



A Nonrandomized Trial of Comprehensive Body Mechanics for Nurses with Low Back Pain and Disability

ARTICLE INFO

Article Type

Original Research

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How to cite this article

Sruthi S, Seethalakshmi A, Jency J M. A Nonrandomized Trial of Comprehensive Body Mechanics for Nurses with Low Back Pain and Disability. International Journal of Musculoskeletal Pain Prevention. 2018;3(1):23-27.

ABSTRACT

Aims Work-Related Musculoskeletal Disorder (WMSDs) is a major health problem among many professionals in the developing countries. The aim of the present study was to assess the effectiveness of comprehensive body mechanics on pain and disability among nurses with low back pain.

Materials & Methods In this study, quantitative, pre-experimental one group pre-test post-test design was used. 144 nurses working in male, female surgical and orthopaedic wards, adult ICU and post-operative ICU, with mild and moderate level of low back pain and disability were selected, using consecutive sampling technique. The outcome variables were measured, using Numerical Pain intensity scale and Oswestry low back pain disability questionnaire. The intervention was comprehensive body mechanics, in which the researcher provided video assisted teaching on ideal body mechanics for 5 minutes followed by demonstration of lower back rehabilitation exercises by video for 15 minutes. Return demonstration and practice of lower back rehabilitation exercises was carried out by the nurses daily for 15minutes for 10 days, under the supervision of the researcher. On the 3rd day, a pamphlet was distributed followed by assessment of the effectiveness of the intervention on the 10th day. The collected data were analysed by SPSS 17 software, using Paired t-test Pearson correlation coefficient.

Findings There was a statistically significant difference before and after the intervention on pain ($t = 17.18$; $p < 0.001$) and on disability ($t = 17.71$; $p < 0.001$) among nurses with low back pain.

Conclusion Comprehensive body mechanics is effective in reducing pain and disability among nurses with low back pain.

Keywords Pain; Nurses; Low Back Pain; Exercises

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Article History

Received: November 30, 2017
Accepted: February 20, 2018
ePublished: March 20, 2018

CITATION LINKS

[1] The prevalence of low back pain among nurses working in Poursina Hospital in Rasht, Iran [2] Warren Kaplan, Update on 2004 Background Paper, BP 1 Introduction [3] Prevalence and risk factors of low back pain among nurses in Sudayr Region [4] Frequency and severity of low back pain in nurses working in intensive care units and influential factors [5] Chronic low back pain and disability among nurses: a cross sectional study from Bam, Iran [6] Work-related low back pain among clinical nurses in Tanzania [7] Work-related risk factors for lower back pain among nurses in Ahmadu Bello University Teaching Hospital (ABUTH), Zaria-Nigeria [8] A study to assess the effectiveness of a self instructional module on the knowledge & practice regarding proper body mechanics among the critical care nurses in selected hospitals of Pune [9] The knowledge and practice of body mechanics among staff nurses: descriptive correlational study [10] Low back pain and coping strategies ' among nurses in Port said city, Egypt [11] Impact of ergonomic intervention on back pain among nurses [12] Effectiveness of PNF training for chronic low back pain [13] A study to evaluate the effectiveness of back strengthening exercise to relieve low back pain among nursing students in selected hostel at Salem [14] Effectiveness of a stretching exercise program on low back pain and exercise self-efficacy among nurses in Taiwan: a randomized clinical trial [15] Prevalence of low back pain in working nurses in Zagazig University Hospitals: an epidemiological study

Introduction

Musculoskeletal disorders are one of the most common public health problems. Work-Related Musculoskeletal Disorder (WMSDs) is a major health problem among many professionals in the developing countries. Job-related tasks predispose nurses to develop back pain. It has been identified as one of the most common complaint among 38% to 67% in the American nurses and 73% to 76% among German nurses [1].

The prevalence of non-specific low back pain was 60% to 70% in industrialized countries, with the one-year prevalence being 15% to 45%. The incidence in adults was found to be at 5% per year. The prevalence was more among the adults than children and it was found to peak between the ages of 35 and 55 [2].

