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A study to assess the effectiveness of ergonomic interventions on mechanical back pain and functional disability among the staff nurses at selected hospital

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Abstract
Ergonomics deals with the interaction of technological and work situations with the human being. Ergonomic exercises include hand stretches, arm stretches and back stretches. Prevention measures for the reduction of mechanical back pain are exercise, diet, cessation of smoking, maintain body weight, standing, sitting and lifting posture, do not lift and twist at the same time, moving things, driving. A Study was conducted to assess the effectiveness of ergonomic interventions on mechanical back pain and functional disability among the staff nurses at selected hospital in Chennai. A pre experimental one group pre-test post-test design. Thirty staff nurses with mechanical back pain and functional disability who fulfilled the inclusion criteria, were selected by purposive sampling technique. To assess the pre-test level of mechanical back pain and functional disability by using the Numerical pain scale and Oswestry low back pain disability questionnaire. Ergonomic intervention of quadriceps stretch, hip flexor stretches, abductor stretch, hamstring stretch, dynamic hamstring stretches, supine butt lift with arms at side and weak gluteal muscles was given for 30 minutes daily for 14 days. A post-test was conducted to assess the level of mechanical back pain and functional disability by using the same Numerical pain scale and Oswestry low back pain disability questionnaire after one month. The study findings showed that the pre-test mean score was 3.03 with standard deviation was 1.07 and post-test mean score was 5.90 with standard deviation 2.98. The paired 't' test value of 21.07, was very highly significant at $p<0.001$ level. The comparison of mean and standard deviation between pre-test and post-test level of functional disability among the staff nurses. The paired 't' test value of 17.61 was very highly significant at $p<0.001$ level.

Keywords: Ergonomics, mechanical back pain, functional disability

Introduction
Nurse's experience significant physical and psychological demands during their day, as well as a work safety climate that can be adverse. The hazards of nursing work can impair health both acutely and in the long term. These health outcomes include musculoskeletal injuries/disorders and thereby functional disability, infections, changes in mental health, and in the longer term, cardiovascular, metabolic, and neoplastic diseases. Compared to other occupations, nursing personnel are among the highest at risk for musculoskeletal disorders.

According to World Health Organization low back pain statistics, the lifetime prevalence of non-specific (common) low back pain is estimated at 60–70% in industrialized countries (one-year prevalence 15-45%, adult incidence 5% per year). The prevalence rate for children and adolescents approaches that seen in adults. It then increases and peaks between ages 35 and 55.

According to American Nurses Association survey records, the Occupational Safety and Health Administration has calculated that nearly half of all healthcare workers suffer at least one work-related musculoskeletal injury during their career. More than half of all nurses (52%) complaints of chronic pain and 38% of registered nurses have suffered occupational-related back injuries severe enough to require time away from work. About 12% of registered nurses consider leaving the profession due to lower back pain and in their survey, almost 60% of nurses list disabling back injuries as one of the top three health safety issues. During the stressful situations, even the most experienced staff members can forget the importance of ergonomics. Hence, nurses are at an increased risk for work-related musculoskeletal injuries as a result of the cumulative effect of manual patient handling task. According to India.

Results

Among 384 staff nurses 285 (74.2%) nurses had low back pain. Among the low back pain cases, 18 (4.7%) cases were diagnosed by health care professionals and 15 (3.9%) cases were on regular treatment. Severe pain was found among 16 (4.2%) samples. 162 (42.2%) staff nurses experienced pain on lumbar region. As an investigator personally had an experience of low back pain, when worked as a staff nurse in the hospital, even my friends changed their profession because of the low back pain.

Ergonomics is an approach or solution to deal with a number of problems - among them are work-related musculoskeletal disorders. Benefits of ergonomics lower costs, higher productivity, better product quality, improved employee engagement, better safety culture.

Statement of the Problem

A study to assess the effectiveness of ergonomic interventions on mechanical back pain and functional disability among the staff nurses at selected hospital in Chennai.

