International Journal of Community Medicine and Public Health
Ramanathan P et al. Int J Community Med Public Health. 2020 Dec;7(12):4839-4844
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20205024

Original Research Article

A cross sectional study on musculoskeletal discomfort and its determinants among agricultural workers in a rural community of Tamil Nadu

Parthasarathi Ramanathan[1], Ram Prabhakar[2]*, Velmurugan Anbu Ananthan[2]

[1]Assistant Professor, Department of Community Medicine, K.A.P. Viswanatham Government Medical College, Tiruchirappalli, Tamil Nadu, India
[2]Assistant Professor, Department of Community Medicine, Theni Government Medical College, Theni, Tamil Nadu, India

Received: 12 November 2020
Accepted: 19 November 2020

***Correspondence:**
Dr. Ram Prabhakar,
E-mail: ramprabhakarmbbs@gmail.com

ABSTRACT

Background: Musculoskeletal disorders are the major contributors of disability worldwide. So, the aim of the present study was to estimate the magnitude and the determinants of musculoskeletal discomfort among agricultural workers in a rural area of Tamil Nadu.
Methods: A cross-sectional community-based study was conducted among 110 subjects aged 15 years and above residing in Veerapandi village, Theni, Tamil Nadu from July to December 2018. A structured questionnaire incorporating nordic musculoskeletal questionnaire was used to collect data. The prevalence of musculoskeletal discomfort (MSD) and its determinants were the main outcome variables. It was analysed with Epi info statistical software. Bivariate and multivariate analysis were done keeping p value<0.05 as statistically significant.
Results: The mean age of the study population was 39.37±12.75 years. Majority (38.2%) were between 25 to 34 years. 54.5% were feamles. The prevalence of MSD was 63.6% (95% C.I. of 53.9% to 72.6%). Lower back (48.5%) was the most common site of MSD followed by knees (45.75%) and neck (35.7%). In bivariate and multivariate analysis, age, female gender and obesity (BMI ≥25 kg/m^2) were the statistically significant determinants of MSD in the study population.
Conclusions: The prevalence of MSD was very high in the study population. There is a pressing need for introduction of lifestyle modifications in high-risk groups and initiate rehabilitative measures for those affected.

Keywords: Musculoskeletal discomfort, Rural population, Prevalence, Risk factors, Nordic musculoskeletal questionnaire, Quality of life

INTRODUCTION

Musculoskeletal disorders are one of the major contributors of disability worldwide. Low back pain is one of the leading causes of disability globally.[1] At least one out of every five persons live with Musculoskeletal disorders.[1] They are injuries or disorders of the muscles, nerves, tendons, joints, cartilage and other supporting structures of the upper and lower limbs, neck, and lower back caused by sudden exertion or prolonged exposure to physical factors such as repetition, force, vibration, or awkward posture. It generally refers to soft tissue injuries occurring gradually over time. It is especially common in rural areas where people are more commonly involved in strenuous physical activities.[2] They significantly limit the mobility and agility of an individual, ultimately leading to reduced productivity by causing early fatigue and retirement. They also affect the ability to participate in

social roles. These injuries can develop when the same muscles are used over long periods without adequate rest. They also affect the health-related quality of life.[3,4]

In spite of the enormous global impact, these disorders do not receive the attention they deserve by the medical profession, policy makers or the media and are not considered national health priorities. They are perceived to be less serious on comparison with other non-communicable diseases like cardiovascular diseases, diabetes and cancer. The decade 2000–2010 was declared as the "bone and joint decade" by the World health organization (WHO) and United Nations in order to improve the health-related quality of life.[5]

Work-related musculoskeletal disorders can affect shoulders, arms, elbows, wrists, hands, back, legs and feet. The symptoms may range from pain, ache, tenderness, swelling, tingling to stiffness. Spasm of the muscles of upper and lower back can also affect the cervical spine. In arthritis, the most predominant symptom is pain and in subjects with osteoarthritis, pain is the important determinant of disability.[6,7] A number of population based surveys have been done reporting the prevalence of MSDs based on self-reported persistent pain or individual musculoskeletal symptoms in various parts of india.[3,4,6,8] However only a very few studies have considered the relative frequency of musculoskeletal symptoms at different sites.[9-11] There are also suggestions that the more areas of musculoskeletal pain a person has, the more likely it is that other areas will be involved later.[12]

An association between chronic musculoskeletal diseases and risk factors such as obesity, physical inactivity, stress and smoking, gives opportunities to prevent these diseases through changes in lifestyle. Socioeconomic factors also need to be considered. Therefore, it is necessary to extrapolate the factors associated with the symptoms especially the preventable ones, because recognizing them may facilitate better recommendations and implementing sustainable steps to stop this threat.

