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RESEARCH ARTICLE

A Cross-Sectional Study on Work-Related Musculoskeletal Disorders Among Staff Nurses in a Tertiary Care Hospital of Chennai

G. S. Parthiban and J. Geetha Kalpana

Kilpauk Medical College, Chennai - 600010, Tamil Nadu, India; parthisanthanam1069@gmail.com

Abstract

Background: Work-Related Musculoskeletal Disorders (WRMSDs) refer to injuries affecting the muscles, nerves, tendons, joints, cartilage, and spinal discs that arise from or are worsened by job-related activities. These disorders can result from frequent, repetitive tasks or awkward postures, leading to discomfort both during work and at rest. **Aim and objective:** To estimate the prevalence pattern of work-related Musculoskeletal disorders among the staff nurses. To study the relation of self-reported musculoskeletal strain pattern with RULA- Rapid upper limb assessment score among staff nurses in Government Kilpauk Medical College. **Methods:** 110 staff nurses working in Kilpauk Medical College were enrolled. Musculoskeletal symptoms were assessed using the Nordic Standardised Musculoskeletal Questionnaire and RULA scale to assess ergonomic risk factors associated with musculoskeletal disorders. **Results:** Prevalence of musculoskeletal disorders is 56.4%. Musculoskeletal symptoms occurred most commonly in the lower back (68.2%), upper back (33.6%), neck (29.1%), shoulders (29%), ankles and feet (26.4%), and shoulder (23.6%). The 12-month and the last 7-day period of WMSDs in any region were 56.40% and 49.10% respectively. Comparing the working posture with the risk assessed by the RULA score shows that in the ICU, 9.1% are at negligible risk and 90.9% are at low risk. In the operating theatre, 75.0% are at low risk, and 25.0% are at medium risk. In outpatient services, 95.8% are at negligible risk, and 4.2% are at medium risk. In ward duty, 52.4% are at negligible risk, and 47.6% are at low risk. The p-value is 0.000, indicating statistical significance. Of which the Majority have a RULA score of 2 and 3 categories, indicating a low risk for injury and a need for ergonomic intervention. **Conclusion:** Work-related musculoskeletal disorders are common among nurses, and lower back pain is the most common symptom. It is advisable to implement educational programs focused on prevention and coping strategies for musculoskeletal disorders among nurses to lower the incidence of workplace hazards and enhance the quality of patient care. The RULA scale can be used for ergonomic screening, recommending workstation modifications, and testing the effectiveness of ergonomic interventions.

Keywords: Cumulative Trauma Disorders, Educational Programs, Ergonomic Interventions, Ergonomic Risk Factors, Lower Back Pain, Nordic Standardised Musculoskeletal Questionnaire, Musculoskeletal Symptoms, Nursing Workforce, Occupational Health, Patient Handling, Rapid Upper Limb Assessment (RULA), Repetitive Strain Injuries, Workplace Hazards, Work-Related Musculoskeletal Disorders (WRMSDs)

1. Introduction

Work-Related Musculoskeletal Disorders (WRMSD) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs which are induced or aggravated by work and the circumstances of its performance[1]. Work activities which are frequent and repetitive, or activities with awkward postures, cause these disorders, which may be painful during work or at rest. Repetitive strain injuries, Cumulative trauma disorders, and Overuse syndrome are some of the alternative names of WRMSDs. Nurses often conduct patient handling by bending their waist and maintaining an uncomfortable posture towards the

**Author for correspondence*

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opposite side of the bed or chair, shifting the patient, increasing the risk of back pain[2].

2. Aim and Objectives

- To estimate the prevalence pattern of work-related Musculoskeletal disorders among the staff nurses.
- To study the relation of self-reported musculoskeletal strain pattern with RULA- Rapid upper limb assessment score among staff nurses in Government Kilpauk Medical College.

