndrome, which is clinically relevant considering its impact on work productivity and quality of life. Preventive measures such as ergonomic interventions, rest breaks, strengthening, and stretching exercises for forearm musculature should be promoted among this occupational group.

Similar observations have been reported in occupational health studies linking repetitive upper limb movements to peripheral nerve entrapments and musculoskeletal disorders (Tay *et al*., 2015).A more detailed gender-wise distribution revealed striking differences. Among males, only 4.5% were positive while 95.5% were negative, whereas among females, 57.1% were positive and 42.9% were negative. This gender disparity suggests that women are more vulnerable to developing pronator teres syndrome despite being fewer in number in the workforce. Previous studies also emphasized that women often engage in prolonged, repetitive, and fine-motor tasks such as weeding and hand-harvesting, predisposing them to forearm muscle strain and median nerve compression (Ghosh *et al*., 2019). Furthermore, reduced muscle mass and endurance compared to men may make women more susceptible to overuse-related neuropathies (Werner & Andary, 2011).

These findings highlight the need for gender-specific ergonomic interventions in farming. Preventive strategies, including ergonomic tool design, task rotation, frequent rest breaks, and physiotherapy-based strengthening programs, may help reduce the risk of pronator teres syndrome. Awareness among farm workers about early symptoms such as forearm pain, weakness, and paraesthesia is also crucial for timely intervention.

Overall, the study indicates that while PTS is present in both genders, its burden is disproportionately higher among female farm workers. Addressing this occupational health issue is essential to improve productivity, reduce disability, and enhance the quality of life of Farm workers.

In this study, the majority of female is having pronator teres syndrome than men because women workers had to perform more repetitive, fine motor and prolonged forearm activities (weeding, harvesting with sickles, sowing and food processing) and men perform heavy, forceful, and gross motor tasks (ploughing, carrying heavy load).

Conclusion

This study revealed that 25% of prevalence found in farm workers who are prone to develop pronator teres syndrome, although it showed higher occurrence in females than males.

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