The Prevalence rate of low back pain among 248 nurses in Saudi Arabia was 53.2% and the factors related to high prevalence were physical work demand, shortage of qualified nurses, and poor scheduling of work. A positive relationship was found between intensity of low back pain, total working hours of the nurses, patient handling activities, and work stress [3].

It was also determined that those having less knowledge regarding low back pain, and those who performed activities requiring prolonged standing and bending had severe pain. The average pain scores were higher among nurses with master's and doctoral degrees working in intensive care unit [4].

Nurses between the age group of 21 to 57 years and weighing about 48kg to 98kg have increased low back pain with the positive correlation ($r=0.68$) between low back pain and disability [5].

The major 3 risk factors that led to low back pain were manual transfer of patients between bed/wheelchair and bath cart, perceived physical exertion, and psychological demands [6]. Nurses working in the medical wards (92.9%), Intensive care unit/ Orthopedic ward (90.9%), male surgical and gynaecological ward (86.7%) each had higher prevalence of low back pain [7].

A self-instructional module on knowledge and practice regarding body mechanics among nurses was found to be effective in improving the knowledge from 60% average to 100% with good knowledge and in the same manner, practice of body mechanics was also improved from 60% of average practice to 100% of good implementation of proper body mechanics [8].

Nurses with good knowledge on body mechanics fail to practice it in their clinical activities [9]. The coping strategies followed by the nurses with low back pain were rest and sitting (60%) and lying down after long standing (40%) [10].

The impact of ergonomic intervention on nurses' low back pain was found to have some

improvement in the risk factors associated with low back pain [11]. Comparing the effect of Proprioceptive Neuromuscular Facilitation (PNF) program and core stabilization exercises on functional ability of nurses with chronic low back pain showed a significant improvement among those who underwent core stabilization exercises [12]. Back strengthening exercises reduce low back pain among nurses from 5.50 to 0.03 at after 30 days of practice [13].

Stretching Exercise Program was significantly effective, comfortable, relaxing, and reducing low back pain among Taiwanese nurses with significant reduction in visual analogue scale for pain and exercise self-efficacy scale before and 2, 4, and 6 months after the exercise [14].

Therefore, the aim of the present study was to assess the effectiveness of comprehensive body mechanics on pain and disability among nurses with low back pain.

Materials and Methods

In this study, quantitative, pre-experimental one group pre-test post-test design was used. The study was conducted in the male and female surgical wards, male and female orthopaedic wards, adult and postoperative intensive care units, Sri Ramachandra Hospital, Porur, Chennai.

Nurses who were either male or female, willing to participate, had mild and moderate intensity low back pain and disability with scores between 1 and 6 on numerical pain scale, working in adult and postoperative ICU, surgical and orthopaedic wards were selected as samples, using non-probability consecutive sampling technique.

Nurses who were not available, pregnant, practicing back strengthening exercises or on any treatment for backache, have more than 40% disability in Oswestry low back pain disability questionnaire and have back pain associated with pathological conditions.

The study was conducted after the approval from the Institutional Ethics Committee, Sri Ramachandra University (CSP/16/JAN/45/78). Participants were explained clearly about objectives of the study and a written informed consent was obtained from all the participants before conducting the study. Confidentiality of the responses were assured and maintained throughout the study.

Information was obtained on their background variables, numerical pain rating scale, and Oswestry low back pain disability questionnaire before and after the comprehensive body mechanics. The reliability of the tool was established by the Cronbach's alpha method and the 'r' value obtained was 0.72.

The data collection period was one month from July, 11th 2016 to August, 7th 2016. The data were

collected through self-administered questionnaire method. The data collection procedure was carried out in 4 phases. They are as follow:

Phase I: The total nurses in the selected wards and ICUs were 211, out of whom, 150 were available and willing to participate. The remaining were not willing, antenatal, and on CL, LOP, week OFF.

Phase-II: The aim and procedures of the study were explained to the participants and a written informed consent was obtained from them before conducting the study. Pre-test was administered to assess the low back pain and disability among 150 nurses, using numerical pain rating scale and Oswestry low back pain disability questionnaire through self-administered method. At the end of the pre-test, 144 nurses were selected for the intervention as per sample selection criteria and 6 nurses who had severe level of pain and disability were not given the intervention.