3. Review of Literature

The WRMSDs have been described by the WHO, and guidance regarding various risk factors has been given. Mechanical overload, repetition frequency, exposure time, posture and accidents[1]. CTD refers to a broad category that encompasses various specific diagnoses as well as general conditions impacting mainly the upper limbs, shoulders, neck, and lower back. These disorders can develop in any environment where there is prolonged exposure to mechanical stress, with workplaces being the most prevalent context. The economic impact of WRMSDs has not been extensively researched in India. Numerous studies have investigated WRMSDs across various occupational groups. Research on WRMSDs in the healthcare sector has focused on orthopaedic surgeons, dentists, nurses, sonographers, and others, leading to several recommendations aimed at reducing musculoskeletal disorders[3]. Several authors have reported the prevalence of MSD among nurses in developed populations worldwide. However, data on the prevalence of MSD are limited in India[4-14]. Additionally, most nurses in India are women who also bear the responsibilities of caring for their families, which further elevates their physical and mental burdens. Indian nurses seem to face a greater risk of developing musculoskeletal disorders compared to their counterparts in Western countries. A recent systematic comparison study comparing OWAS, RULA, and REBA scales shows that risk levels assessed by the RULA were more significantly associated with MSDs than with those by the OWAS and REBA, and the intra- and inter-reliabilities for the RULA were not low, and RULA is better suited for assessing postural loads and the association with MSDs[15]. Among previous studies, studies using the RULA scale to evaluate WRMSD among staff nurses were very few. So, in this study, we are using the RULA scale for assessing WRMSD among staff nurses. The Department of Physical Medicine and Rehabilitation has proposed to conduct a cross-sectional study on work-related musculoskeletal disorders among staff nurses. Hence, this study was conducted to assess the workspace postural position and its relation to musculoskeletal strain patterns. The findings of the study can be utilised to plan and evaluate workplace interventions to reduce the burden of MSD among nurses.

4. Materials and Methods

Study Design: Descriptive cross-sectional study.
Study Population: Staff nurses working in the Government Kilpauk Medical College, Chennai.
Study Area: Government Kilpauk Medical College, Chennai
Study Duration: 2 months (Dec 2023- Jan 2024)
Inclusion Criteria:

1. Willing to participate.
2. Staff nurses working in Govt. Kilpauk Medical College Hospital, Chennai.
3. Staff nurses working at a tertiary care hospital for at least one year.

Exclusion Criteria:

1. Not willing to participate.
2. Pregnant.
3. Any major injuries, trauma, or major medical conditions that lead to musculoskeletal disorders.

Sample Size: Prevalence of the most common musculoskeletal disorders from a previous study is 44.1%. Power of the study is 80%, Confidence level is 95%, desired accuracy is 10. So, the sample size required for the study is 110. N=4pq/ d2=4*44.1*55.9/100=99. To add 10% non-responders, N=99+10=109. Round of into 110.
Sampling Method: A Simple Random sampling technique will be used for this study. All eligible participants were added to the study till to achieve the sample size of 110 was achieved.
Outcome Measures:

1. Nordic score - Site of pain and Interference with work and work ability due to pain
2. Rapid Upper Limb Assessment (RULA) score- the awkward posture causing pain- using the posture for

upper and lower arm, wrist, Neck, Trunk, legs, load carried is interpreted using the RULA table and graded as below.

RULA score Interpretation

1 - 2 Negligible risk, no action required 3 – 4 Low risk, Change may be needed

5 – 6 Medium Risk, Further investigation, change soon

6 + Very high risk, Implement change now

Study Procedure:

1. Nurses working in Govt. Kilpauk Medical College Hospital, Chennai, are selected for the study as per the inclusion and exclusion criteria.
2. Informed consent obtained.
3. Basic details, Co-morbidities, Lifestyle, No. of years of experience, No. Hours of work per day, Number of days of work per week, Height, Weight and Duration and intensity of pain, Sickness absence due to pain and impact of back pain in daily activities, management of pain recorded.
4. Study questionnaire data filled out about MSK pain.
5. RULA score documented.
6. Participants were allowed to work at their own workplace for approximately 15min while postures and interaction were observed. The RULA score was recorded on paper and was later input into a spreadsheet that calculated the RULA final score.
7. The questionnaire is in English and will be communicated to the staff nurses.

