

Research Article

# Burden of Musculoskeletal Disorders in Adults of Rural Areas of Delhi: A Cross-sectional Study

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## I N F O

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## A B S T R A C T

**Background:** Musculoskeletal disorders (MSDs) are disabling chronic conditions prevalent worldwide. However, there is paucity of literature of such disorders from India.

**Objective:** To study the epidemiology of Musculoskeletal disorders in adult population of rural areas of Delhi.

**Materials and Methods:** The study was a descriptive, cross sectional, community-based study and conducted in a rural area of Delhi. Modified Nordic musculoskeletal questionnaire (NMQ-E) was used to determine the prevalence of MSDs. Data were summarized using frequencies, proportions and appropriate statistical tests were applied for significance. Binary logistic regression was used.

**Results:** The lifetime prevalence of MSDs in the present study was found to be 57% (114) of the study participants, 53% (106) participants had history of MSDs in the past 12 months, 48% (96) participants had history of MSDs in the past 4 weeks while 35% (70) participants had history of MSDs at the time of interview. Lower backache was the most common complaints (54.2%). MSDs were found to be more associated with female gender, increasing age, being overweight or obese, and having a history of trauma.

**Conclusion:** One in three adults was suffering from MSDs in rural Delhi and more so in females and elderly.

**Keywords:** Musculoskeletal Disorders, Disability, Bone and Joint, Prevalence, Adults, Trauma

## Introduction

Musculoskeletal disorders (MSDs) are rampant in the world and one of the commonest causes of long-term pain and disability, affecting millions of people.<sup>1</sup> Acknowledging this fact, the World Health Organization (WHO) and the United Nations had declared '2000-2010' as "Bone and Joint Decades" with the objective of improving health related

quality of life for people suffering with MSDs throughout the world.<sup>2</sup>

MSDs involve muscles, nerves, tendons, joints, cartilage, and supporting structures of the limbs, neck, and lower back.<sup>3</sup> Main cause is sudden exertion or prolonged exposure to physical factors (repetition, force, vibration, or awkward posture).<sup>2</sup> They encompass a spectrum of conditions,

from those of acute onset and short duration to lifelong disorders, including osteoarthritis, rheumatoid arthritis, osteoporosis, and low back pain. The prevalence of many of these conditions increases markedly with age, and many are affected by lifestyle factors, such as obesity and lack of physical activity.<sup>3</sup>

Amongst the various MSDs back pain is one of the leading causes of sick leaves. Fractures related to osteoporosis have almost doubled in number in the past decade; it is estimated that 40% of all women over 50 years in age may have osteoporotic fracture. The severe injuries caused by traffic accidents and unrest are also the sources of MSDs and require preventive and restorative services. Joint diseases are of special significance in older age groups, accounting for half of all chronic conditions in persons aged 65 and over.<sup>4</sup>

Prevalence rates vary across studies of a given musculoskeletal condition and pain due to different case definitions, time periods, and populations studied. A number of factors, in addition to age and sex, have been found to increase an individual's risk of developing persistent musculoskeletal pain. The presence of degenerative disease processes (rheumatoid arthritis and osteoarthritis) obviously increases the risk of painful joints; however, not all osteoarthritis are associated with pain. Both repetitive use and disuse of musculoskeletal structures have been associated with pain. Persons who experience musculoskeletal pain problems either avoid their usual activities or may limit their activities due to pain.

There are few studies that document the burden of musculoskeletal disorders amongst adults in India,<sup>5-11</sup> particularly in rural population. The present study had an objective to find out the burden of MSDs in the adults population of rural areas of Delhi.

## Materials and Methods

This was a descriptive, cross-sectional, community-based study. The data were collected from the participants (aged 18 years or more) living in rural areas of Delhi for at least last 6 months. The study area covered 3 sub-centres namely *Dichoau*, *Chhawla*, and *Mitroan* and included all 5 villages of these sub-centres i.e. *Dichaon* Enclave, *Dichaon* village, *Digupura*, *Mitraon*, *Chhawla* which comes under PHC, *Najafgarh* which was one of the field practice areas of Department of Community Medicine, Vardhman Mahavir Medical College and Safdarjung hospital (VMMC & SJH), New Delhi. The study duration was eighteen months from November 2017 till April 2019. Participants with pregnancy, severely ill and mental ill were excluded from the study.

