

Original Research Article

Assessment of risk factors for the development of musculoskeletal disorders among working women

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ABSTRACT

Background: Musculoskeletal disorders (MSDs) account for 33% of all work-related illnesses and are the most frequent cause of all health-related absence from work. Working women particularly are at more risk of developing MSDs since they are involved in household activities and childcare along with office work. Psychosocial stress and comfort level at work also play a major role in development of MSDs. So, this study was done to assess the risk factors for the development of MSDs.

Methods: Cross sectional study was conducted among 60 women clerical staff of a tertiary care hospital, who participated on voluntary basis. Data was collected using semi structured questionnaire. Information on MSDs was collected using Nordic scale. Descriptive statistics, chi square and odds ratio was used for data analysis.

Results: Mean age of study participants was 33.88 ± 6.97 years and mean BMI was 23.74 ± 4.15 kg/m². 81.7% were working 6-8 hours per day, 36.7% working in static posture for longer periods and 28.3% had sleep disturbances. Majority of women had low back pain both in last seven days (56.7%) and twelve months (35.0%). Those who complained of sleep disturbance were nine times and seven times at higher risk of developing pain in last seven days ($p=0.015$, OR=9.48) and twelve months ($p=0.005$, OR=7.85).

Conclusions: Low-back pain was commonest among MSDs, significantly associated with sleep disturbance. Counseling sessions should be conducted regarding work ergonomics and Occupational Health Departments should be established to avoid untoward events that develop in their productive life.

Keywords: MSDs, Nordic scale, Sleep, Women, Working

INTRODUCTION

Musculoskeletal disorders (MSDs) are among the leading causes of occupational health problems with consequences for workers, employers and society, of these occupational health problems, Work Related Musculoskeletal disorders (WRMSDs) are the commonest form of MSDs affecting people that result from work related events.^{1,2} The World Health Organization (WHO) has characterized multifactorial risk factors that contribute to WRMSDs among workers all over the world,

which will be leading cause of disability and will have an serious societal and public health implications by 2020. WRMSDs affects the quality of life, causing substantial amount of health care costs accounting for approximately one-third of all lost workday illnesses.^{3,4}

Thus MSDs refers to an amalgam of inflammatory and degenerative conditions which affects muscles, tendons, ligaments, joints, peripheral nerves and supporting blood vessels presenting with ache, pain, numbness or discomfort. It affects all persons irrespective of age, sex

and are mostly prevalent across a wide range of occupations.⁵

Globally, MSDs is the largest single cause of work-related illness, accounting for over 33% of all newly reported occupational illnesses in the general population, and these disorders are the second most common cause of disability worldwide.⁶ Disability due to MSDs is estimated to have increased by 45% from 1990 to 2010 and is expected to continue to rise with an increasingly obese, sedentary and ageing population.⁷

MSDs are commonly caused by overexertion, muscle strain and repetitive strain. The risk of disorder is also directly related to the number, speed of movements and the amount of force exerted with each movement. A task with high repetition and poor postures may result in a significant number of complaints or injuries.⁴ Thus MSDs are work-related, when the work environment and performance of work are significant contributors to their development or exacerbation and most common presenting MSDs are low back and neck pain.^{4,7}

Musculoskeletal morbidity influences the society in a large scale and symptoms will be a threat to worker's life and should be determined closely for the well-being of work participation, social attachments and their financial positions.⁸

Physical factors such as repetitive movements, sustained postures, incorrect work positions and prolonged sitting in incorrect fixed positions and on the other hand psychosocial factors such as low job satisfaction, high job demands, low job control and low workplace social support have been associated with the onset of MSDs among workers. These factors may reinforce each other and their effects may be mediated by cultural or societal factors.¹

MSDs have higher prevalence among women than men and are more vulnerable as well as affected and women's excess health risk revolve around two basic propositions. Greater prevalence or severity of symptoms may be due to the higher demands and constraints that women face or because they are affected by health impact of particular demands and constraints.⁹ WMSDs are reported to have significant impact on quality of life, lost work time or absenteeism, increase work restriction, transfer to another job, or disability than any other group of diseases with a considerable economic toll on the individual, the organization and the society as a whole.²