5. Data Collection and Statistical Analysis

- Data collection will be done after getting approval from the institutional ethics committee.
- Data will be entered in Microsoft Excel, and analysis will be done by SPSS 22.0.
- Prevalence of work-related musculoskeletal disorders among staff nurses will be given as a percentage.
- The association between working posture and musculoskeletal pain will be identified.

5. Results

Total No of Participants: 110

Table 1 provides the age distribution of the participants. It shows that the minimum age is 28 years, the maximum age is 50 years, the mean age is 39.2 years, and the standard deviation is 5.3 years.

Tabel 1. Age distribution

	N	Minimum (Years)	Maximum (Years)	Mean (Years)	Std. Deviation (Years)
Age	110	28.00	50.00	39.2	5.3

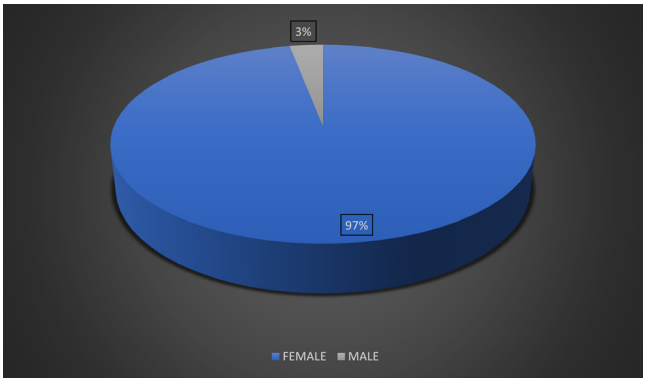

Figure 1. Gender distribution of the participants.

It shows that 97% of the participants are female and 3% are male.

Table 2. BMI

	N	Minimum (kg/m^2)	Maximum (kg/m^2)	Mean (kg/m^2)	Std. Deviation (kg/m^2)
BMI	110	20.00	28.00	23.31	1.65

Table 2 presents the Body Mass Index (BMI) of the participants. The minimum BMI is 20.00 kg/m^2, the maximum BMI is 28.00 kg/m^2, the mean BMI is 23.31 kg/m^2, and the standard deviation is 1.65 kg/m^2.

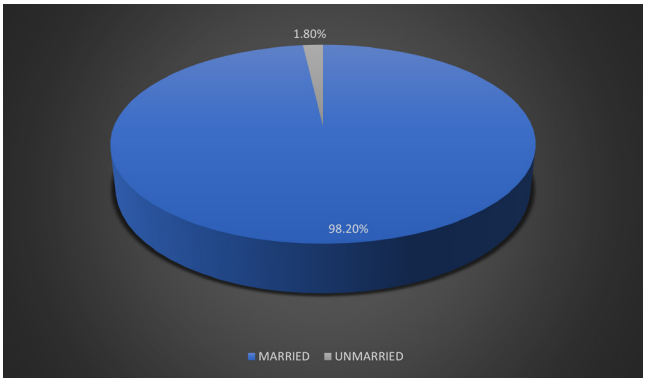

Figure 2. Marital status of the participants.

It indicates that 98.20% of the participants are married, while 1.80% are unmarried.

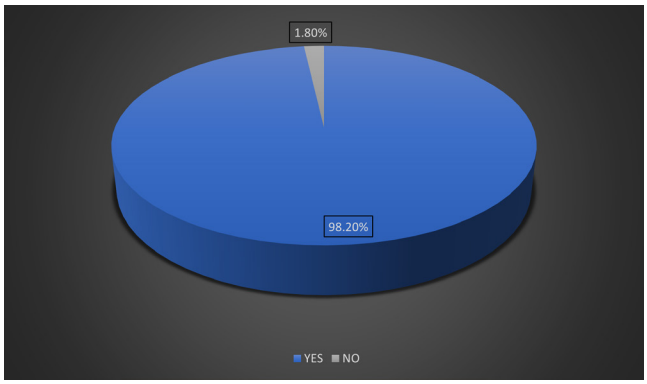

Figure 3. Percentage of participants who have children.

Table 3. Comorbidities

	Frequency	Percent
No	92	83.6
Yes	18	16.4
Total	110	100.0

It reveals that 98.20% of the participants have children, while 1.80% do not.