There is a lack of literature with regards to population-based studies on association between musculoskeletal disorder and socio demographic, behavioral characteristics of the rural population, especially in Tamil Nadu. Although the impacts of these health issues are significant there is a lack of awareness among rural population. This area needs to be attended and should be made out to come out of the tag of a neglected health problem. So, the aim of the present study was to estimate the magnitude and the determinants of musculoskeletal discomfort in a rural area in Tamil Nadu.

Objectives

Objectives were to estimate the prevalence of musculoskeletal discomfort among agricultural workers in a rural area of Tamil Nadu and to describe the association between musculoskeletal discomfort and socio demographic, behavioural characteristics in the study population.

METHODS

A descriptive cross-sectional community-based study was done on adults, aged 15 years and above residing in Veerapandi village, Theni, Tamil Nadu from July to December 2018 for a period of 6 months. Pregnant women and subjects who were very sick were excluded from the study. Only those subjects giving consent were included in the study. The sample size was calculated as 110 using the formula for cross sectional study $N=4pq/l^2$, where, p is the proportion in the population processing the characteristic of interest, q=(p-1) and l is the level of absolute precision or acceptable error. Taking 49 % as prevalence of musculoskeletal discomfort from a reference study, with acceptable error of 0.1% at 95% confidence interval, the sample size was estimated to be 100.[8] The final size of 110 was arrived taking into a non-response rate of 10%.

Study technique

The study techniques included interview and clinical examination

After explaining the objectives and the procedure of the study, the participants were administered a structured questionnaire through interview containing two parts. The first part collected their baseline socio-demographic, behavioural, anthropometric and general examination characteristics as listed below.

1) Baseline socio-demographic characteristics such as age, sex, religion, education, occupation, family type and per capita income (PCI) 2) Behavioral characteristics such as smoking, alcohol and physical activity 3) Anthropometric and general examination characteristics such as height, weight, body mass index (BMI) and blood pressure.

The second part of the questionnaire was the main study tool.

Study tool

The nordic musculoskeletal questionnaire (NMQ) was developed from a project funded by the Nordic Council of Ministers.[13,14] It had been adapted and tested across various countries and cultures.[15-19] Their aim was to develop and test a standardized questionnaire methodology allowing comparison of low back, neck, shoulder and general complaints for use in epidemiological studies. The tool was not developed for clinical diagnosis. It takes 9 anatomical sites into consideration for symptoms like pain, weakness, discomfort, ache, numbness etc on either sides or one

side. It is used as screening tool in many epidemiological studies.

Statistical analysis

The prevalence of Musculoskeletal discomfort and its determinants were the main outcome variables. Socio-demographic, behavioural, anthropometric and other factors constituted the explanatory variables. To analyse the data Epi info statistical software was used. As per need of the concepts/objectives the results of the cross table were presented in percentages and averages along with standard deviation (SD). A Bivariate analysis was done to ascertain the relationship of dependent variable with other variables. Factors found to be statistically significant by Multivariate logistic regression were considered as the final determinants of MSD. Primary outcome variables were expressed with 95% confidence intervals (C.I) p value of<0.05 was taken as statistically significant.

RESULTS

Table 1 describes the baseline socio-demographic and clinical characteristics of the study population. The mean age of the study population was 39.37±12.90 years. Majority (38.2%) were aged between 25 to 34 years. 54.5% were feamles. Majority were from joint family (73.6%). Majority of the study population had an educational qualification of Middle school (41.8%). About 34.6% were from socio-economic class IV while 30.9% were from socio-economic class III according to modified BG Prasad's socio-economic scale 2019. 35.5% had systemic hypertension. 35.45% were obese. Tobacco and alcohol consumption were seen in 29.1% and 22.7% respectively.

Table 1: Baseline sociodemographic and clinical characteristics (n=110).