Repetitious movements, awkward postures and high force levels are the three primary risk factors that have been associated with WRMSDs. The WRMSDs develop over a period of time and these are not curable, however, suitable coping strategies can help in controlling the development of WRMSDs. Workers performing strenuous work can cope with musculoskeletal symptoms

by changing their working techniques and following certain ergonomic principles.¹⁰

To define the problem and its relationship to work factors, increasing interest has been directed in many countries to the development of various methods to estimate and record musculoskeletal symptoms. Questionnaires have proved to be the most obvious means of collecting the necessary data.¹¹ Hence, this study was undertaken to assess risk factors for the development of musculoskeletal disorders among working women using Nordic scale.

METHODS

A cross sectional study was conducted among women clerical staff working in a tertiary care hospital, Dharwad, Karnataka from December 2015 to February 2016 after obtaining Institutional Ethical Committee clearance. 60 women participated on voluntarily basis after signing a written informed consent form and those women who were above 60 years of age, not willing to give consent and previously diagnosed of having MSDs were excluded. Data was collected using semi structured questionnaire, which was pre-designed and pre-tested consisting of information such as age, sex, marital status, nature of work, number of working hours per day, years of job experience, self -perceived comfort level, working in static posture, number of hours of usage of computer and sleep related disturbances. Relevant information on MSDs was collected and assessed by using Nordic scale.^{11,12} It consists of self-reported musculoskeletal complaints with respect to nine body areas such as neck, shoulder, elbows, wrists/hands, upper back, lower back, hips, knees and ankles/feet over last one week and last 12 months in a pictorial way (body map) in which participants had to mark the region of pain. The region marked was considered as having pain and without mark as not having pain.

Statistical analysis

Data was entered using Epidata v3.1 and analyzed using SPSS v20. Descriptive statistics like frequencies, percentages, mean and standard deviation were calculated. Chi square test and odds ratio was applied to determine the association between two categorical variables. P value less than 0.05 was considered statistically significant.

RESULTS

Total of 60 working women participated in the study. Mean age of study participants was 33.88±6.97 years and mean BMI was 23.74±4.15 kg/m². 86.7% of them were married and majority of the participants (28.3%) were in the age group of 26-30 years. 30.0% of them had job experience of 7-10 years and 81.7% of participants were working 6-8 hours per day. Nature of work in 50.0% was sitting and 48.3% had both sitting and standing. 80.0%

were doing moderate activity and 36.7% were working in static posture for longer period of time. 48.3% women were using computer for more than 8 hours per day

including at work as well as at home and 28.3% had complaint related to sleep disturbances (Table 1).

Table 1: Profile of working women (n=60).

Variables	Number	Percentage
Age in years		
20-25	06	10.0
26-30	17	28.3
31-35	13	21.7
36-40	13	21.7
41-45	09	15.0
46-50	02	03.3
Marital status		
Unmarried	08	13.3
Married	52	86.7
Job experience in years		
1-3	16	26.6
4-6	17	28.3
7-10	18	30.0
>10	09	15.0
Nature of job		
Sitting	30	50.0
Standing	01	01.7
Both	29	48.3
Number of working hours/day		
5-6 hrs	01	01.7
6-8 hrs	49	81.7
>8 hrs	10	16.6
Type of worker		
Sedentary	12	20.0
Moderate	48	80.0
Static posture at work		
Yes	38	63.3
No	22	36.7
Usage of computer in hours per day		
2-4	9	15.0
5-7	22	36.7
>8	29	48.3
Sleep disturbances		
Yes	17	28.3
No	43	71.7
BMI in kg/m²		
<18.5	05	8.3
18.5-24.9	35	58.3
>25	20	33.3

Table 2 describes region wise distribution of pain among study participants. Most common MSDs among participants was low-back pain (56.7%), followed by neck pain (45.0%), shoulder (41.7%), knees (28.3%), wrist (21.7%), ankles (18.3%), elbows/hips and thighs

(16.7%) and least pain was noted in upper back (11.7%) in the last 7 days. Similarly, when it was assessed for the last 12 months, majority of participants again complained of low-back pain (35.0%), followed by neck pain (25.0%) and least was noted in knees/elbows/upper-back (5.0%) and hips/thighs (3.3%) in the last 12 months.

