A STUDY OF MUSCULOSKELETAL DISORDERS AMONG ADULT POPULATION IN RURAL FIELD PRACTICE AREA OF A MEDICAL COLLEGE IN WESTERN MAHARASHTRA

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ABSTRACT

Objectives: The present study was conducted to find the prevalence of selected musculoskeletal disorders (MSDs) in the rural field and to describe these disorders concerning certain sociodemographic factors.

Methods: The study is a community-based cross-sectional study undertaken in the village of western Maharashtra. A total of 330 subjects were included by systematic random sampling. The study included all adults (>18 years) and permanent residents of the study area. The interview of subjects was conducted through contacting by door-to-door survey in the community. A predefined questionnaire was used to interview the included subjects.

Results: The prevalence of MSDs was 33.03%. The development of MSD was more common in patients with >60 years (56.2%). Moreover, illiterate (52.8%), professionally working (41.1%), overweight (51.8%), married group (36.9%), and heavy workers (54.9%) showed significant differences in the incidence of MSDs.

Conclusion: The MSDs in the present study had a higher prevalence with certain sociodemographic factors determining its occurrence. The mainstay for the prevention of MSDs is early diagnosis, education of the people in rural areas about the importance of early diagnosis, and motivating them to seek early treatment.

Keywords: Musculoskeletal disorders, Prevalence, Osteoarthritis, Sociodemographic factors.

INTRODUCTION

According to the Years Lived with Disability (YLDs) calculations, musculoskeletal disorders (MSDs) are the second most common cause of disability in greater parts of the world. MSDs cause 21·3% of all YLDs, which is second to the mental and behavioral disorders (22.7%) [1].

Various MSDs progress gradually and limit the capability to perform core activities [2]. The severity of the pain, the site of MSD, and other factors determine the limitation of performance. Chronic pain and reduced physical performance or functioning will lead to reduced quality of daily life [3].

In Maharashtra, India, the burden of MSDs is more and to reported to be a prevalence of 19.5% [4]. In many parts of Maharashtra, most of the populations are involved in farming and agriculture as their main occupation; hence, this could be the reason for them to develop MSDs. Few studies determined the prevalence of MSDs in rural regions of the country [5,6].

Hence, the present study was carried out to assess the prevalence of MSDs and to describe various sociodemographic factors which could play a role in the occurrence of MSDs.

Objective of the study
- To assess the prevalence of selected MSDs in the study population
- To describe the MSDs in relation to selected sociodemographic risk factors in the study population.

METHODS

The study is a community-based cross-sectional study undertaken in a village in western Maharashtra. The study protocol was submitted to the institutional ethics committee and approval was taken before beginning the study. It included all adults (>18 years) who were permanent residents of the study area. Informed consent was obtained from all the included patients.

Patients with congenital abnormalities, younger (<18 years of) age group, and who were not permanent residents of the village were excluded from the study.

Sample size calculation
The prevalence of MSDs in the rural population of India is 18.2% [7].

The sample size was calculated to estimate 95% confidence interval, for the prevalence of MSD with 5% absolute error of margin by the formula:

$$n = \frac{\left\{Z_{(1-\alpha/2)}\right\}^2 \times n \times (1-n)1}{d^2}$$

n=sample size
Z=value of alpha error from standard normal distribution table
α=level of significance
π=expected proportion (prevalence)
d=error of margin (precision)
Substituting the above, the sample size was calculated to be 330.

Sampling method

The study subjects were selected by systematic random sampling. The total population in a village was 1798 based on demographic survey study. Hence, 1798 subjects were considered as sampling frame and 330 subjects were taken as sample size. A formula of k=N/n was used to calculate sampling interval in which k is the sampling interval, N is the sampling frame, and n is the sample size. The sampling interval was found to be 5.45 on calculation. The standard systematic random sampling method was used since the value is not an integer. The interview of subjects was conducted by contacting by door-to-door survey in the community. If the study participant was not available during the interview, he/she was tried to contact in the subsequent visits.

Following principal outcomes were studied in the present study:
1. Osteoarthritis (OA)
2. Rheumatoid arthritis (RA)
3. Low backache (LBA)
4. Post Traumatic MSDs (PT MSDs)
5. Others: All those conditions that did not satisfy the abovementioned principal outcome variables' criteria.

