🔓 **Research Article**

EFFECTIVENESS OF EXERCISE PROGRAM ON LOW BACK PAIN AMONG NURSES WORKING AT A MEDICAL COLLEGE HOSPITAL IN DHAKA, BANGLADESH

Halima Akter

Department Of Graduate Nursing, Banghabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Md. Shariful Islam

Department Of Adult And Elderly Health Nursing, National Institute Of Advanced Nursing Education and Research (NIANER), Mugda, Dhaka, Bangladesh

Jotsna Akter

Department Of Adult And Elderly Health Nursing, National Institute Of Advanced Nursing Education and Research (NIANER), Mugda, Dhaka, Bangladesh

Khaleda Akter

Department Of Psychiatric And Mental Health Nursing, National Institute Of Advanced Nursing Education and Research (NIANER), Mugda, Dhaka, Bangladesh

Corresponding Author: Halima Akter

Teaching Assistant, Department Of Graduate Nursing, Banghabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

ABSTRACT

Background: Low Back pain (LBP) is one of the most thought-provoking health conditions among the health professionals, especially nurses and it is considered as a significant health problem around the world. The aim of this study was to examine the effectiveness of exercise programs to reduce LBP among nurses working at Mugda Medical College Hospital in Dhaka.

Methods: A Quasi Experimental one group pre-posttest study design with 5 weeks' exercise program and one week follow up session was used. A total of 60 nurses were conveniently recruited from Mugda Medical College Hospital.

Data collection period was from January to March 2020. Nurses' characteristics were described by using Socio-Demographic Questionnaire (SDQ) and their LBP status was examined by Nordic Musculoskeletal Questionnaire (NMQ) and 11 points of Verbal Rating Scale for pain (VRSP) assessment. Descriptive statistics such as frequency, percentage, mean and standard deviation was used to describe the demographic characteristics and LBP of nurses. Inferential statistics such as matched paired t-test and independent sample t-test were used to examine the relationship between the variables.

Results: Finding shows that the mean pre-test LBP score of nurses was 5.40 (SD = 0.74) and post-test LBP score was 1.51 (SD = 1.27). The mean differences were 3.89 (SD = 0.53) which indicates significant difference between pre and post-test score. In matched paired t-test, it was found that there was a significant mean difference between pre and post-test of LBP (p< 0.001).

Conclusion: There was a significant mean difference after exercise program among the nurses with LBP. It indicates that exercise program was effective to reduce LBP. This finding can be recommended to develop educational modules for nurses to provide appropriate care to the patients.

KEYWORDS

Back pain, low back pain, exercise program, nurse.

INTRODUCTION

Pain and discomfort that is limited from the superior border of the inferior gluteal fold to the inferior costal margin, with or without leg pain, is defined as low back pain [1]. Low back pain (LBP) is recognized as a major health problem worldwide [2] and is one of the most discussed health conditions among healthcare professionals, particularly nursing professionals [3]. According to existing literature, the incidence of LBP in nurses' ranges from 40% to 97.9%, and it is more common in nurses than in the general population [4]. A closer analysis of the data shows that the prevalence rate of LBP among nurses were 74.2% in India, 87% in China, 76.5% in Malaysia and 72.9% in Bangladesh [5,6,7,8]. Given the estimation, the prevalence of LBP among nurses in Bangladesh was slightly lower but was much higher than other peer countries like Pakistan (32%) [9] and Nigeria (44.1%) [10].

Nurses are more likely to acquire LBP due to the nature of their work, which includes frequently lifting patients during a shift, assisting patients with ambulation, frequently moving patients' beds, standing frequently, and taking on too much work [11,12]. On the other hand, some earlier authors [13,14,15,16] recognized certain workplace factors as key predictors of LBP, including as overtime work, extended working hours, working posture, twisting the body while working, manual handling, and shift work. In addition, life style elements like physical activity and psychological well-being, such as stress and job satisfaction, were linked to the emergence of LBP in nurses [15,17]. Additionally, existing literature have reported that socio-demographic characteristics such as gender, marital status, family history, monthly salary and educational

level influence the development of LBP in nurses [15,17, 18].

LBP affects nurses in both their personal and professional lives. LBP interferes with nurses' ability to perform their jobs effectively, which lowers the standard of care provided to patients [19]. A few studies have shown that nurses' occupations may be terminated due to physical and mental pressures [20]. According to a study conducted in the United States, back injuries caused 12% of nurses to quit their jobs between 1980 and 2012 [21]. Reduced income and/or job loss might cause family stress or a loss of neighborhood and group ties [22]. On the other hand, a systemic evaluation of the effects of LBP on nurses found that it can cause loss of physical function, deterioration of overall health and fitness, loss of social functioning, and disruption of psychological function [22]. Along with the affected individuals, LBP has an impact on the organizations they are connected to. According to a study from the United Kingdom, apart from UK, other industrialized nations also experience growing absenteeism and costs for disability benefits related to back pain [23]. Additionally, the standard of patient care is compromised, which indirectly adds to the workload for the other nurses working in the same ward. Additionally, it was discovered that LBP can be expensive due to the high cost of workers' compensation, insurance for injured workers, recruitment or training expenses, the time-consuming nature of LBP treatment, and return-to-work rehabilitation [24].