Sample size was calculated on the basis of the study conducted by Majumdar et al. (2015)<sup>10</sup> where prevalence of MSDs was 33.9% applying the formula of sample size for proportion as  $(1.96)^2 pq/l^2$  taking absolute error as 10%.

By taking non-response rate as 10%; taking design effect= 2, sample size came out to be 198 (rounded off to 200). Proportionate to population size sampling technique was used to select the study sample.

The total population in the study area was 32,941. A sampling frame was developed of the approximate number of households in each village served by the three sub-centres. Approximately 6585 households were found in the study area. Pre-testing of the questionnaire was done in a similar rural population residing in a village of Fatehpur Beri, which was another field practice area of Department of Community Medicine, VMMC & SJH, New Delhi. A total of 20 participants were selected for pre-testing of the questionnaire. Following pre-testing, the questionnaire was suitably modified.

The questionnaire consisted of the following three sections:

**Part 'A'** questions related to Socio-demographic Profile, history of trauma, comorbidities, relevant present, past and personal history.

**Part 'B'** questions from extended Nordic Musculoskeletal Questionnaire (NMQ-E). The NMQ-E comprises of 11 questions asked in reference to 9 body regions, equating to 99 data items generated by the tool.<sup>12</sup> It is extended version of Standardised Nordic Questionnaire presented by Kuorinka et al.<sup>13</sup>

**Part 'C'** Included clinical examination findings including general physical, systemic and local examination.

Data analysis was done using licensed SPSS software version 21.0 (Chicago, Illinois). Univariable analysis was done initially to find out the association between various factors and MSDs and the results were presented with the help of tables and appropriate text. A p-value of less than 0.05 was considered significant. Binary logistic regression was applied. Variables which were found to be significant by univariable were put into multivariable analysis. The study protocol was approved by Institutional Ethical Committee of VMMC & SJH. Written and informed consent was obtained from the participants before proceeding with the study.

Clinical examination of the selected individuals was done to rule out postural deformities and limb length discrepancies or any limb deformities. To establish the diagnosis and to ensure their appropriate management they were referred to specialised doctors in Internal Medicine (at subcenter, Chhawla) or in Orthopaedics (at RHTC, Najafgarh) according to the convenience of study participants.

## Results

A total of 211 peoples were approached, but 11 participants did not give consent. Therefore, 200 adult participants residing in Najafgarh, Delhi were included in the study.

### Socio-demographic Profile of Study Participants

Mean  $\pm$  SD age was  $36.2 \pm 12.8$  years (range 19-73 years). Mean age of males was  $51.5 \pm 14.7$  years and that of females was  $47.31 \pm 13.7$  years. Maximum participants, 78 (39%) belonged to the age group of 18 to 29 years. Out of the total 200 participants, 103 (51.5%) were female and 97 (48.5%) were male (Table 1).

**Table 1. Distribution of study participants according to socio-demographic profile (N=200)**

| Age Group (in completed years)           | Frequency | Percentage (%) |
|--|-----------|----------------|
| 18-29                                    | 78        | 39             |
| 30-39                                    | 49        | 24.5           |
| 40-49                                    | 37        | 18.5           |
| 50-59                                    | 25        | 12.5           |
| 60 years and above                       | 11        | 5.5            |
| <b>Socio-demographic Characteristics</b> |           |                |
| <b>Gender</b>                            |           |                |
| Male                                     | 97        | 48.5           |
| Female                                   | 103       | 51.5           |
| <b>Religion</b>                          |           |                |
| Hindu                                    | 185       | 92.5           |
| Muslim                                   | 7         | 3.5            |
| Sikh                                     | 5         | 2.5            |
| Christian                                | 3         | 1.5            |
| <b>Marital Status</b>                    |           |                |
| Single                                   | 52        | 26             |
| Currently Married                        | 136       | 68             |
| Widow/ divorced                          | 12        | 6              |
| <b>Type of Family</b>                    |           |                |
| Nuclear Family                           | 133       | 66.5           |
| Joint Family                             | 67        | 33.5           |
| <b>Number of Family Members</b>          |           |                |
| 4 or less                                | 78        | 36             |
| 5 or more                                | 122       | 61             |
| <b>Education</b>                         |           |                |
| Illiterate                               | 61        | 30.5           |
| Primary School                           | 33        | 16.5           |
| Middle School                            | 47        | 23.5           |
| High School                              | 24        | 12             |
| Intermediate/ Post High School Diploma   | 20        | 10             |
| Graduate/ Post-graduate                  | 15        | 7.5            |

| <b>Socio-economic class according to Modified BG Prasad scale 2018 (Based on income in Rs. per capita per month)</b> |    |      |
|--|----|------|
| Class I- Upper (>6574)   | 44 | 22   |
| Class II- Upper middle (3287-6573)   | 70 | 35   |
| Class III- Middle (1972-3286)  | 59 | 29.5 |
| Class IV- Lower middle (986-1971)  | 26 | 13   |
| Class V- Lower (< 986)   | 1  | 0.5  |