A questionnaire consisting of 4 sections was prepared based on Community Oriented Programme for Control of Rheumatic Diseases. The first section contains details about the sociodemographic data of the patient. The second section contains questions regarding joint pain, soft tissue/muscle pain, swelling, and stiffness. The third part of the study tool involved the joint evaluation. The fourth part of the study questionnaire included the questions about the history of the injury, the nature of the injury, the result of the injury, and the cost of the treatment.

Data analysis

The principal worker collected the data, compiled, and analyzed using the relevant statistical tests based on the aims and objectives of the study. All these variables were measured on a dichotomous scale as being present or absent and this was based on the standard case definitions. The necessary guidance from the faculty biostatisticians was also sought.

RESULTS

Prevalence of different MSDs

The primary objective of the study was to find the prevalence of MSDs in the study population. Out of 330 subjects, 109 had MSDs according to the case definitions used in the study. Hence, the prevalence of MSDs was 33.03%.

Among the 330 patients, the majority (54.2%) were from the age category of 18–39 years. The mean age of the study population was 40.88±16.97 years. Male patients (55.5%) predominated than females (44.5%). Around 162 (71.1%) subjects belonged to the nuclear family, 122 (15%) subjects to the joint family and the remaining 13.9% were three-generation family. Nearly one-fourth (23.6%) of the study subjects were illiterate, and 25.5% were educated till primary and middle school. Few subjects 37 (11.2%) were graduates and above.

Analysis of the current occupation of the subjects showed that the highest numbers (57.58%) were working in the unskilled category. Most (95.5%) of the study subjects were Hindus followed by Muslims (2.4%). Christians accounted for 2.1%. Other religions such as Sikhs, Buddhists, and Jains were not found in the study population. Around 176 subjects were vegetarians and 154 subjects were non-vegetarians. More than three-fourths of the study subjects (77.9%) were married followed by unmarried (17.6%). Very few (4.5%) were widowed/widower. There were no separated/divorced subjects in the study. The majority (85.46%) of the study subjects belonged to the middle class including lower middle and upper middle. It was found that 205 (62.1%) of the study subjects had normal body mass index (BMI), 98 subjects (29.7%) were overweight/obese, and 27 patients (8.2%) were underweight.

It is also seen that 142 (43.03%) of the study population were heavy workers, 144 (43.64%) were moderate workers, and (13.33%) were sedentary workers.

It is seen from Table 1 that age, literacy status, current occupation, BMI, marital status, and nature of work were found to be significantly associated with the presence of MSDs (p<0.05). The development of MSD was more common in patients with >60 years (56.2%), showing that incidence of MSDs increases with age. Furthermore, it was majorly seen in illiterate (52.8%) and working (41.1%) subjects than the educated and non-professionals. Underweight patients (51.8%) had MSDs commonly than normal and overweight patients. Marital status also showed significant difference in the incidence of MSDs (married=36.9%). MSDs were more common among heavy workers (54.9%). This may be due to high risk of wear and tear of cartilage in heavy workers.

Table 2 shows the prevalence of different MSDs.

Table 3 shows description of demographic factors in various types of MSDs.

Low backache (LBA)

Around 20 people were affected with LBA contributing to 18.34% of all MSDs and a prevalence of 6.06% in the study population. LBA was commonly seen among the young and middle-aged group patients. Males are predominantly affected. The majority of them had only formal school education (55%). Most commonly affected were unskilled laborers and overweight individuals who belonged to middle socioeconomic status (SES) and affected patients, majorly belonging to joint and nuclear families. Moreover, LBA was more common in married groups and heavy workers (Table 3).

OA

Out of 109 patients, 41 were affected with OA contributing to 37.61% of all MSDs. The prevalence of OA was found to be 12.42% in the study population. It was most common in the elderly age group and females. Majority of subjects affected were illiterates (53.66%), unskilled laborers, and overweight individuals who belonged to middle SES and joint families. OA was more common among married and heavy workers.

PT MSDs

Twenty-one (21) subjects were affected constituting 19.26% of all MSDs with a prevalence of 6.36% in the study population. Younger age groups and males are predominantly affected. The majority of them had formal school education (66.66%). Unskilled laborers were commonly affected. A maximum of those affected had normal BMI. A higher number of patients belonged to middle SES and joint families. Moreover, the majority of them were married and heavy workers.