Objectives

- To assess the level of mechanical back pain and functional disability among the staff nurses.
- To determine the effectiveness of ergonomic interventions on mechanical back pain and functional disability among the staff nurses.
- To find the association between the post-test level of mechanical back pain and functional disability among the staff nurses with their selected demographic variables.

Hypothesis

- **H_1:** There is a significant difference between the pretest and posttest level of mechanical back pain and functional disability after the administration of ergonomic interventions among the staff nurses.
- **H_2:** There is a significant association between the posttest level of mechanical back pain and functional disability and selected demographic variables among the staff nurses.

Methodology

Quantitative research approach was adopted for the study. A Pre experimental one group pretest and posttest was used to conduct the study. The study was done on 30 staff nurses selected by non-probability purposive sampling technique with mechanical back pain and functional disability who fulfilled the inclusion criteria. The sampling criterion includes staff nurses who were all working at selected hospital in Chennai. The data was collected through Numerical pain scale assessment and Oswestry low back pain disability questionnaire. Before collecting the data formal permission was obtained from the concerned authority by explaining the purpose and objectives of the study. After the permission, verbal consent was obtained from staff nurses. Ergonomic intervention included demonstration regarding exercising various body parts performed to reduce mechanical back pain for 30 minutes per day. It includes quadriceps stretch, hip flexor stretches, abductor stretch, hamstring stretch, dynamic hamstring stretches, supine butt lift with arms at side and weak gluteal muscles. Daily follow up will be done by doing the regular visit. A posttest assessment was conducted after one month in the form of Numerical pain scale assessment and Oswestry low back pain disability questionnaire.

Results and Discussion

The data collected was analyzed using descriptive and inferential statistics. The demographic variables of staff nurses with respect to the age, 16 (53.3%) were in the age group of 25-30 years, 11 (36.7%) were in the age group of 31-35 years and 3 (10.0%) were in the age group of 36-40 years. Related to gender 5 (16.7%) were male, 25 (83.3%) were female.

In accordance with educational status of staff nurses, 5 (16.6%) were completed GNM, 22 (73.3%) were completed PBBSc, (N), 3 (10.0%) were completed BSc (N). With regard to monthly income of staff nurses, 13 (43.3%) were earning Rs.10, 000 – Rs.15, 000, 17 (56.7%) were earning Rs. 15,001- Rs.20, 000 and none of them were earning above Rs.20, 000.

Regarding marital status of staff nurses, 19 (63.3%) were single, 11 (36.7%) were married and none of them were widow. In accordance with type of family in staff nurses, 20 (66.7%) were living in nuclear family and 10 (33.3%) were living in joint family. Related to working unit of staff nurses, 5 (16.7%) were working in emergency and trauma, 16 (53.3%) were working in ICU and 9 (30.0%) were working in OT.

Considering years of clinical experience of staff nurses, 3 (10.0%) were having less than 3 years of clinical experience, 24 (80%) were having 3 to 5 years of clinical experience and 3 (10.0%) were having more than 5 years of clinical experience. With regard to years of experience with back pain of staff nurses, 6 (20.0%) were less than 3 years, 20 (66.7%) were 3-5 years and 4 (13.3%) were more than 5 years of pain.

Regarding the practice of fitness activities among the staff nurses all of them 30 (100%) had no such practice. In accordance to pain relief measures among the staff nurses 22 (73.3%) were not taking any pain relief measures, 8 (26.3%) were taking pain relief measures such as diclofenac ointment and pain killer tablets like paracetamol.

The first objective was to assess the level of mechanical back pain and functional disability among the staff nurses

In pre-test level of mechanical back pain among the staff nurses, 24 (80%) had moderate pain, 6 (20%) of them had severe pain and none of them had no or mild pain,. In pre-test level of functional disability all of them 30 (100.00%) had moderate disability and none of them had minimal disability.

