

# Effectiveness of Ergonomic Training Program on Knowledge, Self-efficacy and Practice on Prevention of Work Related low Back Pain among Staff Nurses

Sosunika Hijam<sup>1</sup>, Uma Deaver<sup>2</sup>, Kanika<sup>3</sup>, Jyoti Sarin<sup>4</sup>

<sup>1</sup>M.Sc. Nursing, Department of Medical Surgical Nursing, <sup>2</sup>Professor and Head of Department, Department of Community Health Nursing, <sup>3</sup>Professor, Department of Medical-Surgical Nursing, <sup>4</sup>Principal cum Professor, M.M. College of Nursing, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala, Haryana, India

## Abstract

**Background:** Low back pain is a major occupational problem among health care workers. Body mechanics and Ergonomic programs can prevent low back pain among them. The aim of the study was to assess and compare knowledge, self-efficacy and practice on prevention of work related low back pain among staff nurses before and after administration of Ergonomic Training Program in experimental and comparison group.

**Methods:** A Quasi Experimental Non Equivalent Control Group Pre-test and Post-test Design was used. Eighty staff nurses from MMIMS&R Hospital, Mullana were selected by convenience sampling technique. Ergonomic Training Program was administered in experimental group for two days. Standardised Nordic questionnaire for low back pain, Pain assessment scale, structured knowledge questionnaire, structured self-efficacy scale and structured observational checklist were used to collect data.

**Results:** The study showed that there was a significant difference in the mean post-test knowledge ( $p=0.001$ ) and practice ( $p=0.001$ ) scores of staff nurses in experimental and comparison group. There was a significant difference between the mean pre-test and post-test knowledge ( $p=0.001$ ), self-efficacy ( $p=0.047$ ) and practice scores ( $p=0.0001$ ) in experimental group.

**Conclusion:** Ergonomic Training Program was effective in improving the knowledge, self-efficacy and practice on prevention of work related low back pain among staff nurses.

**Keywords:** Effectiveness, Ergonomic Training Program, knowledge, self-efficacy, practice, staff nurses, work related low back pain

## Introduction

Worldwide, low back pain is found to be experienced for at least once in their lifetime by most of the people (estimated from 50 % to 80 %).<sup>1</sup> It has been estimated

that the annual incidence of low back pain (LBP) in adults is found to be 15% with point prevalence of 30%.<sup>2</sup> In developed countries, the prevalence rate of LBP has been estimated to be 15% to 64% and more than 79% in the developing countries.<sup>3</sup> It is estimated to be 38% to 67% in the American nurses, 73% to 76% in nursing staffs of Germany, and 9.38% in Hong Kong nurses, and over 50% in Iranian nursing staffs.<sup>4</sup> One-third of the loss of work occurs due to work related accidents and diseases related to occupation.<sup>5</sup> Of all the LBP cases, 37% of them occur as a result of work related constructs. It changes between 12% and 38% in women, 31% and 45% in men.<sup>6</sup> Nursing is identified as one of the

---

### Corresponding author:

**Sosunika Hijam**

M.M College of Nursing, Maharishi Markandeshwar (Deemed to be University), Mullana-133207, Ambala, Haryana, India

Email ID: sosuhijam0503@gmail.com

Contact no: +918240714739/ +918335841488

occupation who is at risk of developing LBP.<sup>7</sup> In nurses, while giving care there is repeated flexion or extension of the body, including object or patient lifting, transferring of patients which represents major bodily stress and results in back injuries.<sup>8</sup> The prevention and control of the musculoskeletal disorders can be achieved by using the applied science of ergonomics. Nursing involves risk activities; with high prevalence of musculoskeletal complaints related to the low back, neck and shoulder pain.<sup>1</sup> Nurses are exposed to musculoskeletal disorders as they are mainly standing for long hours<sup>9</sup>, maintaining wrong position for a long time during their working shifts. Low back pain among staff nurses is mainly due to repetitive motions.<sup>10</sup> In developing countries, the nurses have little knowledge of ergonomics principles in their workplace and they are not trained adequately to prevent and control hazards due to occupational exposure. Knowledge of ergonomics can help nurses in avoiding certain risk factors of musculoskeletal disorders and can improve health and safety in the workplace.<sup>11</sup> It was reported by a study that ergonomics training program can help in major improvement in lifting of patients and carrying behaviour.<sup>12</sup> A study also suggested the use of Ergonomics and body mechanics to prevent work related low back pain.<sup>13</sup>

Moreover, the researcher had personal experience that the staff nurses in clinical settings do not practice proper techniques of body mechanics and ergonomic principles in performing nursing activities during their work shifts. This has aroused the interest to conduct this study to possess the effectiveness of Ergonomic Training Program (ETP) on knowledge, self-efficacy and practice on prevention of work related low back pain among staff nurses.