RA

Only 2 individuals affected with RA constituting 1.83% of all MSDs and prevalence of 0.61% in the study population. RA was more commonly seen among younger age group (18–39 years) and in females. Patients were unskilled laborers and lower educational status. All the affected belonged to overweight and obese category. Majority of them were married and heavy workers.

Others

Around 25 patients were suffering with unspecified MSDs, constituting 22.93% of all MSDs and prevalence of 7.58% in the study group. Younger age group and females were maximally affected. Majority of those affected were unskilled laborers and had lower educational status. Majority of the affected ones had normal BMI and they were married and heavy workers.

DISCUSSION

In the present study, age was found statistically significant (p<0.05) with MSD. It was found that the elderly group >60 years had more

Table 1: Association between sociodemographic variables with selected MSDs

Variables	MSD	No MSD	Percentage	Chi-square value	p-value
Age					
18–39	49	130	22.3	19.354	**0.001 (<0.05)**
40–59	24	63	27.5		
≥60	36	28	56.2		
Gender					
Female	56	91	38	3.074	0.080 (>0.05)
Male	53	130	28.9		
Type of family					
Joint	50	72	40.9	5.649	0.059 (>0.05)
Nuclear	45	117	27.7		
Three generation	14	32	30.4		
Literacy status					
Illiterate	41	37	52.5	18.183	**0.000 (<0.05)**
School education	60	155	27.9		
Graduation	8	29	21.6		
Current occupation					
Profession/semi-profession	7	10	41.1	10.403	**0.015 (<0.05)**
Skilled/semi-skilled	6	31	16.2		
Unemployed	22	64	25.5		
Unskilled	74	116	38.9		
Socioeconomic status					
Lower	18	22	45	4.238	0.120 (>0.05)
Middle	87	195	30.8		
Upper	4	4	50		
Religion					
Christian	2	5	28.5	1.120	0.571 (>0.05)
Hindu	103	212	32.6		
Muslim	4	4	50		
Type of diet consumed					
Non-veg	52	102	33.7	0.071	0.790
Veg	57	119	32.3		
BMI category					
Underweight	14	13	51.8	8.317	**0.040 (<0.05)**
Normal	57	148	27.8		
Overweight	31	49	38.7		
Obese	7	11	38.8		
Marital status					
Married	95	162	36.9	8.137	**0.017 (<0.05)**
Unmarried	11	47	18.9		
Widowed/widower	3	12	20		
Nature of work					
Heavy	78	64	54.9	55.050	**0.000 (<0.05)**
Moderate	21	123	14.5		
Sedentary	10	34	22.7		

MSD: Musculoskeletal disorder, BMI: Body mass index; *Statistically significant

Table 2: Prevalence of various types of MSDs

Type of MSD	Frequency	Prevalence (%)
Osteoarthritis	41	12.42
LBA	20	6.06
Post-traumatic MSDs	21	6.36
Others	25	7.58
RA	2	0.61
Total	109	33.03

MSD: Musculoskeletal disorder, RA: Rheumatoid arthritis

subjects affected with MSDs as compared to the other age groups. In a study by Mishra *et al.*, a similar finding was documented in which the elderly population had more people affected with MSDs [8]. This can be explained by the fact that MSDs in general are common in old age because of the various pathophysiological processes that increase the risk of developing the same. Along with this, some elderly people in the study area were still involved in the farming, which along with age has higher chances of developing MSDs.

The literacy status in this study was grouped into 3 categories for seeing the association and we found that the illiterate group had higher subjects with MSDs as compared to other literacy groups. This can be explained by the fact that the illiterates owing to not knowing about disease condition tend to neglect the disease coupled with lack of seeking treatment leads to progression of the disease. In a study by Ahmad and Alvi, among rural population in South India, 52% of the subjects affected with MSDs had no formal education [5]. Another study by Ajit *et al.*, the study found that there was statistically significant association between literacy and MSDs (p<0.05) with illiterates at more risk of contracting MSDs [9]. This justifies the finding of the study that the literacy is an important predictor of MSDs.

The present study found that unskilled laborers were commonly affected with MSD. A study by Ajit *et al.*, documented a similar finding that the prevalence of MSDs among construction workers was very high (48.5%) [9]. Among the workers, the manual laborers were most commonly affected (25%). This is due to the fact that these laborers are exposed routinely to activities like prolonged standing, abnormal postures, heavy weight lifting, and various kinds of trauma. All these factors along with the lack of awareness and inability to access the health care facility among this group lead to the development of these disorders. In a study by Ahmad and Alvi, it was found that quarry workers had a high prevalence of MSDs of 81.2% highlighting the importance of occupation in MSDs [5].