In post-test, none of them had no pain, 22 (73.3%) had mild pain, 8 (26.6%) had moderate pain and none of them had severe pain. In pre-test level of functional disability, 24 (80%) of them had minimal disability and 6 (20.00%) of them had moderate disability.

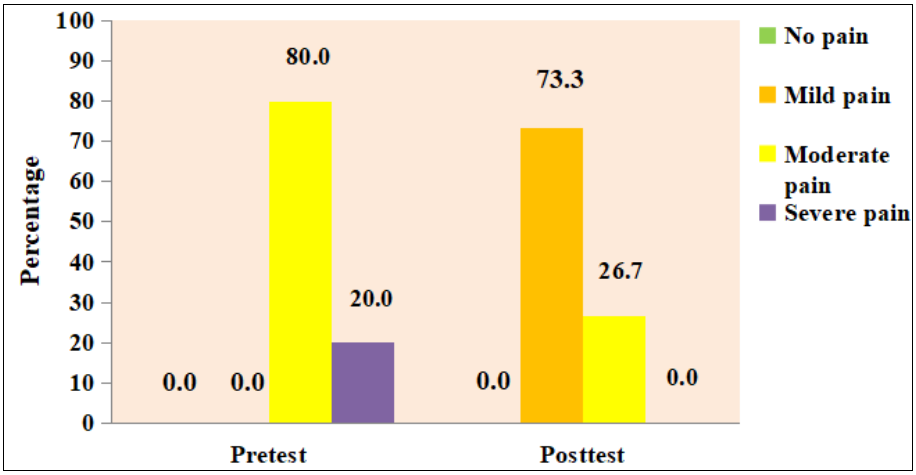

Fig 1: Frequency and percentage distribution of pre-test and post-test level of mechanical back pain among the staff nurses

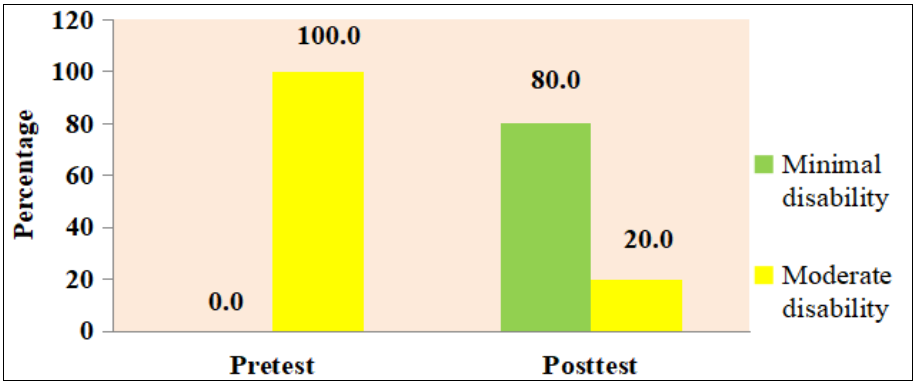

Fig 2: Frequency and percentage distribution of pre-test and post-test level of functional disability among the staff nurses

The second objective was to determine the effectiveness of ergonomic interventions on mechanical back pain and functional disability among the staff nurses: The analysis revealed that the mean mechanical back pain was decreased from 5.37 to 3.03 which showed a marked difference of 2.34 and the standard deviation was decreased from 1.19 to 1.07 which showed a marked difference of 0.12 followed by the ergonomic interventions. The paired 't' test value of 21.07, was very highly significant at $p<0.01$ level. It indicates the effectiveness of ergonomic interventions on mechanical back pain among the staff nurses. The mean functional disability was decreased from 14.53 to 5.90 which showed a marked difference of 8.63 and the standard deviation was increased from 1.48 to 2.98 which showed a marked difference of 1.5 followed by the ergonomic interventions. The paired 't' test value of 17.61 was very highly significant at $p<0.01$ level. It indicates the effectiveness of ergonomic interventions on functional disability among the staff nurses.