Exercise programs can be crucial in helping nurses with LBP avoid a significant loss in terms of their personal, professional, social, financial, and organizational well-being. The results of a randomized controlled trial research indicated that the basic exercise program was successful in reducing pain and exhaustion [25]. On the other hand, a meta-analysis of 61 nurse-specific randomized controlled trials found that exercise therapy reduced chronic back pain for the course of the studies' follow-up periods [26]. In a randomized controlled trial study, the Back School program was used with 137 nurses as the experimental group, and results showed a reduced LBP syndrome intensity score on the visual analogue scale compared to the pre-intervention score [3]. Another quasi-experimental study found that nurses who participated in a stretching exercise program saw modest to significant reductions in LBP [27]. Although many nations have concentrated on helping nurses lower their LBP through exercise programs, Bangladesh's research is insufficient in this area. In Bangladesh, there weren't many studies done to lower LBP among nurses. As a result, the purpose of this study was to evaluate the impact of exercise regimens on LBP among nurses employed by a medical college hospital situating in Dhaka city.

METHODOLOGY

In order to examine the effectiveness of exercise on LBP, a quasi-experimental study design was used in this study. In this design, a group of nurses was selected from Mugda Medical College Hospital and they were gone through Verbal Rating Scale for Pain (VRSP) test before and after administering the intervention. Based on previous study reference [2], the effect sample size (60) was calculated by using a standard formula developed by Lachenbruch and Cohen, (1989) [28]. The inclusion criteria for being the participants of this study was female nurses who were experiencing LBP for longer than 6 months, had pain scores between 4 to 6 score on the 11 points Verbal Rating Scale for Pain (VRSP), and had full time working experience. In contrast, those who had orthopedic and/or neurological diseases, received surgery for back pain,

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pregnant, reluctant to attend in the exercise program and received any pain management strategies were excluded from the study.

150 nurses were conveniently selected for data collection. Of these, 80 nurses were selected by screening of Nordic Musculoskeletal Questionnaire (NMQ) for the pre-testing of Verbal Rating Scale for Pain (VRSP). However, 20 nurses were excluded due to pain < 6 months (N = 4), pain > 6 point (N = 3), pain < 4 point (N = 2), unwillingness to attend in the study (N = 2), training (N = 4) and receive pain management strategies (N = 5). Finally, 60 nurses were nominated to attend the exercise program and divided into 5 groups where each group consisted of 12 members and gone through the pre-test of VRSP. But 7 participants were discontinued the program due to their pregnancy, death of parents and illness. Therefore, finally 53 nurses were received intervention for the next 5 weeks with 1 week follow up according to exercise program schedule under the guidance of a physiotherapist. The exercise program included relaxation of spinal muscles, maintenance of spinal curvature, improvement of lumber lordotic curvature, stretches postural adjustment and maintenance of spinal mobility. Each group was participated in the exercise program once in a week within 20 minutes of session. A total of 5 sessions were allocated for each participant. The study participants were given advice to continue the learned exercise program on a daily basis at home for remaining 6 days in a week.

After the exercise program schedule, the researcher distributed self-administered questionnaires to the participants. The researcher met with each participant individually at their workplace and collected post-test data from them using VRSP. The self-administered questionnaire had three sections. Section I was designed to obtain information about the socio-demographic (SDQ) profile of nurses, section II was related to Nordic Musculoskeletal Questionnaire (NMQ) and section III was related to 11 points of Verbal Rating Scale for pain (VRSP) assessment. After collection of data, the statistical analysis was performed by using SPSS (version 22.0). The descriptive statistics such as frequency, percentage, mean, SD was used to measure the socio-demographic characteristics of nurses and other major variables. Paired sample t-test was used to compare pre and posttest means score within the group. Independent sample t test was used to compare the association between nurses' characteristics and pre-posttest LBP score. $P < 0.05$ was considered as statistically significant.

The proposal was approved by the Institutional Review Board (IRB) of the National Institute of Advanced Nursing Education and Research (NIANER) and Bangabandhu Sheikh Mujib Medical University (BSMMU) in Dhaka, Bangladesh, prior to data collection. Permission was obtained from a selected University Medical College Hospital via a written order signed by the Directors of NIANER and Mugda Medical College Hospital, Mugda, Dhaka. Participants both verbal and written consent were taken after explaining the aim of this study and ensuring the confidentiality and anonymity. Both the consent form and questionnaire were translated into Bengali language for avoiding error in data collection.

