

To Compare The Ergonomic Evaluation Of Working Posture And Musculoskeletal Complaints In Nurses Of Hospitals In Pune Region

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Abstract:

To study and to compare the ergonomic evaluation of working posture and musculoskeletal complaints in nurses of hospitals in Pune Region.

Background: Nurses are subjected to musculoskeletal disorders for the reason of working situations and pressures. Although ergonomic risk assessment tools have been used for the early detection of risky working postures, their operational procedures and validations do not target the competence of occupational nursing personnel. The profession-related activities of nurses have ergonomic risk factors. A lack of knowledge about the correct performance of these activities can cause musculoskeletal problems.

Materials and Methods: In this prospective conventional study, 67 Nurses of hospitals working in Pune region belonging to age group of 29-45 years working in general wards. The nurses who had the work experience of minimum of 7 years and maximum of 20 years were included. The material used were REBA (Rapid Entire Body Assessment) and Nordic Musculoskeletal pain questionnaire to evaluate the working posture of nurses during dressing help, saline administration/injecting medicine, blood administration and to evaluate pain in the body region.

Results: The observational study which included total 67 participants which are nurses in which there were female 59(88%) and males 8 (12%) with average age of 36.7 ± 4.4 years and working experience of 13.4 ± 2.7 . There is a significant in the p value (P value < 0.05) which indicates there is a correlation of improper posture and musculoskeletal pain among the nurses in general ward in Pune region.

Conclusion: This study concludes that there is a significant in the p value (P value < 0.05) which indicates there is a correlation of improper posture and musculoskeletal pain among the nurses in general ward in Pune region. Due to long standing hours, daily working hours, duration of working in general wards and repetitive working in saline administration, Blood sampling/ Injecting medicine, Dressing help and administrative work contribute to wrong and improper working posture adaptation. The findings showed that this study population needs ergonomic interventions and educational programme to improve working posture, which can afterwards help to promote their health and well-being

Key Word: Rapid entire body assessment, Musculoskeletal disorders, Work-related Musculoskeletal disorders

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I. Introduction

Nurses play an integral role in the healthcare industry, providing care to the patients and carrying out leadership roles in hospitals, health systems and other organizations. Nurses are exposed to Work-related Musculoskeletal Disorders (WMSD) risk factors mainly due to bio-mechanical overload caused by patient handling, among other tasks. In order to specifically assess the nurses' patient handling risks and also to evaluate their musculoskeletal symptoms frequency. Work related musculoskeletal disorders (WMSDs) are defined as musculoskeletal disorders that result from a work related event. Work related musculoskeletal disorders are the leading causes of work disability. The most common WMSDs are low back pain, redness in the calf muscle and sciatica, knee and ankle pain, neck, upper limbs and shoulder pain, etc. Studies revealed that nurses suffer most injuries when handling patients and standing or working for long time in awkward posture. The posture of working nurses in Hospitals has received very limited attention hence it is necessary to evaluate the ergonomic position of working nurses in Hospitals and by this study we can assess the working positions in nurses so as to initiate the preventive measures for those who have inappropriate posture during working which can contribute to development of musculoskeletal disorders and make them aware and give advice's about correct postures, to decrease risk of further musculoskeletal disorders.

II. Material And Methods +

An observational study was carried out between September-March 2023-2024 in hospitals including government and private hospitals of Pune Region, study included total 67 participants which are nurses in which there were Females 59(88%) and Males 8(12%) with average age of 36.7 ± 4.4 years and 13.4 ± 2.7 years of work experience were included for this study.

Study Design: Observational study

Study Location: This was a observational hospital based study done in Pune region.

Study Duration: September 2024 to March 2024.

Sample size: 67 subjects.