Table 3 outlines the presence of comorbidities among the participants. It shows that 83.6% of the participants do not have comorbidities, while 16.4% do.

5.1 Job Description

It shows that 10.0% work in the ICU, 10.9% in the operating theatre, 21.8% in outpatient services, and 57.3% in ward duty.

Table 5 provides information about the duty shifts of the participants. It shows that 72.7% work during the day shift, while 27.3% work during the night shift.

5.2 Working Hours Per Day

For night duty: 12 hours

For day duty: 6 hours

Table 6 indicates whether participants work overtime. It shows that 67.3% of the participants work overtime, while 32.7% do not.

Table 7 presents data on whether participants manually lift patients. It shows that 23.6% of the participants manually lift patients, while 76.4% do not.

Table 8 provides information on whether participants are taking treatment for pain. It shows that 27.3% of the participants are taking treatment for pain, while 72.7% are not.

Table 4. Working place inside the hospital

	Frequency	Percent
ICU	11	10.0
Operation Theatre Duty	12	10.9
Outpatient	24	21.8
Ward Duty	63	57.3
Total	110	100.0

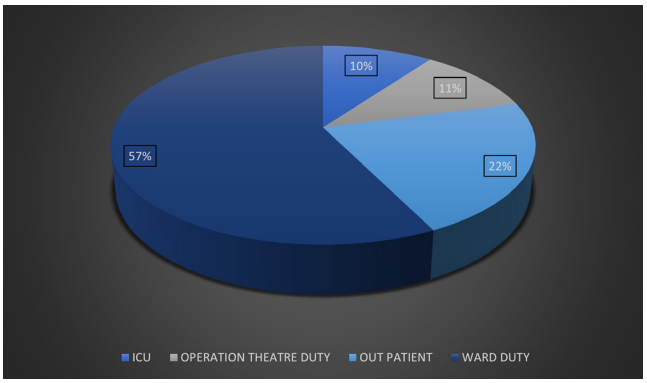

Figure 4. Working places of the participants within the hospital.

Table 5. Duty shift

	Frequency	Percent
Day	80	72.7
Night	30	27.3
Total	110	100.0

Table 6. Working overtime

	Frequency	Percent
Yes	36	67.3
No	74	67.3
Total	110	100.0

Table 7. Manual lifting of patients

	Frequency	Percent
Yes	26	23.6
No	84	76.4
Total	110	100.0

Table 8. Taking treatment for the pain

	Frequency	Percent
Yes	30	27.3
No	80	72.7
Total	110	100.0

Table 9. Comparison between work days and off days

		Mean	Std. Deviation	Mean difference	95%CI of difference		p Value
					Upper	Lower	
Pain Scale (Score)	Work Days	5.4	1.4	1.7	2.07	1.36	**0.000***
	Off Days	3.7	1.3				

*Significance p<0.05

5.3 Pain Scale

Table 9 compares the pain scale scores between workdays and off days. It shows that the mean pain score on workdays is 5.4 with a standard deviation of 1.4, while the mean pain score on off days is 3.7 with a standard deviation of 1.3. The mean difference is 1.7, with a 95% confidence interval of 2.07 to 1.36, and a p-value of 0.000, indicating statistical significance.

Table 10 and Figure 5 present the risk assessment by RULA score. It shows that 51.8% (57) of the participants are at negligible risk, 45.5% (50) are at low risk, and 2.7% (3) are at medium risk.

Table 11 compares the working posture with the risk assessed by the RULA score. It shows that in the ICU, 9.1% are at negligible risk and 90.9% are at low risk. In the operating theatre, 75.0% are at low risk, and 25.0% are at medium risk. In outpatient services, 95.8% are at negligible risk, and 4.2% are at medium risk. In ward duty, 52.4% are at negligible risk, and 47.6% are at low risk. The p-value is 0.000, indicating statistical significance.

