

## Original Research Article

# Prevalence of work related musculoskeletal disorders among load men in a market area in Kancheepuram district, Tamil Nadu

M. Vijayakarhikeyan<sup>1</sup>, Muthulakshmi Muthiah<sup>2\*</sup>, P. Angayarkanni<sup>1</sup>

<sup>1</sup>Department of Community Medicine, Vinayaka Missions Kirupananda Variyar Medical college and Hospitals, Vinayaka Missions Research Foundation University, Salem, Tamil Nadu, India

<sup>2</sup>Department of Community Medicine, Saveetha Medical College and Hospitals, Saveetha Institute of Medical and Technical Sciences University, Chennai, Tamil Nadu, India

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### \*Correspondence:

Dr. Muthulakshmi Muthiah,

E-mail: [muthulakshnimuthiah@gmail.com](mailto:muthulakshnimuthiah@gmail.com)

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## ABSTRACT

**Background:** Work related musculoskeletal disorders are globally responsible for deterioration in the quality of work, disability and distress among the workers. Load men are very much prone for MSD due to longer hours of work, carrying heavy loads, improper rotation of work among the workers. Objectives of current study were to estimate the prevalence of WRMDs among load men, to identify the pattern of WRMDs among load men and to identify the comorbidities among load men.

**Methods:** This is a cross-sectional analytical study conducted on occupational load men working in the market area in Padappai. Sample size included was 230 and data was collected using a prevalidated standardized Nordic questionnaire. Descriptive and analytical statistics were used to explain the study variables.

**Results:** Prevalence of work related musculoskeletal disorder was 84% and 79% during the past 12 months and past 7 days respectively. WRMD prevalence during the past 12 months was highest in wrist/hand (78.3%) and hip/thigh (47.4%) during the past 12 months and past 7 days respectively. In this study, 57.4% had any form of comorbidity. Variables significantly associated with WRMD ( $p < 0.05$ ) were work experience, hours of work, weight of lift and climbing stairs in current study.

**Conclusions:** The health issues of load men have been neglected and WRMD prevalence among load men was high in this study. Load men should undergo periodic health checkups and awareness about WRMDs must also be increased among them.

**Keywords:** Ergonomics, Load men, Workplace, Screening

## INTRODUCTION

Ergonomics is the science that deals with assessing an individual's efficiency in a working environment and it concentrates on placing a right person in a right job.<sup>1,2</sup> Disorders of muscles, skeleton, and related tissue, which have been empirically shown or suspected to have been caused by workplace activity was the definition of work-related musculoskeletal disorders (WRMDs) given by occupational health safety associations (OSHA). WRMDs are also known as cumulative trauma disorders (CTDs) or

repetitive strain injuries (RSIs) as the joint, muscles, tendons and nerves are affected due to repetitive stress on them for longer duration.<sup>3,4</sup>

Musculoskeletal disorders (MSDs) are globally responsible for deterioration in the quality of work, disability and distress among the workers and also pose a social as well as work related burden.<sup>5</sup> Prevalence of WRMDs varies between 30-80% based on the recent global estimate given by the world health organisation (WHO).<sup>6</sup> Musculoskeletal disorders were found out to be

a significant problem according to the studies conducted in developed countries like United States, Netherland and United Kingdom as MSD leads to loss of work time and also result in notable disability.<sup>7,8</sup>

Major factors responsible for development of MSD include awkward position, repetition and force either individually or in combination. MSD accounts for 35%-40% of the global burden of disease (GBD) which was attributed to occupational risk factors, such as poor working conditions, longer duration of work, repetitive strenuous work and improper body postures.<sup>10-13</sup> Standard Nordic questionnaire (SNQ) is a tool widely used in various parts of the world to assess the prevalence and pattern of WRMDs.<sup>14</sup> The sensitivity and specificity of SNQ was 82.3% and 82.4% respectively.<sup>15</sup>

Load men are very much prone for MSD due to longer hours of work, carrying heavy loads, improper rotation of work among the workers. MSD are common in more than one region of the body interfering their normal work, leading to deterioration in the quality of life and resulting in hospitalization at advanced disease.<sup>5</sup> In India, due to the socioeconomic conditions work stress in any occupation is unavoidable and WRMDs is the prime cause of work-related disorder in the load men and there are no sufficient measures and policies to ensure the safety and health of the occupational workers.<sup>16</sup>

The health issues of load men have been neglected so far, this study mainly aims at focusing on their major health problem, musculoskeletal disorders. This study would throw light on the area which remains unnoticed, so that we will be able to provide necessary health services in the future.