S no.	Characteristics	Categories	Number (%)
1.	Age group (years)	15-24	11 (10.0)
		25-34	42 (38.2)
		35-44	16 (14.5)
		45-54	22 (20.0)
		55-64	15 (13.6)
		>64	4 (3.6)
2.	Age	Mean age in years	39.37±12.90
		Range in years	17 to 69
3.	Gender	Female	60 (54.5)
		Male	50 (45.5)
4.	Type of family	Joint	81 (73.6)
		Nuclear	29 (26.4)
5.	Education	Below primary	18 (16.4)
		Primary	15 (13.6)
		Middle	46 (41.8)
		Secondary	18 (16.4)
		Higher secondary	13 (11.8)
6.	Socio economic status (Modified Prasad's scale 2019)	I (≥7008)	3 (2.7)
		II (3504-7007)	12 (10.9)
		III (2102-3503)	34 (30.9)
		IV (1051-2101)	38 (34.6)
		V (<1051)	23 (20.9)
7.	Hypertension	Yes	39 (35.5)
		No	71 (64.5)
8.	Categories based on hypertension (JNC VII criteria)	Normal	36 (32.7)
		Pre-hypertension	35 (31.8)
		Stage 1 hypertension	35 (31.8)
		Stage 2 hypertension	4 (3.7)
9.	Categories based on BMI	Underweight (<18.5)	2 (1.8)
		Normal (18.5-22.9)	60 (54.5)
		Pre-obese (23-24.9)	9 (8.2)
		Obese (≥25.0)	39 (35.45)
10.	Tobacco consumption	Yes	32 (29.1)
		No	78 (70.9)
11.	Alcohol consumption	Yes	25 (22.7)
		No	85 (77.3)

Table 2: Baseline anthropometric characteristics and vitals (n=110).

Characteristics	Mean±SD	Range
Height (centimetre)	153.9 ± 9.95	138 to 178
Weight (kg)	63.4±9.73	45 to 82
BMI (kg/m^2)	25.45±4.54	17.67 to 39.34
Systolic BP (mm of Hg)	119.15±15.66	80 to 154
Diastolic BP (mm of Hg)	82.87±9.6	60 to 100

Table 2 describes the baseline anthropometric characteristics and vitals of the study population. The mean BMI was 25.45±4.54 kg/m^2. The mean systolic BP was 119.15±15.66 mm of Hg while the mean diastolic BP was 82.87±9.6 mm of Hg.

Table 3 describes the characteristics of the MSD in the study population. The prevalence of MSD was 63.6% with 95% C.I. of 53.9% to 72.6%.

Lower back (48.5%) was the most common site of musculoskeletal discomfort followed by knees (45.7%) and neck (35.7%). 67.2% had symptoms for more than one month. 41.4% of the study population self-medicated themselves for MSD. Table 4 and Table 5 describe the determinants of musculoskeletal discomfort in the study population. In bivariate and multivariate analysis, Age, female gender and obesity (BMI≥25 kg/m^2) were the statistically significant determinants of MSD in the study population.

Table 3: Characteristics of musculoskeletal disorder in the study population.

S.no.	Characteristics	Categories	Number(%)
1.	Musculoskeletal discomfort (n=110)	Yes	70 (63.6)
		No	40 (36.4)
2.	Site of MSD (n=70) [not mutually exclusive]	Neck	25 (35.7)
		Shoulders	11 (15.7)
		Elbows	16 (22.8)
		Wrist/hands	10 (14.2)
		Upper back	18 (25.7)
		Lower back	34 (48.5)
		Thighs/hips/buttocks	7 (10)
		Knees	32 (45.7)
		Ankles/feet	9 (12.8)
3.	Duration of symptoms (n=70)	<1 month	23 (32.8)
		>1 month	47 (67.2)
4.	Use of self-medication for MSD (n=70)	Yes	29 (41.4)
		No	41 (58.6)

Table 4: Bivariate logistic regression analysis of musculoskeletal discomfort with various variables.

Independent variable	MSD N (%)	Or (95% CI)	P value
Age (yrs)			
(continuous variable)	-	1.072 (1.032 – 1.114)	0.001
Gender			
Female (60)	44 (73.3)	2.538 (1.144 – 5.633)	0.022
Male (50) (Ref)	26 (52.0)	1	
Type of family			
Joint (81)	52 (64.2)	1.096 (0.456 – 2.634)	0.838
Nuclear (29) (Ref)	18 (62.1)	1	
Tobacco consumption			
Yes (32)	16 (50.0)	0.444 (0.191 - 1.033)	0.060
No (78) (Ref)	54 (69.2)	1	
Alcohol consumption			
Yes (25)	12 (48.0)	0.430 (0.173 – 1.065)	0.068
No (85) (Ref)	58 (68.2)	1	
Hypertension			
Yes (39)	22 (56.4)	1.613 (0.721 – 3.606)	0.244
No (71) (Ref)	48 (67.6)	1	
BMI			
BMI ≥ 25 (39)	31 (79.4)	3.179 (1.284 – 7.875)	0.012
Normal (71) (Ref)	39 (54.9%)	1	

Table 5: Multivariate logistic regression analysis of musculoskeletal discomfort with various variables.