Nordic MSK Questionnaire

Specific Body Parts:

Table 10. Risk assessment by RULA score

	Frequency	Percent
1 – 2 (Negligible Risk)	57	51.8
3 – 4 (Low Risk)	50	45.5
5 – 6 (Medium Risk)	3	2.7
Total	110	100.0

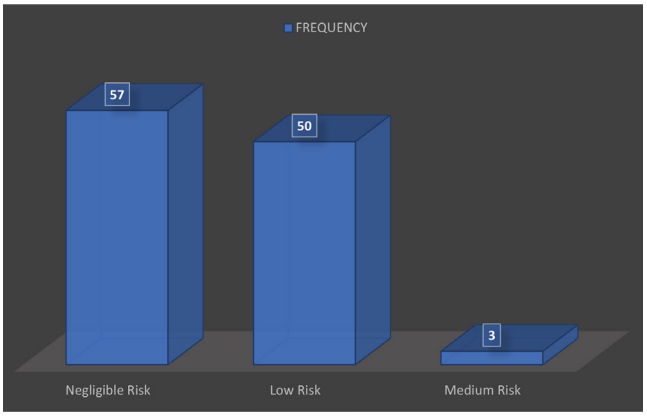

Figure 5. Risk assessment by RULA score.

Table 11. Working posture vs risk assessed by RULA score

			RULA Score Interpretation			Total
			Negligible Risk	Low Risk	Moderate Risk	
WORKING PLACE	ICU	Count	1	10	0	11
		% within working posture	9.1%	90.9%	0	100.0%
	OPERATION THEATRE DUTY	Count	0	9	3	12
		% within working posture	0.0%	75.0%	25.0%	100%
	OUT PATIENT	Count	23	0	1	24
		% within working posture	95.8%	0	4.2%	100%
	WARD DUTY	Count	33	0	30	63
		% within working posture	52.4%	0	47.6%	100%
Total		Count	57	3	50	110
		% within working posture	51.8%	2.7%	45.5%	100.0%
p Value 0.000, Chi-Square test done						

Table 12 provides information on the specific body parts where participants have experienced pain. It shows that 29.1% have neck pain, 23.6% have shoulder pain, 17.3% have elbow pain, 4.5% have wrist/hand pain, 33.6% have upper back pain, 68.2% have lower back pain, 21.8% have buttock/thigh pain, 11.8% have knee pain, and 26.4% have ankle/foot pain.

Table 13 and Figure 6 indicate the presence of pain in the last 12 months. It shows that 56.4% of the participants have experienced pain in the last 12 months, while 43.6% have not.

Table 12. Specific body parts

	Yes		No	
	Frequency	**Percent**	**Frequency**	**Percent**
Neck	32	29.1	78	70.9
Shoulder	26	23.6	84	76.4
Elbow	19	17.3	91	82.7
Wrist/ Hands	5	4.5	105	95.5
Upper Back	37	33.6	73	66.4
Lower Back	75	68.2	35	31.8
Buttock/ Thigh	24	21.8	86	78.2
Knee	13	11.8	97	88.2
Ankle/ Foot	29	26.4	81	73.6

Table 13. Presence of pain in the last 12 months

	Frequency	Percent
Yes	62	56.4
No	48	43.6
Total	110	100.0

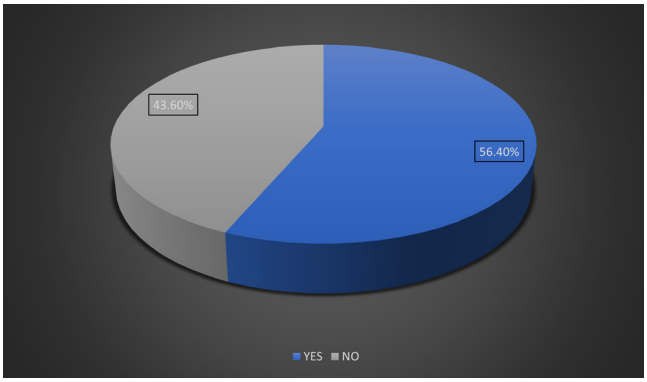

Figure 6. Presence of pain in the last 12 months.

Table 14 and Figure 7 indicate the presence of pain in the last 7 days. It shows that 49.1% of the participants have experienced pain in the last 7 days, while 50.9% have not.