### **Objectives**

Objectives of the current study were to estimate the prevalence of WRMDs among load men, to identify the pattern of WRMDs among load men and to identify the comorbidities among load men.

## **METHODS**

### **Study design, location, duration and population**

Current study was a cross-sectional analytical study conducted at Padappai which is the field practice attached to Sree Balaji medical college and hospital, situated in the Kancheepuram district of Tamil Nadu, for a period of 6 months from March 2019 to August 2019. The study population included occupational load men working in the market area of the study area during the study period.

### **Inclusion criteria**

Load men belonging to the 18 to 60 years of age group and those who were willing to participate were all included in the study. The workers performing task for a

prolonged period of time for an average of 5 days in a week were only included in the study.

### **Exclusion criteria**

Workers who are severely ill, those who are on anti-psychiatric treatment and those who didn't give consent to participate in the study were excluded.

### **Sample size and sampling method**

The sample size for the study was calculated based on a previous study done by Vasanth et al in the year 2015, which showed MSD prevalence as 83.6%.<sup>3</sup> Using the formula.

$$4PQ/L^2$$

The sample size was calculated with a precision of 5% and accounting 5% for refusal rate, the sample size was rounded off to 230. As per the study objective, purposive sampling method was used to select the study subjects. All the participants were clearly explained about the purpose of the study and its benefit and informed consent was obtained prior to the data collection.

### **Study tool and data collection**

A pre-validated standardized Nordic questionnaire (SNQ) was the tool used to assess the prevalence and pattern of WRMDs. The questionnaire had a sensitivity of 82.3% and specificity of 82.4%. The SNQ was used at the time of data collection. The respondents were interviewed, by asking the questions to the load men in their local language and their responses were noted down.

### **Data analysis**

The data was entered in Microsoft excel and was analyzed using SPSS Version 20 and the prevalence of WRMDs was calculated using descriptive statistical factors like percentages and frequencies. The pattern and comorbidities associated with WRMDs were expressed using descriptive statistics. The factors influencing WRMDs were studied using Chi square test and Odds ratio,  $p < 0.05$  was the level of significance used in the study.

## **RESULTS**

In current study, nearly 50.4% were belonging to 41-50 years of age and 33.9% belonged to 31-40 years of age. About 46.5% of the load men had studied upto middle school, 29.2% had studied upto primary school and 9.1% were illiterates. Around 81.7% were married and 17% were unmarried. Among the study respondents, 57.4% belonged to joint family and 29.1% belonged to nuclear type of family. With respect to work experience, nearly 53% of the load men were working for 5 to 10 years, 18.7% were involved in that occupation for less than 5

years and 10.9% were working for more than 15 years. In this study, 47.8% and 38.7% of the load men were working for duration of 9-12 hours and 5-8 hours in a day respectively.

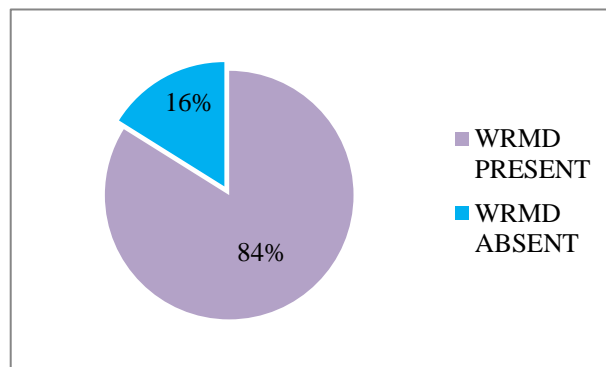
**Table 1: Sociodemographic characteristics of the study population (n=230).**