Table 3: Description of MSDs concerning sociodemographic factors

Age category	LBA, n (%)	OA, n (%)	Others, n (%)	Post-traumatic MSDs, n (%)	RA, n (%)	Total, n (%)
Age						
18–39 years	8 (40)	6 (14.63)	15 (60)	18 (85.72)	2 (100)	49 (44.95)
40–59 years	8 (40)	7 (17.08)	9 (36)	0 (0.0)	0 (0.0)	24 (22.02)
≥60 years	4 (20)	28 (68.29)	1 (4)	3 (14.28)	0 (0.0)	36 (33.03)
Total	20 (100)	41 (100)	25 (100)	21 (100)	2 (100)	109 (100)
Literacy status						
Illiterate	7 (17.07)	22 (53.66)	5 (12.20)	6 (14.63)	1 (2.43)	41 (100.0)
School education	11 (18.33)	16 (26.67)	18 (30)	14 (23.33)	1 (1.67)	60 (100.0)
Graduate	2 (25)	3 (37.5)	2 (25)	1 (12.5)	0 (0.0)	8 (100)
Total	20 (18.3)	41 (37.61)	25 (22.94)	21 (19.27)	2 (1.83)	109 (100)
Current occupation						
Gainful employment	2 (15.38)	3 (23.08)	5 (38.46)	3 (23.08)	0 (0.0)	13 (100)
Unemployed	5 (22.73)	4 (18.18)	7 (31.82)	6 (27.27)	0 (0.0)	22 (100)
Unskilled	13 (17.5)	34 (45.94)	13 (17.57)	12 (16.22)	2 (2.70)	74 (100)
Total	20 (18.3)	41 (37.61)	25 (22.94)	21 (19.27)	2 (1.83)	109 (100)
BMI categories						
Underweight	3 (15)	7 (17.07)	1 (4)	3 (14.29)	0 (0.0)	14 (12.84)
Normal	6 (30)	12 (29.27)	22 (88)	17 (80.95)	0 (0.0)	57 (52.29)
Overweight	8 (40)	20 (48.78)	1 (4)	1 (4.76)	1 (50)	31 (28.44)
Obese	3 (15)	2 (4.88)	1 (4)	0 (0)	1 (50)	7 (6.43)
Total	20 (100)	41 (100)	25 (100)	21 (100)	2 (100)	109 (100)
SES						
Lower	0 (0.0)	9 (50)	4 (22.22)	5 (27.78)	0 (0.0)	18 (100)
Middle	20 (22.9)	32 (36.78)	18 (20.69)	15 (17.24)	2 (2.30)	87 (100)
Upper	0 (0.0)	0 (0.0)	3 (75)	1 (25)	0 (0.0)	4 (100)
Total	20 (18.3)	41 (37.61)	25 (22.94)	21 (19.27)	2 (1.83)	109 (100)
Type of family						
Joint	9 (45)	20 (48.78)	10 (40)	11 (52.38)	0 (0.0)	50 (45.7)
Nuclear	9 (45)	15 (36.59)	12 (48)	7 (33.33)	2 (100)	45 (41.28)
Three generation	2 (10)	6 (14.63)	3 (12)	3 (14.29)	0 (0.0)	14 (12.84)
Total	20 (100)	41 (100)	25 (100)	21 (100)	2 (100)	109 (100)
Type of diet						
Non-veg	9 (45)	18 (43.90)	12 (48)	11 (52.38)	2 (100)	52 (47.71)
Vegetarians	11 (55)	23 (56.10)	13 (52)	10 (47.62)	0 (0.0)	57 (52.29)
Total	20 (100)	41 (100)	25 (100)	21 (100)	2 (100)	109 (100)
Marital status						
Married	18 (18.5)	37 (38.95)	21 (22.10)	17 (17.89)	2 (2.11)	95 (100)
Unmarried	2 (18.18)	1 (9.09)	4 (36.36)	4 (36.36)	0 (0.0)	11 (100)
Widowed	0 (0.0)	3 (100)	0 (0.0)	0 (0.0)	0 (0.0)	3 (100)
Total	20 (18.3)	41 (37.61)	25 (22.94)	21 (19.27)	2 (1.83)	109 (100)
Nature of work						
Heavy	15 (75)	30 (73.17)	16 (64)	15 (71.43)	2 (100)	78 (71.56)
Moderate	5 (25)	5 (12.20)	7 (28)	4 (19.05)	0 (0.0)	21 (19.27)
Sedentary	0 (0.0)	6 (14.63)	2 (8)	2 (9.52)	0 (0.0)	10 (9.17)
Total	20 (100)	41 (100)	25 (100)	21 (100)	2 (100)	109 (100)
Family H/O MSD						
No	16 (80)	19 (46.34)	20 (80)	15 (71.43)	1 (50)	71 (65.14)
Yes	4 (20)	22 (53.66)	5 (20)	6 (28.57)	1 (50)	38 (34.86)
Total	20 (100)	41 (100)	25 (100)	21 (100)	2 (100)	109 (100)