Sample size calculation: Where level of confidence (Z) is 90% ,margin error (d) is 10%, prevalence (p) is 47%

$$n = \frac{(0.9)^2 \cdot 0.47(1-0.47)}{(0.1)^2}$$

$$n = 67$$

The sample size was estimated on the basis of a convenient sampling method. We assumed that the margin error is 10 % , prevalence is 47 % and confidence level of 90%. The sample size actually obtained for this study was 67 subjects.

Subjects & selection method: The subjects were the nurses working in both private and government hospitals in Pune region. Ruby hall Hospital Pune main branch , Kamla Nehru Hospital Pune, Noble Hospital hadapsar Pune , Sahyadri Hospital , Sasoon Hospital Pune, Kamalnayan hospital Pune , KEM hospital Pune.

Inclusion criteria:

1. Age between 29 - 45
2. Both Genders
3. Nurses working in general wards
4. Working hours - more than 7-8 hours.
5. Working experience minimum 7 years and maximum of 20 years.

Exclusion criteria:

1. Subjects with Musculoskeletal complaints due to injuries outside of workplace.
2. Subjects who are pregnant or less than 1 year postpartum.

Procedure methodology

After Clearance from the ethical committee taken. Patient's consent was taken by giving consent form. Followed by recruiting the patients as per the inclusion criteria. The evaluation includes taking a photo of the subject with their consent while they are doing their working tasks such as REBA-during Saline infusion , Blood sampling and injecting medicine , dressing help. Nordic musculoskeletal questionnaire for evaluating if subject has any pain in the body. Data was collected and statistical analysis was done by comparing the REBA score and the pain score.

Statistical analysis

Data analysis was done using Chi-square test for assessing activity scores of REBA(Rapid Entire Body Assessment)and Nordic Scale results for 67 participants. The statistical significance was set at ≤ 0.05 and the confidence interval was at 95%.

III. Result

An observational study was carried out between September-March 2023-2024, study included total 67 participants which are nurses in which there were Females 59(88%) and Males 8(12%) with average age of 36.7 ± 4.4 years and 13.4 ± 2.7 years of work experience. The results are shown as below :-

Table no 1 The table shows that there are 59 (88%) females and 8 (12%) males.

Table no 1 : Gender of Participating Nurses

Gender	No. of people	Percentage
Male	8	12%
Female	55	88%

Table no.2 The table shows that the REBA score in activity of the following :-

1. Dressing help of 55 nurses were in the moderate risk (82%) and 12 nurses were in high risk (18%).
2. Saline administration of 59 nurses were in the moderate risk (88%) and 8 nurses were in high risk (12%)

3. Blood sampling/injecting medicine of 56 nurses were in the moderate risk (84%) and 11 nurses were in high risk (16%) .

Table no. 2 Assessment of Working Posture of Nurses using REBA Score for different activities