### Prevalence of Musculoskeletal Disorders

Out of 200 study participants, lifetime prevalence of MSDs was reported by 114 (57%) study participants, 106 (53%) participants had history of MSDs in the past 12 months, 96 (48%) participants had history of MSDs in the past 4 weeks while 70 (35%) participants had history of MSDs at the time of interview.

### Body Parts Affected amongst Presently Affected Participants with MSDs

Most common affected body part was lower back (n=38, 54.3%) followed by knee and leg (n=22, 31.4%) and ankle and foot (n=16, 22.6%) amongst the participants, who had history of MSDs at the time of interview (Table 2).

Out of 114 study participants who had history of MSDs ever, 33 (29%) got admission, and 6 (5.3%) participants changed their duty due to MSDs.

**Table 2. Distribution of study participants currently affected with MSDs according to involvement parts of the body (n=70)**

| S. No. | Body Parts        | MSD           |              |
|--------|-------------------|---------------|--------------|
|        |                   | Present n (%) | Absent n (%) |
| 1.     | Lower back        | 38 (54.3%)    | 32 (45.7%)   |
| 2.     | Knee and leg      | 22 (31.4%)    | 48 (68.6%)   |
| 3.     | Ankle and foot    | 16 (22.6%)    | 54 (77.4%)   |
| 4.     | Wrist and hand    | 11 (15.7%)    | 59 (84.3%)   |
| 5.     | Shoulder and arm  | 8 (11.4%)     | 62 (88.6%)   |
| 6.     | Elbow and forearm | 7 (10%)       | 63 (90%)     |
| 7.     | Hip and thigh     | 6(8.5%)       | 64 (91.5%)   |
| 8.     | Upper back        | 4 (5.7%)      | 66 (94.3%)   |
| 9.     | Neck              | 3 (4.3%)      | 67 (95.7%)   |

\*Numbers and percentage are not mutually exclusive.

### Determinants of Musculoskeletal Disorders

A significantly higher percentage of females were currently suffering from MSDs (44.7%) as compared to the males (24.7%) and a higher proportion of study participants in the age group of 60 years and above (72.7%), lower socio-

economic class IV and V (n=15, 55.6%), history of any kind of trauma (54.4%), increasing BMI were by affected with current MSDs. Out of 70 participants who were currently affected with MSDs, 40 (37%) participants who going outside for work were affected with the MSDs compared to 30 (32.6%) participants staying at home 12 (46.2%) but this difference was not statistically significant (Table 3).

It was observed by multivariable analysis that the study participants with age > 40 years, no RTA history and female gender had 14.11 (95% CI 5.46-36.46), 0.152(95% CI 1.13-4.23) and 7.58 (95% CI 2.31-24.53) times the risk of having musculoskeletal disorders and predictors respectively, as compared to those with age less than 40 years, RTA history and males (Table 4).