## Material and Methods

**Research approach and design:** Quantitative research approach with quasi experimental non-equivalent control group pre-test post-test research design was used.

**Setting:** The study was conducted in MMIMS&R Hospital, Mullana, Ambala, Haryana. It is a multispecialty tertiary care hospital.

**Sampling:** Convenience sampling technique was used, 80 staff nurses (40 staff nurses each in experimental

and comparison group) working in various wards of MMIMS&R Hospital, Mullana, Ambala, Haryana were included in the study. Cohen's d formula was used for sample size calculation (effect size was 0.66; at power of 0.80, the recommended sample for each group was between 33-44).

### Tools and techniques for data collection

Section-I: Part-A (Demographic variables of the staff nurses). Part-B (Standardised Nordic Questionnaire for low back pain among staff nurses) developed by Kuorinka I et al in 1987. Part-C (Numeric pain scale to assess the level of low back pain among staff nurses) consisting of pain score ranging from 0 (No pain) to 10 (Worst pain)

Section-II: Structured knowledge questionnaire to assess the knowledge of staff nurses regarding prevention of work related low back pain.

Section-III: Structured self-efficacy scale to assess the self-efficacy of staff nurses regarding prevention of work related low back pain.

Section-IV: Structured observational checklist to assess the practice of staff nurses regarding prevention of work related low back pain by using ergonomics and its principles.

### Data collection procedure

Pilot study was conducted prior to final data collection.

On day one, pre-test was conducted. On day two after taking the pre-test, ETP (Ergonomic training program) was administered by using lecture cum discussion with the help of power point slides and videos for two hours in experimental group. On day three, demonstration and return demonstration of ergonomic principles and exercises (body stretches) to the staff nurses was carried out (the experimental group was divided into four sub-groups of ten staff nurses each with duration of one hour for each group). On day 15, after the intervention, post test was conducted for both the groups.

### Ergonomic training program

It consisted of teaching regarding work related low back pain, ergonomic and its principles, and the body

stretches or exercises to reduce or prevent work related low back pain among staff nurses.

### Statistical Analysis

SPSS version 20.0 was used for data analyses. For descriptive statistics, frequency, percentage, mean, median, standard deviation, range was used. For parametric tests, it included chi-square, t-test, one way ANOVA, and post hoc tests. For non-parametric tests, it included chi-square, Mann-Whitney test, Wilcoxon signed rank test and Kruskal Wallis test. K-S test was applied and parametric test was applied for knowledge score and Non-parametric tests were applied for self-efficacy score and practice score regarding prevention of work related low back pain among staff nurses.

### Results

The study results showed that majority of the staff nurses were females (96.25%) and majority were from age group of 23-25 years, 81.25% of staff nurses were single, 74 (92.5%) of staff nurses were not having history of abdomen/ back/ limb surgery, 72 (90%) of them had no child, 76 (95%) were GNMs, 56 (70%) were having 0-12 months year of experience in the present working area 68 (85%) of the staff nurses were working for six hours per day, all of them had no training regarding body mechanics, 76 (95%) of them were not attending yoga class and 78 (97.5%) of them were not going to gym, 59 (73.75%) of them were having normal BMI and all of the staff nurses were not diagnosed with diseases like arthritis, prolapse inter-vertebral disc, etc.

In pre-test, 48/80(60%) had below average knowledge, 70/80 (87.5%) had good self-efficacy and 47/80(58.75%) had good practice scores regarding prevention of work related low back pain. In post-test, 23 (57.5%) had good knowledge, 21 (52.5%) had very good self-efficacy and 34 (85%) had very good practice after the administration of Ergonomic Training Program (ETP) in experimental group.

There was significant difference between pre and post test knowledge scores ( $t=11.45$ ,  $p=0.001$ ), self-efficacy scores ( $Z= -1.98$ ,  $p= 0.047$ ) and practice scores ( $Z= -5.17$ ,  $p=0.0001$ ) among staff nurses in experimental group.

There was a significant difference in post test knowledge scores ( $t=12.01$ ,  $p=0.001$ ) [Table 1], and practice scores ( $Z= -6.84$ ,  $p=0.0001$ ) [Table 2] among staff nurses in experimental and comparison group. There was no significant difference in post-test self-efficacy scores ( $Z= -1.67$ ,  $p=0.09$ ) [Table 3] among staff nurses in experimental and comparison group. Therefore, it can be inferred that Ergonomic Training Program was effective in improving the knowledge and practice of staff nurses on prevention of work related low back pain.

There was a weak positive correlation between knowledge and self-efficacy score ( $r= 0.38$ ,  $p= 0.02$ ), and also between self-efficacy and practice score ( $r=0.32$ ,  $p=0.047$ ) among staff nurses in experimental group after the administration of Ergonomic training program.