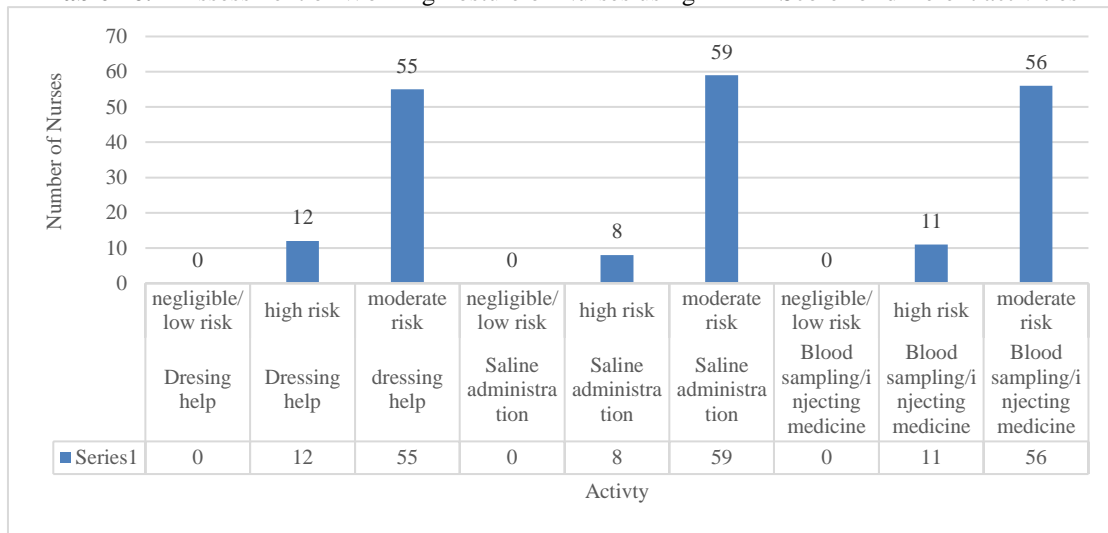


Table no 3 This table shows that nurses suffering from musculoskeletal neck pain. There were 23 nurses (34%) nurses who had trouble in the neck region and 44 nurses (65%) were not having any pain in last 12 months. There were 22 nurses (32%) who had pain at any time during the last 12 months were been prevented from doing the normal work due to pain neck region and 45 (67%) nurses were not having any pain in last 12 months. There were 30 nurses (44%) who had trouble in neck region during the last 7 days and 37 nurses (55%) were not having any pain in last 7 days.

Table no 3 Assessment of the musculoskeletal neck region complaints in Nurses using Nordic Scale

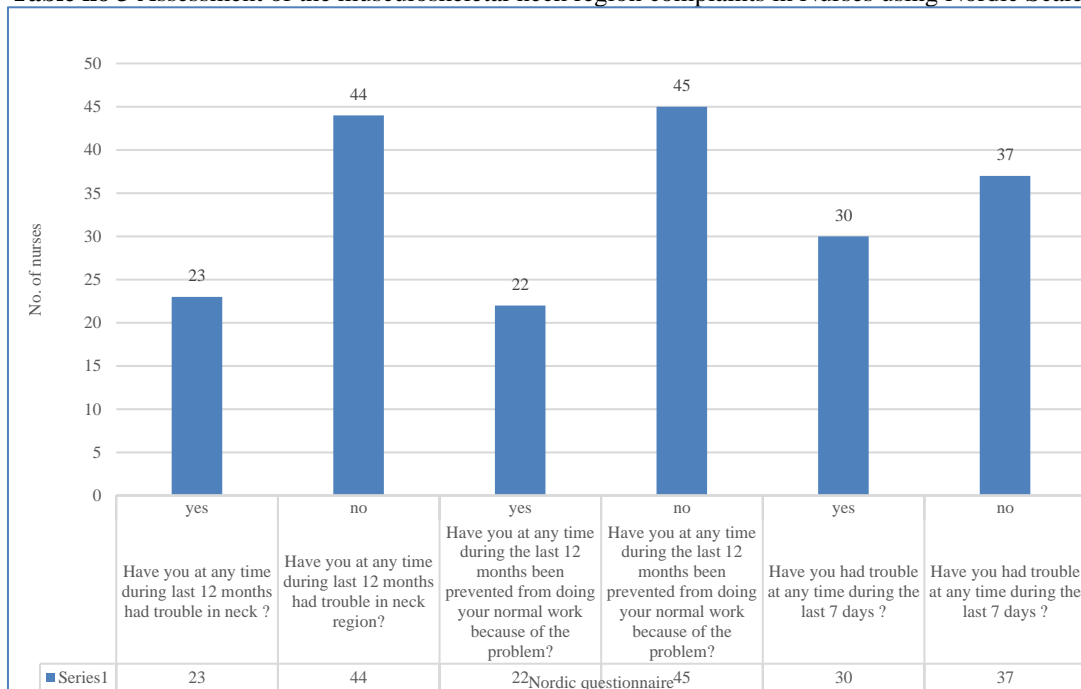


Table no 4 This table shows that nurses suffering from musculoskeletal lower back pain. There were 44 nurses (65%) nurses who had trouble in the lower back region and 23 nurses (34%) were not having any pain in last 12 months. There were 45 nurses (67%) who had pain at any time during the last 12 months were been prevented from doing the normal work due to pain lower back region and 22 nurses (32%) were not

having any pain in last 12 months. There were 37 nurses (55%) who had trouble in lower back region during the last 7 days and 30 nurses (44%) were not having any pain in last 7 days.