Comparison of pain between the last 1 year and vs last 7 days

Table 15 and Figure 8 compare the presence of pain in the last 12 months with the presence of pain in the last 7 days. It shows that among those who did not experience pain in the last 12 months, 76.8% did not experience pain in the last 7 days, and 9.3% did. Among those who experienced pain in the last 12 months, 23.2% did not experience pain in the last 7 days, and 90.7% did. This difference was statistically significant, p-value 0.000

Table 14. Presence of pain in the last 7 days

	Frequency	Percent
YES	54	49.1
NO	56	50.9
Total	110	100.0

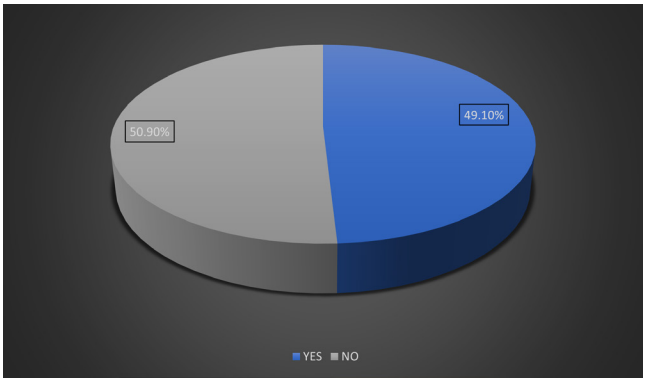

Figure 7. Presence of pain in the last 7 days.

Table 15. Last 1 year vs last 7 days

			Last 7 Days		Total
			No	**Yes**	
Last 12 months	No	Count	43	5	48
		% Within Last 7 Days	76.8%	9.3%	43.6%
	Yes	Count	13	49	62
		% Within Last 7 Days	23.2%	90.7%	56.4%
Total		Count	56	54	110
		% Within Last 7 Days	100.0%	100.0%	100.0%

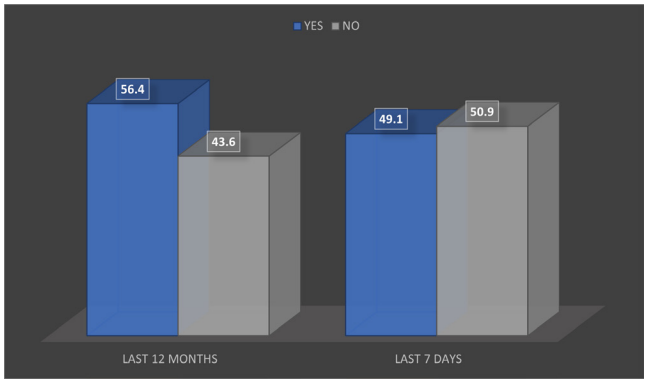

Figure 8. Last 1 year vs last 7 days.

5 Discussion

The prevalence of musculoskeletal disorders is 56.4%. Musculoskeletal symptoms occurred most commonly in the lower back (68.2%), upper back (33.6%), neck (29.1%), shoulders (29%), ankles and feet (26.4%), and shoulder (23.6%). The 12-month period and the last 7-day period of WMSDs at any region were 56.40% and 49.10% respectively. Comparing the workplace with the risk assessed by the RULA score shows that in the ICU, 9.1% are at negligible risk and 90.9% are at low risk. In the operating theatre, 75.0% are at low risk, and 25.0% are at medium risk. In outpatient services, 95.8% are at negligible risk, and 4.2% are at medium risk. In ward duty, 52.4% are at negligible risk, and 47.6% are at low risk. The p-value is 0.000, indicating statistical significance. Of which the Majority have a RULA score of 2 and 3 categories, indicating a low risk for injury and a need for ergonomic intervention.

6. Summary and Conclusion

Work-related musculoskeletal disorders are common among nurses, and lower back pain is the most common symptom. It is advisable to implement educational programs focused on prevention and coping strategies for musculoskeletal disorders among nurses to lower the incidence of workplace hazards and enhance the quality of patient care. The RULA scale can be used for ergonomic screening, recommending workstation modifications, and testing the effectiveness of ergonomic interventions.

7. Limitation

- Small sample size
- Pain can be overrated or underrated.
- The Quality of life, Job satisfaction component of the staff nurses has to be studied in detail.

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