Variable	Frequency	%
<b>Age (years)</b>		
20-30	8	3.5
31-40	78	33.9
41-50	116	50.4
>50	28	21.2
<b>Education</b>		
Illiterate	21	9.1
Primary school	67	29.2
Middle school	107	46.5
High school	27	6.3
>High school	8	1.9
<b>Marital status</b>		
Unmarried	39	17
Married	188	81.7
Divorce	3	1.3
<b>Type of family</b>		
Nuclear	67	29.1
Joint family	132	57.4
Three generation family	31	13.5

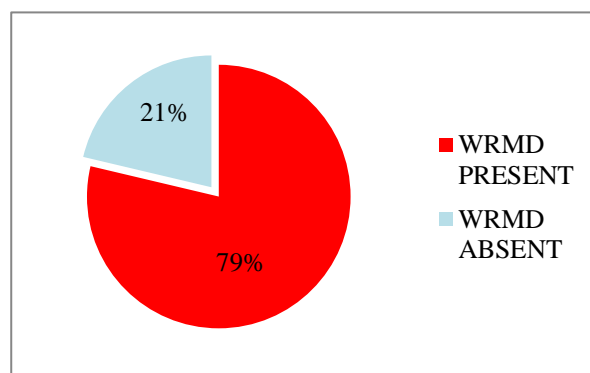
**Table 2: Work related characteristics of the study population (n=230).**

Variable	Frequency	%
<b>Work experience (years)</b>		
<5	43	18.7
5-10	122	53
11-15	40	17.4
>15	25	10.9
<b>Working hours per day (hours)</b>		
<5	8	3.5
5-8	89	38.7
9-12	110	47.8
>12	23	10
<b>Weight of lift each time (Kg)</b>		
<50	69	30
50-75	137	59.6
>75	24	10.4
<b>Number of times weight lifted in a day</b>		
<5	38	16.5
5-7	106	46.1
8-10	70	30.4
>10	16	7
<b>Climbing stairs</b>		
Yes	98	42.6
No	132	57.4

Among the load men, 59.6% were carrying a weight of 50-75 kilograms during each lift and 10.4% were carrying more than 75 kilograms of weight during each lift. Nearly 46.1% of the study participants were lifting the weight for 5-7 times in a day and 7% were lifting the weight for more than 10 times in a day. In this study, 42.6% of the load men were climbing stairs and the rest were not climbing stairs with the weight (Table 2).



**Figure 1: Prevalence of work related musculoskeletal disorder during past 12 months (n=230).**



**Figure 2: Prevalence of work related musculoskeletal disorder during past 7 days (n=230).**

**Table 3: Pattern of WRMD among the study participants (n=230).**

Region of pain	Prevalence of WRMD during the past 12 months, N (%)	Prevalence of WRMD during the past 7 days, N (%)
Neck	69 (3)	69 (30)
Shoulder	145 (63)	73 (31.7)
Elbow	178 (77.4)	50 (21.7)
Wrist/hand	180 (78.3)	50 (21.7)
Upper back	69 (30)	65 (28.3)
Lower back	96 (41.7)	87 (37.8)
Hip/thigh	112 (48.7)	109 (47.4)
Knee	115 (50)	108 (47)
Leg/ankle	71 (30.9)	66 (28.7)

\* Multiple responses allowed

The prevalence of work-related musculoskeletal disorder was 84% during the past 12 months (Figure 1) and prevalence of Work-Related Musculoskeletal disorder during the past 7 days was 79% (Figure 2). Among the load men with work related musculoskeletal disorder during the past 12 months 78.3% had pain in the wrist/hand, 77.4% had elbow pain and 63% had shoulder pain. Whereas among the load men with work related musculoskeletal disorder during past 7 days, majority 47.4% had hip/thigh pain, 47% had knee pain and 37.8%

had lower back pain. Among the load men with Work Related musculoskeletal disorder the severity was assessed and depicted in (Table 4). About 12.2% of the load men with knee pain, 10.9% with low back pain and 10% with wrist/hand pain consulted a doctor. Nearly 44.3% with knee pain, 19.6% with hip/thigh pain and 19.1% with low back pain had reduced activity at work. Also, 13.5% with hip/thigh pain, 9.1% with knee pain and 9.1% of the load men with shoulder pain had made change of jobs or duties due to severity of the pain.