Table no 4 Assessment of the musculoskeletal low back region complaints in Nurses using Nordic Scale

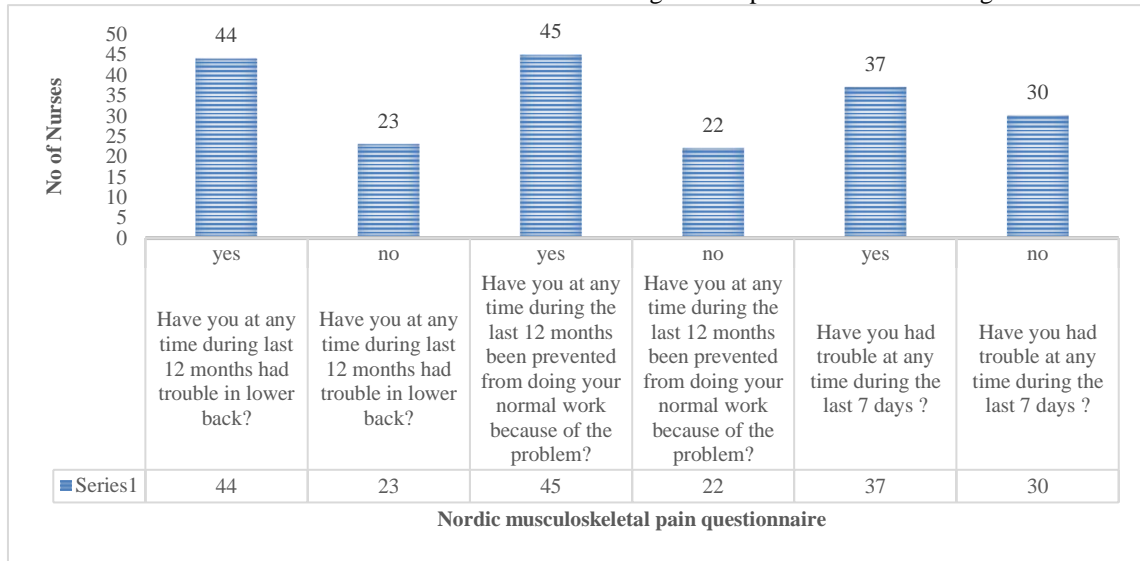


Table no 5 The table shows the activity scores obtained from REBA activity score Nordic Musculoskeletal pain questionnaire readings showed that -

1. Trouble in the last 7 days may be related to risks of Saline Administration.
2. At any time during the last 12 months been prevented from doing the normal work due to neck and back pain may be related to the risk of Blood Sampling/ Injecting Medicine.
3. At any time during the last 12 months been prevented from doing the normal work due to neck and back pain and trouble in the last 7 days may be related to the risks of dressing help.

Table no 5 Comparison of the risk observed in REBA with the musculoskeletal complaints of the Nurses

Activity	Activity Score	Trouble in lower back during last 12 months		P-value	Obstruction in normal work during the last 12 months due to back pain		P-value	Trouble in the last 7 days		P-value
		Yes	No		Yes	No		Yes	No	
Saline Administration	High Risk	8	0	0.594	6	2	0.183	8	0	0.015
	Moderate Risk	55	4		30	29		33	26	
Blood sampling/ Injecting medicine	High Risk	11	0	0.479	10	1	0.007	9	2	0.114
	Moderate Risk	52	4		26	30		32	24	
Dressing help	High Risk	12	0	0.445	11	1	0.003	11	1	0.015
	Moderate Risk	51	4		25	30		30	25	