Table 3 describes association of risk factors with pain in last 7 days in which sleep disturbance was found to be significantly associated with musculoskeletal pain ($\chi^2=5.888$, $df=1$, $p=0.015$, $OR=9.48$, $CI=1.14-78.42$). This shows that disturbed sleep will have nine times more impact as a risk factor for the development of the pain. When comfort level was assessed with pain, it shows that more the comfort lesser the pain ($\chi^2=0.259$, $df=1$, $p=0.610$, $OR=0.55$, $CI=0.05-5.38$). This shows that pain is inversely proportional to comfort level. Pain in last seven days was also more when compared with other risk factors such as nature of job, static posture and BMI but were not statistically significant.

Association of risk factors with pain in last 12 months is depicted in Table 4. Risk factors such as nature of job played a major role and was six times more prone and significant in the development of the pain ($\chi^2=11.552$, $df=2$, $p=0.003$, $OR=6.54$, $CI=2.03-21.03$), followed by sleep disturbance in whom chances of developing pain was eight times more than who had normal sleep ($\chi^2=7.880$, $df=1$, $p=0.005$, $OR=7.85$, $CI=1.59-38.60$). Women working in static posture for long time had five times greater risk of development of pain ($\chi^2=8.086$, $p=0.004$, $OR=4.90$, $CI=1.58-15.16$) and those with abnormal BMI (<18.5 and >25) were twelve times at higher risk of developing pain than people with normal BMI ($\chi^2=15.683$, $df=2$, $p=0.0003$, $OR=12.41$, $CI=3.09-49.70$), when pain was considered for last 12 months.

Table 2: Region-wise distribution of pain among working women as per Nordic scale*.

Region of pain	Pain in last 7days				Pain in last 12 months			
	Yes		No		Yes		No	
	No.	%	No.	%	No.	%	No.	%
Low back	34	56.7	26	43.3	21	35.0	39	65.0
Neck	27	45.0	33	55.0	15	25.0	45	75.0
Shoulder	25	41.7	35	58.3	09	15.0	51	85.0
Knees	17	28.3	43	71.6	03	05.0	57	95.0
Wrist	13	21.7	47	78.3	04	06.7	56	93.0
Ankles	11	18.3	49	81.6	0	0	100	100
Elbow	10	16.7	50	83.3	03	05.0	57	95.0
Hips/thighs	10	16.7	50	83.3	02	03.3	58	96.7
Upper back	07	11.7	53	88.3	03	05.0	57	95.0

*Multiple responses.

Table 3: Comparison of risk factors in relation to pain in last seven days.

Risk factors	Pain				χ^2	df	P	OR (CI)
	Yes		No					
	No.	%	No.	%				
Nature of work								
Sitting	25	83.3	05	16.7	5.856	2	0.054	3.05 (0.90-10.33)
Both	18	62.1	11	37.9				
Comfort level								
Comfortable	38	69.1	17	30.9	0.259	1	0.610	0.55 (0.05-5.38)
Uncomfortable	04	80.0	01	20.0				
Sleep disturbance								
Yes	16	94.1	01	5.9	5.888	1	0.015	9.48 (1.14-78.42)
No	27	62.8	16	37.2				
Static posture								
Yes	27	71.1	11	28.9	0.019	1	0.890	2.45 (0.91-6.25)
No	16	72.1	06	27.3				
BMI								
<18.5	04	80.0	01	20.0	0.272	2	0.872	1.78 (0.38-3.63)
18.5-24.9	24	68.6	11	31.4				
>25	14	70.0	06	30.0				

Table 4: Comparison of risk factors in relation to pain in last twelve months.