**Table 4: Severity of WRMD among the load men (n=230).**

Severity	Neck	Low back	Shoulder	Elbow	Wrist/ hand	Knee	Hip/ thigh	Leg/ ankle
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
<b>Seen by a doctor</b>	17 (7.4)	25 (10.9)	21 (9.1)	20 (8.7)	23 (10)	28 (12.2)	13 (5.7)	15 (6.5)
<b>Hospitalized because of pain</b>	15 (6.5)	34 (14.8)	13 (5.7)	11 (4.8)	14 (6.1)	23 (10)	33 (14.3)	21 (9.1)
<b>Reduced activity at work</b>	32 (13.9)	44 (19.1)	38 (16.5)	37 (16.1)	34 (14.8)	102 (44.3)	45 (19.6)	21 (9.1)
<b>Change of jobs or duties</b>	14 (6.1)	10 (4.3)	21 (9.1)	14 (6.1)	18 (7.8)	21 (9.1)	31 (13.5)	10 (4.3)
<b>Reduced activity at home</b>	6 (2.6)	18 (7.8)	12 (5.2)	21 (9.1)	11 (4.8)	15 (6.5)	23 (10)	12 (5.2)

**Table 5: Association between WRMD during last 12 months and selected study variables (n=230).**

Variable	WRMD during past 12 months		P value	Odds ratio	95% CI
	Yes (193)	No (37)			
<b>Age (years)</b>					
>40	117	27	0.158	0.570	(0.26-1.24)
≤40	76	10			
<b>Work experience (years)</b>					
>5	133	6	<0.0001*	10.71	(4.22-27.16)
≤5	60	29			
<b>Hours of work in a day (hours)</b>					
>8	110	23	0.560	0.80	(0.39-1.66)
≤8	83	14			
<b>Weight of lift each time (Kg)</b>					
>50	133	9	<0.0001*	6.89	(3.06-15.51)
≤50	60	28			
<b>Number of times weight lifted in a day</b>					
>7	70	16	0.422	0.74	(0.36-1.52)
≤7	123	21			
<b>Climbing stairs</b>					
No	121	11	0.0004*	3.97	(1.85-8.51)
Yes	72	26			

\*p<0.05 is significant.

In current study, on assessing the presence of comorbidities among the load men it was found that 57.4% had any one comorbidity and among them, 34% had surgical problems, 25% were diabetic, 19% of the load men were hypertensive and 3% had thyroid disorder. In current study, association between prevalence of work related musculoskeletal disorder during the past 12 months and selected study variables was assessed using

chi square test and p<0.05 was the significance level set. Variables significantly associated with the prevalence of WRMD during the past 12 months were work experience >5 years (p<0.0001, Odds ratio 10.71), weight of lift each time more than 50 kg (p<0.0001, Odds ratio 6.89) and climbing stairs (p=0.0004, Odds ratio 3.97). Variables significantly associated with the prevalence of WRMD during the past 12 months were work experience >5 years

(p=0.0004, Odds ratio 3.30), >8 hours of work in a day (p=0.0005, Odds ratio 3.72), weight of lift each time more

than 50 kg (p=0.0046, Odds ratio 2.55) and climbing stairs (p<0.0001, Odds ratio 4.47).

**Table 6: Association between WRMD during last 7 days and selected study variables (n=230).**

Variable	WRMD during past 7 days		P value	Odds ratio	95% CI
	Yes (182)	No (48)			
<b>Age (years)</b>					
>40	113	31	0.750	0.89	(0.46-1.74)
≤40	69	17			
<b>Work experience (years)</b>					
>5	121	18	0.0004*	3.30	(1.70-6.39)
≤5	61	30			
<b>Hours of work in a day (hours)</b>					
>8	120	13	0.0005*	3.72	(1.78-7.77)
≤8	62	35			
<b>Weight of lift each time (Kg)</b>					
>50	121	21	0.0046*	2.55	(1.33-4.87)
≤50	61	27			
<b>Number of times weight lifted in a day</b>					
>7	72	14	0.187	1.58	(0.79-3.16)
≤7	110	34			
<b>Climbing stairs</b>					
No	118	14	<0.0001*	4.47	(2.23-8.95)
Yes	64	34			

\*p<0.05 is significant.