IV. Discussion

This study aims to find the Ergonomic evaluation of the working posture and musculoskeletal pain complaints in Pune city. Nurses routinely perform activities that require lifting heavy loads, lifting patients, working in awkward postures, and transferring patients out of bed and from the floor. These work tasks put nurses at high risk for acute and cumulative Work-related musculoskeletal disorders. Several authors have reported the prevalence of MSD among nurses in the developed populations worldwide. However, data on ergonomic evaluation on working posture with the musculoskeletal complaints are limited in the general ward nurses in Pune region.

According to Sathish kumar jaypal in his research Historical Trajectory of Men in Nursing in India had an alternative opinion over the gender in the nursing profession. Nursing profession has continued to be a female-

dominated profession despite equal opportunity legislation has been passed in many countries. This shows that nursing is mainly an female dominant professional. In India, at least 20.5% of nurses in 2018 were male, according to a World Health Organization report on the country's health workforce in India . It's been observed that nursing has been a generally female-dominated profession. Women have made significant contributions to the nursing field, and patient care is not determined by gender. Based on the research there are 59 (88%) females and 8 (12%) males. According to a WHO report from 2018 , there are 20.5% male nurses and around 80% female nurses in India. Hence, this graph significantly shows a dominance of female nurses over male nurses.

According to the research and article by Mamta Israni , Neeta J Vyas , Megha S Sheth in Prevalence of Musculoskeletal disorders among nurses.: Nurses are at risk of musculoskeletal disorders (MSD) due to their occupation. Prolonged hours of standing in operation theatre, frequent forward bending for dressing, I.V. line insertion and giving injections & carrying heavy weight are common risk factors. Some studies have shown that physical and psychological demands might cause health care workers to leave their profession . For managing and reducing the risk of MSDs among high risk group of work forces such as nurses, estimation of prevalence of MSDs is mandatory. Also, according to Chen et al. indicated that influential factors that contribute to MSD include age, work seniority, work content, working hours, number of hours worked per week, amount of time standing or walking during work, stress levels from work, and exercise habits. Ko et al. discovered a significant correlation between turning or moving patients and pain and discomfort in the lower back. Bazazan et al. investigated the association of MSD and workload with work schedule and job satisfaction among emergency care nurses, and found a significant negative correlation between MSDs prevalence in all body regions, with the exception of the hips/thighs, and degree job satisfaction.

Based on the research maximum people work for 12 years being the full time job being 12 people (17.9%) from which it can be noted that people work for those many years in the hospital continuously which causes many musculoskeletal disorders due to bad postural adaptation.

A similar research was done by Farahnaz Abdollahzade ,Fariba Mohammadi, Iman Dianat , Elnaz Asghari, Mohammad Asghari-Jafarabadi, and Zahra Sokhanvar were able to find in their research that there was relatively high REBA scores in nurses in this highlight a poor working condition and suggest that the nurses' postures at their work stations need urgent investigation and prompt changes are required. A number of significant relationships between working postures and demographic and job characteristics in this study add to the understanding of the working posture of nurses and emphasize the need for ergonomic interventions and educational programs for improving the health and well-being of this working group. Working postures of nurses at their workstations were evaluated using the Rapid Entire Body Assessment (REBA) method, which is a reliable and validated observational method. This tool gives a specific scoring method for recording posture of each body part (e.g. neck-trunk-legs and shoulders-elbow-wrist), which is based on various static or dynamic movements, movements with rapid changes and unstable positions.