There was a significant association of knowledge score with years of experience in present working area and practice score with qualification in experimental group, self-efficacy score with total year of experience. There was significant association of post-test self-efficacy score with present designation, total year of experience, hours of working/ day and work for extended duty hours. There was significant association of pre-test practice score with qualification status of the staff nurses.

It was found that most of the staff nurses i.e. 70/80 (87.5%) and 71/80 (88.75%) were not having low back pain before and after administration of Ergonomic Training Program respectively. In experimental group, 3 (7.5%) were having moderate pain (4-6 pain intensity score) in pre-test which was reduced to 1 (2.5%) in post-test.

### Discussion

In the study, majority of the staff nurses were females (96.25%) and majority were from age group of 23-25 years which was consistent with the study conducted by Sharma R which showed that maximum number of female nurses (97.14%) was from age group of 20-30 yrs.<sup>14</sup> In the study, all of the staff nurses i.e. 80/80 (100%) had no training regarding body mechanics of which the result was consistent with the study conducted by Ibrahim R et al.<sup>15</sup> In the study, 76 (95%) of them were not attending yoga class and 78 (97.5%) of them

were not going to gym and 59 (73.75%) of them were having normal BMI.

All of the staff nurses were not diagnosed with diseases like arthritis, prolapse inter-vertebral disc, etc. This was inconsistent with the finding by **Sandhya RV**.<sup>16</sup>

It was shown that Ergonomic Training Program was effective in improving the knowledge, self-efficacy and practice scores on prevention of work related low back pain among staff nurses. The result was found to be consistent with the study conducted by **Sharma R** which showed that the mean knowledge score and practice scores after the intervention was significantly higher than that before the intervention.<sup>14</sup> Also similar findings were shown by the study conducted by **Ibrahim R et al** which showed significant differences of nurses' knowledge and practice scores between pre-test and post-test (p=0.0000).<sup>15</sup> Similar finding was shown by a study conducted by **Salah M et al** in which there was significant difference regarding total knowledge of back pain and body mechanics in pre- and post- program implementation (Z=4.43, p=0.0000 and Z=4.06, p=0.0000 respectively). Also, there was significant difference regarding practice in pre- and post-program implementation (Z= 5.85, p=0.0000 and

Z=5.29, p=0.0000 respectively).<sup>17</sup>

In the study, there was a significant positive correlation between knowledge and self efficacy scores; self efficacy and practice scores after the administration of ergonomic training program among staff nurses in the experimental group but no correlation was found between knowledge and practice scores among the staff nurses. It was supported by the study conducted by **Khorsandi M et al** in which there was correlation between self-efficacy and practice scores (r=0.19; p=0.027).<sup>18</sup> The result of the study was not consistent with the finding of study conducted by **Vidya VP et al** which showed that a positive correlation was found between the knowledge and practice of body mechanics among staff nurses (r=0.611).<sup>19</sup>

### Conclusion

The study concluded that the Ergonomic training program (ETP) was effective in improving the knowledge, self-efficacy and practice of staff nurses regarding prevention of work related low back pain. It also revealed that there was a significant positive correlation between knowledge and self-efficacy; and also between self-efficacy and practice among the staff nurses regarding prevention of work related low back pain.

**Table 1: Comparison of post-test knowledge scores on prevention of work related low back pain among staff nurses in experimental and comparison group**

(N=80)

Group	Mean±SD	M <sub>D</sub>	SEM <sub>D</sub>	t value	df	p value
Experimental group (n=40)	22.88±4.30	9.6	0.8	12.01	78	0.001*
Comparison group (n=40)	13.25±2.67					

t ( 78 )= 1.99

Minimum score= 0

Maximum score= 30

\*=Significant (p≤ 0.05)

<sup>NS</sup>  
=Not significant(p>0.05)

**Table 2: Comparison of post-test practice scores on prevention of work related low back pain among staff nurses in experimental and comparison group**

(N=80)

Group	Mean rank	Sum of rank	Mann Whitney U test	Z value	p value
Experimental group (n=40)	58.24	2329.50	90.50	-6.84	0.0001*
Comparison group (n=40)	22.76	910			

\*=Significant (p≤ 0.05)

<sup>NS</sup> = Not significant (p>0.05)

**Table 3: Comparison of post-test self-efficacy scores on prevention of work related low back pain among staff nurses in experimental and comparison group**

(N=80)

Group	Mean rank	Sum of rank	Mann Whitney U test	Z value	p value
Experimental group (n=40)	44.83	1793	627	-1.67	0.09 <sup>NS</sup>
Comparison group (n=40)	36.18	1447			

\*=Significant (p≤ 0.05)

<sup>NS</sup> = Not significant (p>0.05)

**Conflict of Interest:** No conflict of interest

**Funding:** Self

**Ethical Clearance:** Formal Ethical approval was obtained from the ethics committee of Maharishi

Markandeshwar (Deemed to be University), Mullana (IEC-1159). Informed consent was obtained from the respondents and they were assured about the confidentiality of their responses.