Independent variable	MSD N (%)	AOR (95% ci)	P value
Age (yrs)			
(continuous variable)	-	1.069 (1.025–1.116)	0.002
Gender			
Female (60)	44 (73.3)	2.542 (1.048–6.167)	0.039
Male (50) (Ref)	26 (52.0)	1	
BMI			
BMI≥25 (39)	31 (79.4)	3.225 (1.195–8.705)	0.021
Normal (71) (Ref)	39 (54.9)	1	

DISCUSSION

The prevalence of MSD among the rural population in Tamil Nadu is not well documented. In the present study, the prevalence of MSD was very high at 63.6% with 95% C.I. of 53.9% to 72.6%. Lower back (48.5%) was the most common site of MSD followed by knees (45.75) and neck (35.7%). In multivariate analysis, Age, Female gender and Obesity (BMI≥25 kg/m2) were the statistically significant determinants of MSD in the study population.

Our study included 110 subjects with almost equal distribution of males and females. Similar community-based studies were done by several authors.[4,6,7,20] The prevalence of MSD as assessed by "The NMQ was very high (63.6%) in our study compared to other studies. Bihari et al in their study observed the overall prevalence of MS (Musculoskeletal) pain was 25.9%. Kar et al in their study observed that lower back problem was highly prevalent (48.8%) among the farmers.[4,8]

It was also higher than that reported by Pingle et al and Chopra et al.[7,20] This difference could be due to the difference in the study population and their occupational characteristics. But Bodhare et al in their study observed a higher prevalence of 77% in the construction workers similar to our study.[6] Our study was a community-based study where the major occupation was farming/clerical work/being a shop owner. Hence the prevalence of MSD was higher in our study.

Work-related MSDs can affect shoulders, arms, elbows, wrists, hands, back, legs and feet. The symptoms may range from pain, ache, tenderness, swelling, tingling to stiffness. In the present study, lower back (48.5%) was the most common site of musculoskeletal discomfort as reported by several other studies, followed by knees (45.7%) and neck (35.7%). 67.2% had symptoms for more than 1 month.

More than 50% of the subjects complained of backache in the study by Bihari et al. Bodhare et al observed the most commonly affected regions were lower back followed by neck, knees and shoulder.[4,6] Kar et al in their study observed that lower back problem was highly prevalent (48.8%) among the farmers. Gangopadhyay et al in their study observed that 75% of discomfort was experienced on wrist, hand and fingers in meat cutters, 81% and 61.9% discomfort in lower back among tailors and typists respectively. 86.2% discomfort on the hand region was observed in weavers. Gangopadhyay et al in their study observed that the common site affected by musculoskeletal disorders were pain at low back (100%), hand (40%), shoulder (30%), wrist (20%) and neck (20%).[3,8,12]

An association between chronic musculoskeletal diseases and risk factors such as obesity, physical inactivity, stress and smoking, gives opportunities to prevent these diseases through changes in lifestyle. In the present study, Subjects with BMI≥25 kg/m^2 had 3.225 times higher odds (95% C.I. of 1.195-8.705) of experiencing musculoskeletal discomfort compared to those with BMI<25 kg/m^2. Bihari et al in their study observed significant association of pain in joints/limbs/knee/lower legs with obesity (OR=2.1, P<0.001) and high body fat (OR = 2.2, P 0.001).[4] Kar et al in their study observed that MSD among the workers might be related to the stressful work posture, long duration jobs, nature of jobs and use of ill-fitted hand tools.[8] Gangopadhyay et al observed that there was a significant (p<0.05) correlation between discomfort level and risk level of the individual working postures of the workers.[3]

Musculoskeletal conditions are commonly linked with depression and increase the risk of developing other chronic health conditions. Besides these factors, MSDs are associated with workload, psychological factors and ergonomic factors which were not discussed due to practical constraints in data collection. The main advantage of this study is that we directly went to the houses of people and survey was conducted. The disadvantage is that this study was a cross-sectional study, by which causal inference are difficult to obtain. Data obtained were subjective perception of the respondents, and the degree of MSD was not quantified by investigation due to the community-based nature of the study.

CONCLUSION

This study highlights the need to formulate a policy and device specific intervention to alleviate suffering and

reduce health care costs and lost productivity due to MS problems. Majority of adults suffering from various MSD's go unrecognized because of poor understanding of the various factors associated and also due to less efficient screening and subsequent opportunities for treatment.