MSD: Musculoskeletal disorder, RA: Rheumatoid arthritis, OA: Osteoarthritis, BMI: Body mass index, SES: Socioeconomic status

In the present study, we found a statistically significant association between BMI and MSDs (p=0.040). However, it was observed that MSDs were common among those who had normal BMI, this was followed by those who were overweight. 28.44% of all those affected with MSDs were overweight. This is in line with the fact that overweight and obesity are risk factors for certain MSDs like OA. In a study by Seok *et al.*, the 12-month prevalence of musculoskeletal (MSK) symptoms was significantly associated with overweight (odds ratio [OR]=1.13) and obesity (OR=1.28) concluding that the risk of MSDs increases with increasing BMI [10]. Murthy and Nikhade, also found that among the overweight, 25.9% had MSDs and among the obese, 60% were affected with MSDs [11]. The increase in weight of the body exerts more pressure on weight-bearing joints and also on the spinal column. Along with this many other factors such as occupation, nature of work, and other factors result in the development of these disorders.

There are very few studies that have found an association between marital status and MSDs. One such study by Alok *et al.*, among workers in a small industry, showed a significant association between marital status and MSDs (p<0.05) [12]. However, no study has proven a scientific relationship between marital status and the occurrence of MSDs.

It was seen that among those affected with MSDs, the maximum were heavy workers. It has been proven from many studies that MSDs are common among heavy workers. In a study by Kapoor *et al.*, it was found that the severity of the MSK symptoms increased with the strenuousness of the job [13]. Studies done by Alghadir and Anwer [14] and Chitragar and Shaikh [15], there was a significant association between the nature of work and health-related quality of life of those affected with MSDs. The influence of the nature of work on MSDs is due to the physiological stress involved in the heavy work like stress on muscles, and pressure on weight-bearing joints and spinal column which predisposes them to develop various MSDs. Not only this, but those involved in heavy work are also more prone to various injuries on field. This explains the finding of MSDs being common among heavy workers.

CONCLUSION

In the present study, age, literacy status, current occupation, BMI, marital status, and nature of work were significantly associated with the presence of MSDs (p<0.05). The development of MSD was more common in patients with >60 years, showing that the incidence of MSDs increases with age. Furthermore, it was majorly seen in illiterate and working subjects than the educated and non-professionals. Overweight BMI, heavy workers, and marital status also showed significant differences in the incidence of MSDs. The prevalence of MSDs in this population was high. There is a grave requirement to educate the people in rural areas about the causes, impact, the importance of early diagnosis and to increase the treatment-seeking behavior of the people. These can be done through the existing medical setup. Facilities should be stepped up particularly in the tertiary care centers to provide rehabilitative services for those who are affected with MSDs.

AUTHOR CONTRIBUTIONS

The authors confirm their contribution to the paper as follows: Dr. Shravan Talkad Study concept and design, literature search, data acquisition, analysis, interpretation of results, manuscript preparation, and manuscript editing. Dr. Pooja Dudeja: Study concept and design, data acquisition, manuscript editing, and review. Dr. Avin B R Alva: Data analysis, interpretation of results, manuscript preparation, and editing. Dr. Shravan Talkad, Dr. Pooja Dudeja, Dr. Avin B R Alva: Manuscript preparation, editing, and review.

CONFLICT OF INTEREST

None.

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