The overall REBA score ranges from 1 to 15, with higher scores showing the more problematic postures. An overall REBA score relates to one of the five action levels: Action level 0 (score of 1) which means that the risk could be overlooked and there is no need to change the current status; Action level 1 (scores of 2-3) that means low risk in which change in position might be needed; Action level 2 (scores of 4-7) which means moderate risk that necessarily requires a change in position; Action level 3 (scores of 8-10) which means high risk with quick necessity to apply changes in position; and Action level 4 (scores of 11-15) which means great risk that requires urgent position change. The present study examined the working postures of nurses while doing three main activities in their job including Saline Administration, Blood sampling/Injecting medicine. The observations and recordings of working postures were carried out by only one investigator, using a three separate REBA assessment sheet for each individual nurses for recording the REBA scores.

Based on our Research the REBA score in activity of Dressing help of 55 nurses were in the moderate risk (82%) and 12 nurses were in high risk (18%) of modification. The REBA score in activity of Saline administration of 59 nurses were in the moderate risk (88%) and 8 nurses were in high risk (12%) of modification. The REBA score in activity of Blood sampling/injecting medicine of 56 nurses were in the moderate risk (84%) and 11 nurses were in high risk (16%) of modification.

In our study standing and bending forward in general ward for prolonged hours, frequent forward bending for dressing, I.V. line insertion and giving injections & carrying heavy weight might be leading factors for back pain and neck pain .It seems that depending on the policy, work regulation, psycho-social environment and use of new technologies, the improper or awkward posture for a longer duration contributes to the overall ranking of each site of body affected by Musculoskeletal disorders are different. The findings from this study may help to understand the need for prevention and coping strategies for ergonomic evaluation and musculoskeletal disorders among nurses in order to reduce rate of occupation hazards and also improve patient care. Different work distribution, shift organization, a better ratio between nurses and patients, an improvement of equipment provision, and specific nurse-training with application of ergonomic methods could improve work efficiency radically and decrease injury rates.

The tasks which people perform at work and generally in life involve posture and movement, and these play a central role in ergonomics. The body's muscles, ligaments and joints are involved in adopting a posture, carrying out movement and applying force. The muscles provide the force necessary to adopt a posture or make a movement. The ligaments have an auxiliary function, while the joints allow the relative movement of the various parts of the body (Dul & Weerdmeester, 2001)

Physical stress is caused by muscle strain, mostly of the neck, upper limb and lower back regions, associated with repetitive movements and sustained positions. The study suggested that improvement of organizational features combined with better workplace layouts, would reduce physical and psychological stressors, resulting in balanced work life, more efficiency and productivity. A study by Ryland, Nelson and Hejkal (2010) showed that bent and twisted postures, if repeated over long periods of time, can result in MSDs. The study was conducted in theaters where doctors operated on infant surgical tables, which were found to be of inappropriate design and height for a comfortable working environment. When the tables were replaced with ergonomically modified ones, the working posture of doctors improved and repeated movements reduced. These resulted in reduced symptoms of MSDs. In order to reduce the risk factors contributing to the development of MSDs, it is necessary to first determine which risk factors are present.

Based on our research there is a significant change in the p value (P value <0.05) which indicates there is a correlation of improper posture and musculoskeletal pain among the nurses in general ward in Pune region. Due to long standing hours, daily working hours, duration of working in general wards and repetitive working and administrative work contribute to wrong and improper working posture adaptation. In uni-variate analyses, there was a statistically significant correlation between working posture and age. The findings showed that this study population needs ergonomic interventions and educational programme to improve working posture, which can afterwards help to promote their health and well-being.

V. Conclusion

This study concludes that there is a significant in the p value (P value <0.05) which indicates there is a correlation of improper posture and musculoskeletal pain among the nurses in general ward in Pune region. Due to long standing hours, daily working hours, duration of working in general wards and repetitive working in saline administration, Blood sampling/ Injecting medicine, Dressing help and administrative work contribute to wrong and improper working posture adaptation. The findings showed that this study population needs ergonomic interventions and educational programme to improve working posture, which can afterwards help to promote their health and well-being.