**Table 3. Association between Current MSDs Status and different variables among study participants (N=200)**

| Variables (N)  | Current Msd Status |                  | p-value |
|--|--------------------|------------------|---------|
|  | Present N (%)      | Absent N (%)     |         |
| <b>Gender</b>  |                    |                  |         |
| Male (97)  | 24 (24.7%)         | 73 (75.3%)       | 0.001*  |
| Female (103)   | 46 (44.7%)         | 57 (55.7%)       |         |
| <b>Age (in years)</b>  |                    |                  |         |
| 18-39 (127)  | 25 (19.7%)         | 102 (80.3%)      | 0.001*  |
| 40-59 (62)   | 37 (59.6%)         | 25 (39.4%)       |         |
| 60 or above (11)   | 8 (72.7%)          | 3 (27.3%)        |         |
| <b>Socioeconomic Status (according to Modified BG Prasad scale 2018 based on income in Rs. per capita per month)</b> |                    |                  |         |
| Class I (54)   | 14 (31.8%)         | 30 (68.2%)       | 0.055   |
| Class II, Class III (129)  | 41 (31.8%)         | 88 (68.2%)       |         |
| Class IV, Class V (27)   | 15 (55.6%)         | 12 (44.4%)       |         |
| <b>BMI (as recommended for Indian population by ICMR in 2011)</b>  |                    |                  |         |
| Underweight (10)   | 0 (0%)             | 10 (100%)        | 0.029*  |
| Normal (93)  | 28 (30.1%)         | 65 (69.9%)       |         |
| Overweight (48)  | 18 (37.5%)         | 30 (62.5%)       |         |
| Obese (49)   | 24 (49%)           | 25 (51%)         |         |
| <b>Trauma History</b>  |                    |                  |         |
| Present (68)   | 37 (54.4%)         | 31 (45.6%)       | 0.001*  |
| Absent (132)   | 39 (29.5%)         | 93 (70.5%)       |         |
| <b>Occupation</b>  |                    |                  |         |
| Mostly staying at home (92)  | 30 (32.6%)         | 62 (67.4%)       | 0.513   |
| Going outside for work (108)   | 40 (37%)           | 68 (63%)         |         |
| <b>Total</b>   | <b>70 (35%)</b>    | <b>130 (65%)</b> |         |

Chi-square test, \*statistically significant (p<0.05).

**Table 4. Predictors of having musculoskeletal disorders among study participants (N=200)**

| Variables     | Unadjusted       |         | Adjusted           |         |
|---------------|------------------|---------|--------------------|---------|
|               | OR (95% CI)      | p-value | OR (95% CI)        | p-value |
| <b>Gender</b> |                  |         |                    |         |
| Male          | Reference        |         |                    |         |
| Female        | 2.46 (1.34-4.49) | 0.004*  | 7.58 (2.31-24.53)  | 0.001*  |
| <b>Age</b>    |                  |         |                    |         |
| 40 and less   | Reference        |         |                    |         |
| >40           | 9.9 (5.00-19.59) | 0.001*  | 14.11 (5.46-36.46) | 0.001*  |

| Occupation                    |                   |        |                    |        |
|-------------------------------|-------------------|--------|--------------------|--------|
| Staying at home               | Reference         |        |                    |        |
| Going outside for home        | 1.22 (0.67-2.18)  | 0.51   | NA                 |        |
| Education                     |                   |        |                    |        |
| Illiterate                    | Reference         |        |                    |        |
| Literate                      | 0.56 (0.30-1.049) | 0.07   | NA                 |        |
| BMI                           |                   |        |                    |        |
| Non obese                     | Reference         |        |                    |        |
| Obese                         | 2.19 (1.13-4.23)  | 0.020  | 0.74 (0.199-2.76)  | 0.656  |
| Self-perceived nature of work |                   |        |                    |        |
| Light                         | Reference         |        |                    |        |
| Moderate                      | 1.32 (0.55-3.14)  | 0.532  | NA                 |        |
| Heavy                         | 1.72 (0.77-3.87)  | 0.189  | NA                 |        |
| Diet                          |                   |        |                    |        |
| Veg                           | Reference         |        |                    |        |
| Mix                           | 0.86 (0.47-1.58)  | 0.633  | NA                 |        |
| Smoking history               |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 0.30 (0.14-0.65)  | 0.002* | 0.113 (0.016-0.81) | 0.030* |
| Tobacco chewing history       |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 0.25 (0.061-1.04) | 0.057  | NA                 |        |
| History of alcohol drinking   |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 0.34 (0.15-0.78)  | 0.01*  | 0.66 (0.094-4.64)  | 0.676  |
| History of weight lifting     |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 0.67 (0.24-1.89)  | 0.051  | NA                 |        |
| History of long sitting       |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 2.86 (1.33-6.15)  | 0.007* | 3.65 (1.078-12.3)  | 0.038* |
| History of long standing      |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 2.06 (0.79-5.36)  | 0.141  | NA                 |        |
| RTA history                   |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 0.47 (0.24-0.92)  | 0.028* | 0.152 (0.058-0.39) | 0.001* |
| Fall history                  |                   |        |                    |        |
| Yes                           | Reference         |        |                    |        |
| No                            | 0.88 (0.37-2.14)  | 0.784  | NA                 |        |

Binary Logistic Regression, \*statistically significant ( $p < 0.05$ ), Nagelkerke R Square=0.546, Hosmer and Lemeshow  $p = 0.109$ .