## DISCUSSION

### Age

In current study majority 50.4% belonged to 41-50 years of age and 33.9% belonged to 31-40 years of age. Vasanth et al study conducted on pluckers in Tamilnadu nearly 28.2% of the participants belonged to 45-50 years of age and the mean age of the study population was 45.6±7.56 years.<sup>3</sup> Mean age of the study participants was 26.25±8.49 years, 43.83±9.33 years and 31±6.38 years in studies by Adsul et al, Bandyopadhyay et al and Gosh et al respectively.<sup>17-19</sup>

### Education

About, 46.8% had studied upto middle school, 29.2% had studied upto primary school and 9.1% were illiterates in our study. In Vasanth et al study, 35.9% were illiterates and 22.6% had studied upto middle school.<sup>3</sup> Dhattrak et al performed a study on the textile workers in Rajasthan and in that study, 11.8% were illiterates, 28.94% and 46.05% had studied upto primary and secondary school respectively.<sup>20</sup> About 67.36% were illiterates and 18.05% had studied upto primary school in a study done by Gurav et al on daily wage workers of Maharashtra.<sup>21</sup>

### Marital status

Nearly, 81.7% were married in our study and 17% were unmarried. Whereas, 84.1%, 42.7% and 95.49% of the study samples were married in studied conducted by

Vasanth et al, Abdul et al and Gurav et al respectively.<sup>3,17,21</sup>

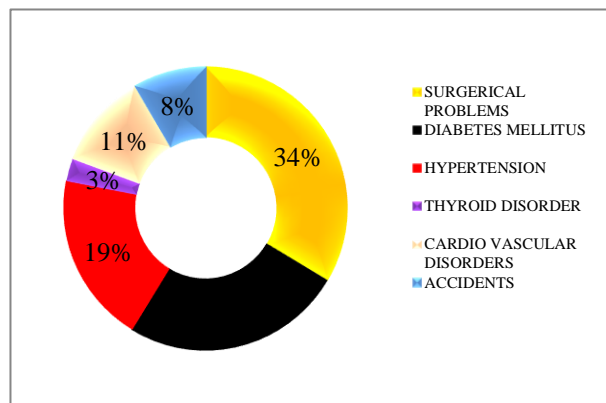
### Family type

In current study, 57.4% belonged to joint family and 29.1% belonged to nuclear type of family. Whereas, in Vasanth et al study majority 94% belonged to nuclear family and 5% of the study respondents belonged to extended family type.<sup>3</sup>

### Prevalence of WRMD

The prevalence of work related musculoskeletal disorder was 84% and 79% during the past 12 months and past 7 days respectively in our study. Similarly, in Vasanth et al study 83.6% and 78.5% were the prevalence of WRMD during the past 12 months and past 7 days respectively.<sup>3</sup> In Prakash et al study conducted on rice mill workers the prevalence of WRMD during past 12 months was 46.66%.<sup>22</sup> Vijay et al conducted a cross sectional study conducted on IT employees in which 59.33% and 45.33% was the prevalence of WRMD during the past 12 months and past 7 days respectively.<sup>23</sup> Metgud study recorded a prevalence of WRMD as 91%.<sup>24</sup> Among palm plantation workers 93% was the WRMD prevalence for the past 12 months in Guan study.<sup>25</sup> In Reddy study on rubber tappers of Kerala 72.2% was the prevalence of WRMD.<sup>26</sup> WRMD was 60.4% and 45.5% among the commercial drivers of Malaysia and occupational Taxi drivers of Israel respectively.<sup>27,28</sup> Prevalence of WRMD was 79.17 in school teachers in Darwish study.<sup>29</sup>

About 25.9% was the prevalence of MSD in the general population in Bihari et study conducted in New Delhi and this low prevalence can be attributed to the pattern of work done by the general population.<sup>30</sup> In a systematic review by Osborn et al the WRMD prevalence was more in farmers compared persons involved in other occupation.<sup>31</sup> Prevalence of WRMD depends on the type of occupation in which the person is involved.