The third objective was to find the association between the post-test level of mechanical back pain and functional disability among the staff nurses with selected demographic variables: In the post-test level of mechanical back pain, there was a significant association of level of mechanical back pain regarding ergonomic interventions among the staff nurses with their selected demographic variables. The age chi square value of 7.85 was significantly associated with post-test level of mechanical back pain at the interval of $p<0.02$. With regard to the marital status chi square value of 6.90 was significantly associated with post-test level of mechanical back pain at the interval of $p<0.05$.With regard to the type of family chi square value of 4.59 was significantly associated with post-test level of mechanical back pain at the interval of $p<0.05$ There was no significant association was found with other demographic variables such as gender, educational status, monthly income, working unit, years of clinical experience, practice of fitness activities and pain relief measures.

In the post-test level of functional disability among the staff nurses with their selected demographic variables. With regard to the age chi square value of 6.34 was significantly associated with post-test level of functional disability at the interval of $p<0.05$. With regard to the marital status chi square value of 7.03 was significantly associated with post-test level of functional disability at the interval of $p<0.01$. With regard to the years of experience with back pain chi square value of 8.86 was significantly associated with post-test level of functional disability at the interval of $p<0.02$. There was no significant association was found with other demographic variables such as gender, educational status, monthly income, type of family, working unit, years of clinical experience, practice of fitness activities and pain relief measures.

Table 1: Comparison of mean and standard deviation between pre-test and post-test level of mechanical back pain among the staff nurses N=30

Mechanical back pain	Mean	Standard deviation	Paired 't' test
Pre-test	5.37	1.19	21.07 ***
Post-test	3.03	1.07	

***p≤0.001

Table 1 depicts the comparison of mean and standard deviation between pre-test and post-test level of mechanical back pain among the staff nurses. The mean was decreased from 5.37 to 3.03 which showed a marked difference of 2.34 and the standard deviation was decreased from 1.19 to 1.07 which showed a marked difference of 0.12 followed by the ergonomic interventions. The paired 't' test value of 21.07, was very highly significant at $p<0.001$ level. It indicates the effectiveness of ergonomic interventions on mechanical back pain among the staff nurses.