Phase III: The total sample of 144 nurses were divided into 3 groups, each group consisting of 50, 50, and 44 samples, respectively. The first sample of 50 nurses were further subdivided into group of 5 to 7 nurses per day from the 6 areas depending on their shift and their availability. They were asked to assemble in the classroom available in each ward and demonstration of comprehensive body mechanics and return demonstration was observed in the class rooms of the respective wards.

On the first day, video assisted teaching on ideal body mechanics such as positioning of the legs, stretching of the back, bending at knees, sliding movement of the legs during shifting the patient from bed to stretcher, stretcher to bed and within the bed, sitting and standing erect with the spinal cord straight was given for 5 minutes. After teaching, the researcher demonstrated the lower back rehabilitation exercises such as single and both knee flexion, pelvic bridges, straight leg raise, trunk rotation, extension exercise, quadruped arm and leg raise, alternate arm and leg raise, prone leg lift, rear lift and standing back extension by video for 15 minutes followed by return demonstration by individual nurses with observation and corrections were given by the researcher. The teaching and demonstration was given in English language.

A pamphlet containing specific images of ideal body mechanics and demonstration of lower back rehabilitation exercise was given to all on the third day of intervention.

The reason for issuing the pamphlets on the third

day was to make the nurses thorough with the exercises on the first 2 days and obtaining a return demonstration, after which the pamphlet was given to them on 3rd day.

In this way, 50 nurses were covered for the first 10 days followed by 50 nurses for the second 10 days and 44 nurses for the third 10 days.

Phase IV: Post-test was conducted on the 10th day to assess the effectiveness of comprehensive body mechanics on low back pain and disability, using numerical pain rating scale and Oswestry low back pain disability questionnaire.

The collected data were analysed by Statistical Package for Social Sciences (SPSS) version 17, using Paired t-test and Pearson correlation coefficient.

Findings

Among 150 nurses, 42% had mild level of pain, 54% had moderate level of pain, and 4% had severe level of low back pain. With regard to disability, 73% had mild disability, 23% had moderate disability, 3% had severe disability, and 1% had crippled level of disability. The 4% who had severe low back pain, 3% with severe level of disability, and 1% with crippled level of disability were excluded from the study.

The comprehensive body mechanics was found to be effective in reducing low back pain and disability among nurses. There was a statistically significant difference ($p < 0.001$) in the mean scores of low back pain and disability before and after the comprehensive body mechanics intervention (Table 1).

After the intervention, the proportion of the nurses in the mild level of pain improved from 43.8% to 73.6%, and the 56.2% of the nurses in the level of moderate pain reduced to 26.4%.

Similarly, 76.0% of the nurses who had mild disability improved to 97.2% and 24.0% of the nurses who had moderate disability reduced to 2.1%.

Statistical significant positive correlation was found between low back pain and disability in pre-test ($r = 0.35$; $p < 0.001$) and in post-test ($r = 0.43$; $p < 0.001$). Hence, as the pain increased, disability also increased among nurses.

Statistical significant association was found between low back pain and age ($p < 0.005$), duration since last delivery ($p < 0.05$) and area of posting ($p < 0.01$). Also, there was a significant association between disability and gender ($p < 0.05$), area of posting ($p < 0.01$) among staff nurses.

Table 1) Comparison of Means of Low Back Pain and Disability between Pre-test and Post-test (N=144)

Variables	Pre-test	Post-test	Difference	Paired t-value	p-value
Pain	3.95±1.28	2.70±1.01	1.25±0.87	17.18	<0.001
Disability	7.42±3.73	3.35±1.99	4.06±2.75	17.71	<0.001

Discussion

There was a significant difference in the mean scores of low back pain before (3.95) and after (2.70) intervention with the mean difference of 1.25. The core stabilization exercises were found to be effective in decreasing pain, improving flexibility and functional performance among nurses with chronic low back pain with the significant difference in the mean scores of low back pain before (7.40) and after (2.62) the intervention [12].