**References**

- 1 Asadi P, Monsef KV, Zia ZS, Zohrevandi B. The prevalence of low back pain among nurses working in Poursina hospital in Rasht, Iran. *Journal of Emergency Practice and Trauma*. 2016; 2(1):11-15
- 2 Ganesan S, Acharya AS, Chauhan R, Acharya S. (2017). Prevalence and risk factors for low back pain in 1,355 young adults: A cross-sectional study. *Asian spine journal*. 2017 Aug; 11(4): 610-17
- 3 Rezaee M, Ghasemi M. Prevalence of low back

- pain among nurses: predisposing factors and role of work place violence. *Trauma monthly*. 2014; 19(4):e17926
- 4 Goswami S, Haldar P, Sahu S. An ergonomic study of postural stress of nurses working in orthopedic wards. *International Journal of Occupational Safety and Health*. 2013 Nov 4; 3(1): 26-31.
  - 5 Lin PH, Tsai YA, Chen W C, Huang SF. Prevalence, characteristics, and work-related risk factors of low back pain among hospital nurses in Taiwan: A cross-sectional survey. *International journal of occupational medicine and environmental health*. 2012 Mar 1; 25(1): 41-50.
  - 6 Chiou WK, Wong MK, Lee YH. Epidemiology of low back pain in Chinese nurses. *International Journal of Nursing Studies*. 1994 Aug 1; 31(4): 361-68.
  - 7 Howyida S, Heba A, Abeer Y. Impact of Application of Body Mechanic Principles on Improving Low Back Pain among Female Workers at Benha University. *Journal of American Science*. 2011; 7(11): 457-67
  - 8 . Toraman AU, Ardahan M, Balyacı ÖE. The effect of the body mechanic behaviors on the low back pain. *Nursing Practice Today*. 2014; 1(2): 107-15.
  - 9 . Gim CS. Factors associated with low back pain among nurses in critical care units, Hospital Universiti Sains Malaysia. *Biomedical Journal of Scientific & Technical Research*. 2017; 1(7): 2025-30.
  - 10 . Saeidi M. The Influence of Ergonomic Training on Low Back and Neck Pains in Female Hospital Personnel. *Jundishapur Journal of Health Sciences*. 2014 Jul; 6(3):e21722
  - 11 . Khan R, Surti A, Rehman R, Ali U. Knowledge and practices of ergonomics in computer users. *JPMA- Journal of the Pakistan Medical Association*. 2012 Mar 1; 62(3): 213-17.
  - 12 Peterson E L, McGlothlin JD, Blue CL. Ergonomics: The development of an ergonomics training program to identify, evaluate, and control musculoskeletal disorders among nursing assistants at a state-run veterans' home. *Journal of Occupational and Environmental Hygiene*. 2004; 1: D10-16.
  - 13 Zakerian SA, Monazzam MR, Dehghan SF, Mohraz MH, Safari H, Asghari M. Relationship between knowledge of ergonomics and workplace conditions with musculoskeletal disorders among nurses: A questionnaire survey. *World Applied Sciences Journal*. 2013; 24(2):227-33
  - 14 Sharma R. Effectiveness of Educational and Selected Exercise Programme to Reduce Back Pain in Staff Nurses. *International Journal of Nursing Education*. 2016; 8(2): 62-67.
  - 15 Ibrahim R, Elsaay OE. The Effect of Body Mechanics Training Program for Intensive Care Nurses in Reducing Low Back Pain. *IOSR Journal of Nursing and Health Science*. 2015; 4(5): 81-96.
  - 16 Sandhya R, Kumari M, Gopisankar AMS. Prevalence of low back pain and knowledge on body mechanics among the staff nurses in a tertiary care hospital. *International Journal*. 2015; 3(9): 928-34.
  - 17 Salah M, Mahdy NE, Mohamed L. Effect of educational program on performance of Intensive Care Nurses to Decrement the low Back pain. *Life Science Journal*. 2012; 9(4): 3109-25.
  - 18 . Khorsandi M, Sharafkhani N, Shamsi M, Ranjbaran M. Knowledge, self-efficacy, and practice among nurses for prevention of chronic low back pain in Arak, Iran, in 2014. *Journal of Occupational Health and Epidemiology*. 2013; 2(4): 157-64.
  - 19 Vidya V P, D'Souza VF, Vinyamol TO, Machado V, Francis J, Gireesh GR, Dennis S. The knowledge and practice of body mechanics among staff nurses: descriptive correlational study. *AJRHASS- American International Journal of Research in Humanities, Art and Social Sciences*. 2014; 8(2): 124-26.