**Figure 3: Prevalence of comorbidities among the load men (n=230).**

#### **Region specific prevalence of WRMD**

In current study, prevalence of the WRMD during the past 12 months was highest in wrist/hand (78.3%) followed by elbow (77.4%) and WRMD during past 7 days was highest in the hip/thigh (47.4%) followed by knee (47%). It is because the load men carry the weight using the wrist and the weight is transmitted to the elbow joint and also the weight is carried on the back putting a pressure on the lower back causing pain Whereas on the contrary WRMD prevalence during past 12 months and past 7 days was highest in shoulder and lower back respectively in Vasanth et al study.<sup>3</sup> In Dihingia et al study conducted on tea plantation workers highest prevalence was seen over the shoulder region as plucking for longer hours exerts the pressure on the shoulder joint.<sup>32</sup> Vijay performed a cross-sectional analysis on MSD on IT employees and the prevalence of WRMD during past 12 months was highest in neck (30.33%) followed by lower back (25.24%) and during past 7 days was highest neck (28.68%) followed by lower back (26.47%).<sup>23</sup> This is because mostly IT employees work with the computer bending down and they work in the sitting posture for long hours putting pressure on the neck and the lower back. Prevalence of WRMD during past 12 months was highest in knee (76.10%) followed by lower back (66.49%).<sup>33</sup> Ghosh et al study on goldsmiths recorded that the prevalence of WRMD was highest in the neck (80%) followed by lower back (75%).<sup>19</sup>

#### **Severity of the WRMD**

WRMD leads to reduced activity at work and in this study, 44.3% with knee pain and 19.6% with hip/thigh pain had

reduced activity at work. In Vasanth et al study about 25.6% with shoulder pain and 25% with neck pain had reduced activity at work.<sup>3</sup> Whereas in Dihingia et al study about 7.6% with neck pain had reduced activity at work.<sup>32</sup> About 12.2% of the load men with knee pain and 10.9% with low back pain consulted a doctor in our study and in Dihingia et al study 36.2% took professional treatment for WRMD and none were hospitalized.<sup>32</sup> On the contrary, 99.5% had consulted a doctor for neck and lower back pain among which only 7.4% were hospitalized.<sup>3</sup>

#### **Comorbidities among study participants**

In the present study, overall 57.4% had any form of comorbidity and among them 34% had surgical problems, 25% were diabetic, 19% of the load men were hypertensive and 3% had thyroid disorder. Adul study recorded that, 12.6%, 7.9%, 20.71% and 3.4% of the study participants were suffering from respiratory problems, injuries, malaria and hypertension.<sup>17</sup> Nearly 5.9% were having cardiovascular problems, and 5.26% of the respondents were having diabetes mellitus in Dhattrak study.<sup>20</sup> In Prakash et al study, about 42% were having respiratory problems, 7% were having conjunctivitis and 4% were having skin problems.<sup>22</sup> About 11.46% were having skin problems, 3.1% were having ophthalmic problems, 5.21% were suffering from injuries and 4.86% were having respiratory problems in Gurav et al study.<sup>21</sup>

#### **Association between WRMD and selected study variables**

Variables significantly associated with WRMD ( $p < 0.05$ ) in our study were work experience, hours of work, weight of lift and climbing stairs. Similarly, mean age, mean years of employment and presence of comorbidities were significantly associated with WRMD in Vasanth et al study.<sup>3</sup> Ghasamkhani study also explored that years of work was significantly associated ( $p < 0.0001$ ) with WRMD.<sup>7</sup> Thus work related factors influence the occurrence of WRMD depending on the type of work.

#### **CONCLUSION**

The prevalence of work related musculoskeletal disorder was 84% and 79% during the past 12 months and past 7 days respectively in our study. Thus the prevalence was high and work related factors like work experience, hours of work, weight of lift and climbing stairs were significantly associated with WRMD. Load men should undergo periodic health checkups and awareness about MSDs must also be increased among them.

#### **Recommendations**

The health issues of load men have been neglected. Hence, we can do periodic screening, the management can plan for interventions by providing breaks and reducing the weight of load. Physiotherapy, exercise interventions in the dispensaries can be done. Warm-up

exercises before starting work can also be encouraged. This may result in improvement of the symptoms and the general health among workers. Strict application of ergonomic principles should be followed so that right person is placed in right job.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

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