There was a significant difference in the mean scores of disability before (7.42) and after (3.35) the intervention with the mean difference score of 4.06. The core stabilization exercises were also found to be effective in decreasing functional disability among nurses with chronic low back pain with the significant difference in the mean scores of disability before (67.3) and after (33.3) the intervention [12].

There was a significant positive correlation between low back pain and disability in pre-test ($r=0.35$; $p<0.001$) and in post-test ($r=0.43$; $p<0.001$). These findings were similar to the results of the study, which revealed that significant positive correlation between duration of back pain and disability with $r=0.68$ [5].

A significant correlation was found between low back pain and age, area of posting and duration since last delivery, showing that the greater the age (25-35 years), the greater the intensity of pain (3.91).

This was also found to be similar in the study, which revealed that the occurrence of low back pain was more prevalent in nurses older than 40 years, followed by those between 20 and 30 years [15].

In relation to the association between the mean scores of pain and area of posting in pre-test, the highest mean score was perceived by nurses posted in female surgical wards (5.00), followed by staff nurses in male orthopaedic ward (4.25) and those in adult ICU (4.07).

There was a high prevalence of low back pain in nurses working in medical ward (92.6%), ICU and Orthopaedic ward (90.9%), surgical and OBG wards (86.7%) [7].

There was a significant association between disability and gender and area of posting. Regarding the gender, the mean of disability score was high among females (7.71) when compared with the males (5.24). This may be because the perception of low back pain was high among females than males.

With respect to area of posting, the mean disability score was high among the nurses working in female surgical ward (10.75) followed by male orthopaedic ward (8.22) and post-operative ICU (7.80). This must be due to the

reason that level of low back pain was high among nurses in these wards.

The current study found that the majority of nurses working in the Female surgical ward, Male orthopaedic ward, Adult ICU, Post-operative ICU, Male surgical ward and Female orthopaedic ward experienced low back pain and disability. Hence, the nurses must be reinforced to practice proper body mechanics during their working hours, stretching and strengthening exercises every day after their duty hours to have reduced low back pain and disability in order to provide quality nursing care, cope with the workload in the working areas, reduce medical expenses, and absenteeism.

The nursing student should be taught application of proper body mechanics, which are already included in the nursing curriculum and with regular reinforcements. Weekly demonstration and return demonstration of comprehensive body mechanics can be arranged for the nurses in groups for regular practice.

The nurses assigned with number of patients per shift had higher intensity of pain; hence, the nurse administrator should allocate adequate relieving staff and provide for rest periods without hindrance to patient care activities. Investment in assisting devices such as patient shifting slides, belts, remote controlled cots can be appropriately utilized to reduce work related injuries.

The current study showed that pain and disability were more among nurses in the female surgical ward. Further studies can be done in this regard to identify specific nursing activities that cause pain so that appropriate strategies as staffing, break times, patient care assignments can be planned.

The study limits the lack of study of musculoskeletal discomfort, its relation with the results of body mechanics on pain, and disability among nurses.

Conclusion

Comprehensive body mechanics is effective in reducing the intensity of low back pain and disability among nurses. Also, there is a positive correlation between low back pain and disability. Low back pain among staff nurses and disability is also influenced by age, gender, duration since last delivery, and area of posting.

Acknowledgements: The authors thank the institution for giving permission to conduct this study and all the nursing personnel who participated in this study.

Ethical Permissions: The study was conducted after the approval from the Institutional Ethics Committee, Sri Ramahandra University (CSP/16/JAN/45/78). Participants were explained clearly about objectives of the study and

a written informed consent was obtained from all the participants before conducting the study. Confidentiality of the responses were assured and maintained throughout the study.

Conflict of Interest: The Author(s) state(s) that there is no conflict of interest.

Authors' Contribution: Sruthi S. (First author), Methodologist/ Original researcher / Statistical analyst/ Discussion author (40%); Seethalakshmi A. (Second author), Introduction author/ Methodologist (35%); Jency JM. (Third author), Discussion author (25%).

Funding: The present research was sponsored by the authors.

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