Risk factors	Pain				χ^2	df	P	OR (CI)
	Yes		No					
	No.	%	No.	%				
Nature of work								
Sitting	24	80.0	06	20.0	11.551	2	0.003	6.45 (2.03-21.03)
Both	11	37.9	18	62.1				
Comfort level								
Comfortable	33	60.0	22	40.0	0.00	1	1.00	1 (0.15-6.48)
Uncomfortable	03	60.0	02	40.0				
Sleep disturbance								
Yes	15	88.2	02	11.8	7.880	1	0.005	7.85 (1.59-38.60)
No	21	48.8	22	51.2				
Static posture								
Yes	28	73.7	10	26.3	8.086	1	0.004	4.90 (1.58-15.16)
No	08	36.4	14	63.6				
BMI								
<18.5	04	80.0	01	20.0	15.683	2	0.0003	12.41 (3.09-49.70)
18.5-24.9	13	37.1	22	62.9				
>25	18	90.0	02	10.0				

DISCUSSION

The present study was aimed to assess risk factors for the development of musculoskeletal disorders among working women. In present study most common MSDs among participants was low-back pain (56.7%), followed by neck pain (45.0%), shoulder (41.7%), knees (28.3%), wrist (21.7%), ankles (18.3%), elbows/hips and thighs (16.7%) and least pain was noted in upper back (11.7%) in the last 7 days.

Majority of participants in our study had low-back pain as much as 56.7%, which is more compared to a multi-centric study done in India among office going, where back pain was affecting only 25.3% women.¹³ The difference could be because of static posture for longer period of time with more number of working hours followed by at the end of the day with routine household activities, which leads to stress. This indirectly predisposes for development of lower back pain.

Our study also found neck pain among 45.0% of study participants. This was similar to a study done in Thailand, where neck pain among office workers was 42.0%.¹⁴ Mostly due to prolonged sitting, poor workstation ergonomics causing prolonged static contraction of muscles with spasm leading to increased pressure on the intervertebral discs and tension on ligaments and muscles aggravating neck pain.

Shoulder pain was also found among 41.7% of our study participants. It was in consistence with study done in Tamil Nadu among bank employees, where prevalence of shoulder pain was 40.0%, this may be because they are

involved with office table work, where they tend to bend forward with shoulder shrugging leading to pain.⁵

Wrist/hand pain among study participants in our study was found to be 21.7%, which was in contrast to a study done in Manipal, Karnataka in which 57.7% of participants reported musculoskeletal symptoms related to wrist and hand.¹⁵ Poor workstation ergonomics, limited rest break and repetitive typing with low or high force were found to be predictors in their study.

In our study sleep disturbance was found to be significantly associated with all sorts of musculoskeletal pain both in last seven days ($\chi^2 = 5.888$, $df=1$, $p=0.015$) as well as in last twelve months ($\chi^2=7.880$, $df=1$, $p=0.005$). Sleep disturbance and MSDs are interlinked which can be explained in two ways i.e. musculoskeletal pain may cause disturbed sleep and disturbed sleep may exaggerate and intensify the pain symptoms.

Apart from sleep disturbance, it was also found in our study that nature of job, static posture and BMI were significantly associated with development of musculoskeletal pain in last twelve months but the same factors were not significant when pain in last seven days was considered. These factors might have impact on musculoskeletal system when present for 12 months or more as symptoms develop over a period of time.

This fact is due to presence of symptoms which have manifested at an early stage and further negligence leading to repetitive stress injuries (RSI) and at a later stage present as MSDs.

CONCLUSION

Low-back pain was the most prevalent musculoskeletal symptom among the study participants. Sleep disturbance was significantly associated with development of pain both in last seven days and which increases to a greater extent in the last twelve months. Other factors such as nature of job, static posture for long time and abnormal BMI were also associated with development of pain in last twelve months. Thus Nordic scale can be recommended and utilized commonly as a screening tool among working women which can detect MSDs at an early stage, so that preventive measures can be started at the earliest. Counseling sessions should be conducted to all working women during pre-placement and on periodical basis regarding work ergonomics irrespective of the working departments. Occupational health departments, which are commonly seen in developed countries to screen such type of MSDs as a routine work procedural ethics. Such departments can be established in our Indian setup as per the rules and regulations in our industries with healthcare set up, so that working personnel can be screened at the earliest to avoid untoward events that develop in their productive life.

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