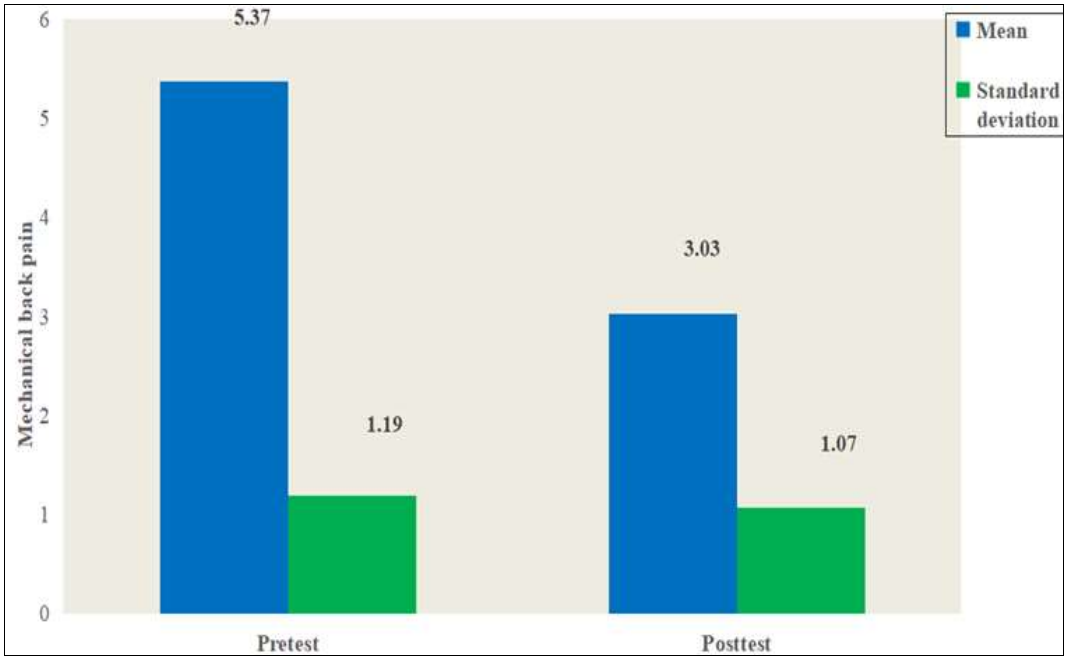

Fig 3: Comparison of mean and standard deviation between pre-test and post-test level of mechanical back pain among the staff nurses

Table 2: Comparison of mean and standard deviation between pre-test and post-test level of functional disability among the staff nurses N=30

Functional disability	Mean	Standard deviation	Paired 't' test
Pre-test	14.53	1.48	17.61 ***
Post-test	5.90	2.98	

***p≤0.001

Table 7 depicts the comparison of mean and standard deviation between pre-test and post-test level of functional disability among the staff nurses. The mean score was decreased from 14.53 to 5.90 which showed a marked difference of 8.63 and the standard deviation was increased from 1.48 to 2.98 which showed a marked difference of 1.5 followed by the ergonomic interventions. The paired 't' test value of 17.61 was very highly significant at $p<0.001$ level. It indicates the effectiveness of ergonomic interventions on functional disability among the staff nurses.

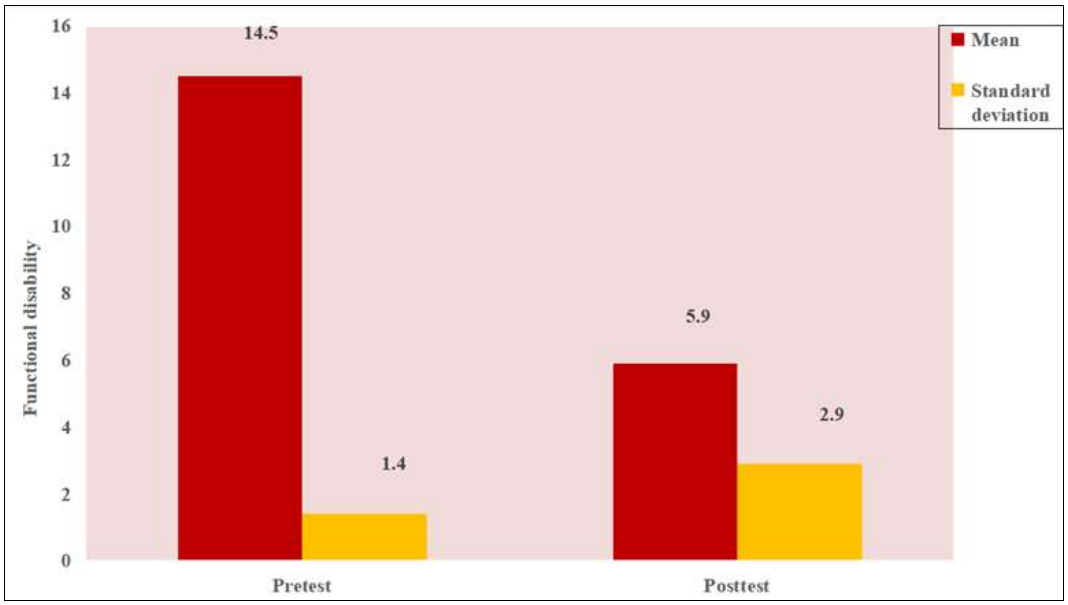

Fig 4: Comparison of mean and standard deviation between pre-test and post-test level of functional disability among the staff nurses

Conflict of Interest
Not available

Financial Support
Not available

Conclusion

This study was done to assess the effectiveness of the ergonomic interventions on mechanical back pain and functional disability among staff nurses. The study findings showed that was an improvement in mechanical back pain and functional disability after the ergonomic interventions.

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