There is an urgent need to introduce lifestyle modifications in high-risk groups and start rehabilitation for those affected. Awkward postures can lead to posture-related musculoskeletal disorders primarily affecting the low back region. Preventive interventions should hence include ergonomic and office equipment modifications.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. World Health Organization. Musculoskeletal conditions: World Health Organization; 2019 Available at: https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions. Accessed on 15 October 2020.
2. Gopalakrishnan S, Ganeshkumar P, Katta A. Study of morbidity profile of a rural population in Tamil Nadu. Journal of clinical and diagnostic research. J Clinic Diagnos Res. 2015;9(2):LC5-9.
3. Gangopadhyay S, Ghosh T, Das T, Ghoshal G, Das B. Effect of working posture on occurrence of musculoskeletal disorders among the sand core making workers of West Bengal. Cent Eur J Public Heal. 2010;18(1):38-42.
4. Bihari V, Kesavachandran C, Pangtey BS, Srivastava AK, Mathur N. Musculoskeletal pain and its associated risk factors in residents of National Capital Region. Ind J Occupat Environment Medic. 2011;15(2):59-63.
5. Lidgren L. The bone and joint decade 2000-2010. Bull World Health Organ. 2003;81(9):629.
6. Bodhare T, Valsangkar S, Bele S. An epidemiological study of work-related musculoskeletal disorders among construction workers in karimnagar, andhra pradesh. Ind J Comm Med. 2011;36(4):304-7.
7. Chopra A, Patil J, Billempelly V, Relwani J, Tandle HS. Prevalence of rheumatic diseases in a rural population in western India: a WHO-ILAR COPCORD Study. J Assoc Physicians India. 2001;49:240-6.
8. Kar SK, Dhara PC. An evaluation of musculoskeletal disorder and socioeconomic status of farmers in West Bengal, India. Nepal Med Coll J. 2007;9(4):245-9.
9. Srilatha , Maiya Arun G, Bhat V, Sathiakumar N. Prevalence of work-related wrist and hand Musculoskeletal disorders (WMSD) among computer users, Karnataka state, India. J Clinic Diagnos Res. 2011;5(3):605-7.
10. Barr AE, Barbe MF, Clark BD. Work-related musculoskeletal disorders of the hand and wrist: epidemiology, pathophysiology, and sensorimotor changes. J Orthopaed Spo Physic Ther. 2004;34(10):610-27.
11. Banerjee P, Gangopadhyay S. A study on the prevalence of upper extremity repetitive strain injuries among the handloom weavers of West Bengal. J Hum Ergol. 2003;32(1):17-22.
12. Gangopadhyay S, Ray A, Das A, Das T, Ghoshal G, Banerjee P, et al. A study on upper extremity cumulative trauma disorder in different unorganised sectors of West Bengal, India. J Occup Heal. 2003;45(6):351-7.
13. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987;18(3):233-7.
14. Dickinson CE, Campion K, Foster AF, Newman SJ, O'Rourke AM, Thomas PG. Questionnaire development: an examination of the Nordic Musculoskeletal questionnaire. Appl Ergon. 1992;23(3):197-201.
15. de Barros EN, Alexandre NM. Cross-cultural adaptation of the Nordic musculoskeletal questionnaire. Int Nurs Rev. 2003;50(2):101-8.
16. Kahraman T, Genç A, Göz E. The Nordic Musculoskeletal Questionnaire: cross-cultural adaptation into Turkish assessing its psychometric properties. Disabil Rehabil. 2016;38(21):2153-60.
17. Fang YX, Li SY, Zhang YN, Zhang P, Wu H, Wang DH. Test-retest reliability of Nordic Musculoskeletal Questionnaire in nurses. Chin J Indust Hygie Occupat Disea. 2013;31(10):753-8.
18. Pinheiro FA, Troccoli BT, Carvalho CV. Validity of the Nordic Musculoskeletal Questionnaire as morbidity measurement tool. Rev Saude Publica. 2002;36(3):307-12.
19. Pugh JD, Gelder L, Williams AM, Twigg DE, Wilkinson AM, Blazevich AJ. Validity and reliability of an online extended version of the Nordic Musculoskeletal Questionnaire (NMQ-E2) to measure nurses' fitness. J Clin Nurs. 2015;24(23-24):3550-63.
20. Pingle AS, Pabdit DD. A cross sectional study of Rheumatic Musculoskeletal Disorders (RMSD) in an urban slum population. Ind J Comm Med. 2006;31:244–5.

Cite this article as: Ramanathan P, Prabhakar R, Ananthan A. A cross sectional study on musculoskeletal discomfort and its determinants among agricultural workers in a rural community of Tamil Nadu. Int J Community Med Public Health 2020;7:4839-44.