## Discussion

The lifetime prevalence of MSDs in the present study was found to be in 57% (114) of the study participants, 53% (106) participants had history of MSDs in the past 12 months, 48% (96) participants had history of MSDs in the past 4 weeks while 35% (70) participants had history of MSDs at the time of interview.

Mendhe HG et al found a 61% prevalence of MSDs among the elderly in rural Andhra Pradesh<sup>14</sup>, and Kirubakaran S et al found a 47.6% prevalence of MSDs among the elderly in rural Tamil Nadu.<sup>15</sup> In the present study, the prevalence of MSD was higher as compared to the studies conducted by Bihari et al, Chopra et al, Majumdar et al, Mahajan et al and Pingle et al. In all these studies, the prevalence ranged between 15 to 33.9%.<sup>8-10,16-17</sup> This difference may be due to the use of different study populations and focus on specific types of arthritis and other MSDs. Pal CP et al from Gurdaspur, Punjab exemplified this, as they have reported a prevalence of 21.6%<sup>18</sup> as their study population included only females and focussed upon prevalence of knee osteoarthritis particularly.

Globally, Hegan et al from Norway and Wijnhoven et al from the Netherlands have reported a similar one-year prevalence of MSDs as 48% and 42% respectively in their study participants,<sup>19-20</sup> while Bazerra et al from Brazil reported a lower prevalence of 21.6% among the adult population.<sup>21</sup>

In the present study, the most commonly affected body part was lower back in 54.3% of the participants, followed by knee and leg (31.4%) and ankle and foot (22.6%) amongst those who had complaints of MSDs at the time of interview. Bihari et al also found that backache (lower/upper) was responsible for more than 50% of the total MSD.<sup>8</sup> Similar findings were seen in the study conducted by Majumdar et al, Banerjee et al, where backache was the most common condition (34.21%) of all MSDs.<sup>11,22</sup> However, Kirubakaran et al (2019) found that out of 405 respondents who reported to have chronic pain, the majority had knee pain (64.5%) followed by low back ache (21.7%).<sup>15</sup>

Among the determinants of MSDs, gender was seen to be an important factor related to MSDs. In the current study, a higher percentage of females had history of MSD as compared to the males and the difference was found to be statistically significant. Kirubakaran et al found that more females (25.4%) had low backache than males (16.8%).<sup>15</sup> Similar findings were reported by others studies too.<sup>7-9,14,16,17</sup>

Age was also another important factor that was found to be related to MSDs. Prevalence of MSDs increased with age. In the present study, a higher proportion of study participants in the age group of 40 years and above were found to be affected with current MSDs (61.64%) as

compared to the younger age group and this difference was statistically significant ( $p < 0.001$ ). Similar finding was seen in Mendhe in which 61% geriatric population was affected with MSDs.<sup>16</sup> According to the SJH study by Sharma et al, the prevalence of MSDs in the geriatric population of rural Dibrugarh was 50.67% and in rural Jodhpur was 46.08%.<sup>7</sup> Pingle et al found that the prevalence of MSDs in the age group above 55 years was in the range of 29% to 33 percent which was more than that in the younger age group below the age of 35 years.<sup>17</sup>

Other important factor that is associated with MSDs is occupation. In the present study, 52.9% housewives were affected with the MSDs, followed by 41.7% among other occupations like tailor, carpenter, labourers, and auto-rickshaw drivers. 36% of the farmers and 23.5% participants doing desk-related work were affected with MSDs. According to Joshi et al, Tailors, those working near furnaces, cooks, workers in buffing, checking and assembly work, and those working with chemicals had the most joint complaints which is similar to our study.<sup>23</sup> Study conducted by Sharma et al found that in Delhi, MSDs was most commonly seen among people involved in housework (13.21%) closely followed by retired people (12.63%). Among the people engaged in agriculture about 6.44% were having MSD. Of those doing service desk job 6.4% and 3.26% in service field job were suffering from MSDs.<sup>7</sup> Study conducted by Gupta et al found 83% of housewives were affected with low back pain that was higher than the present study that could be because of the fact that their study focused only on housewives.<sup>24</sup>

## Conclusion

57% of the study population suffered from any MSDs in their lifetime, and almost one in three adults were affected by any MSDs at the time of the interview. MSDs were found to be more associated with female gender, increasing age, being overweight or obese, and having a history of trauma.

**Conflict of Interests:** None

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