RESULTS

This part study of the study represents the socio-demographic profile of respondents and their baseline data by using NMQ. In addition, this section illustrates the pre and post-test status of LBP by using VRSP and thus, shows the effectiveness of exercise programs to reduce LBP among nurses before and after the intervention. Further, it is presented whether the pre-

and post-test status of LBP is associated with the socio-demographic profile of the nurses and whether there are any influencing variables on LBP if there is a relationship.

Table 1. Distribution of Characteristics of Nurses of Socio-demographic				
				(N = 53)
Variables	**Categories**	**N**	**%**	**Mean ± SD**
Age (Years)	< 38	36	67.9	37.53±6.00
	> 38	17	32.1	
BMI (Body Mass Index)	18.5 – 24.9 (Normal)	16	30.2	26.77±3.30
	25 – 39.9 (Obese)	37	69.5	
Religion	Islam	37	69.8	
	Others	16	30.2	
Marital Status	Married	53	100	
Number of Children	One child	18	34	
	More than one child	35	66	1.68±0.75
Highest level of professional education	Basic Education in Nursing	48	90.6	
	Higher Education in Nursing	5	9.4	
Professional designation	Senior Staff Nurse	45	84.9	
	Nursing Supervisor	4	15.1	
Working Area	Specialized Unit	26	49.1	
	General Unit	27	50.9	
Monthly family income (BDTK*)	< 83000	34	64.2	82754.72±24840.19
	> 83000	19	35.8	
Working experience (Years)	< 16	32	60.4	16.17±5.56
	> 16	21	39.6	

*BDTK= Bangladeshi Taka

Table 1 shows the mean age of the nurses was 37.53 ± 6 years where more than half (67.9%) of the participants were in the age group of less than 38 years. The mean ± SD BMI of the nurses was 26.77 ± 3.3, indicating that they were all overweight. Even still, the majority of nurses (69.80%) were discovered to be overweight. All of the nurses were married, with a majority being Muslims (69.8%). It was found that majority of nurses (92.5%) had children where the mean number of children was 1.68 (SD = 0.75). Most of nurses (90.6%) had held diploma to BSc in nursing degree. About 84.9% of nurses held the position of senior staff nurse. Nearly half (49%) of the nurses were employed in specialist units, compared to roughly half (51%) who worked on general wards. The nurses' average monthly family income was 82754.72 (SD = 24840.19) Bangladeshi Taka, and they had an average of 16.17 (SD=5.56) years of work experience. The majority of nurses (60.4%) have less than 16 years of professional experience.

Table 2. Nurses baseline data by using NMQ			
(N = 53)			
Variables	**Response (Yes)**		**Mean ± SD**
	N	**%**	
Have LBP	53	100	
Have troubles normal activities for LBP	53	100	
Have seen a physician for LBP	28	47.2	
Have troubles last 7 days for LBP	43	81.1	
Duration of pain (year)			5.15±4.18
Diabetes	6	11.3	
Hypertension	10	18.9	
Obesity	6	11.3	
Nothing	33	62.3	
Others	4	7.5	

Table 2 shows that all of the participants had LBP and faced troubles with normal activities. Nearly half of the nurses (47.2%) consulted with doctors for LBP treatment and around 81% nurses had been facing troubles for the last 7 days with LBP during data collection period. The mean suffering duration of LBP was 5.15 (SD = 4.18) years. Considering associated health problems, most of the nurses (62.3%) had no underlying health problems. However, some nurses showed some health problems such as Diabetics Mellitus (11.3%), Hypertension (19%), Obesity (11.3%) and others (7.5%) respectively.

Table 3. Status of LBP among nurses before and after exercise program (N = 53)

Variables	Verbal Rating Scale for Pain (VRSP)														Mean ± SD
	No pain (0)		Very mild pain (1)		Uncomfortably pain (2)		Tolerable Pain (3)		Distressing painful (4)		Very distressing painful (5)		Intense pain (6)		
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
Pre-test (VRSP)									8	15.1	16	30.2	29	54.7	5.40±0.74
Post-test (VRSP)	14	26.4	15	28.3	11	20.8	9	17	4	7.5					1.51±1.27

According to Table 3, the mean of the pain score was 5.40 (SD = 0.74) out of maximum 10 point the pre-test period which indicated moderate level of pain and the pain score ranged from distressing pain to intense Pain. Above half of the nurses (54.7%) had intense pain while only 15% nurses had distressing pain. In the post-test, the mean pain score was 1.51 (SD = 1.27) out of maximum 10 points which indicates mild pain and the pain score was ranged from no pain to distressing pain. Among the participants, about quarter of the nurses (26.4%) had no pain, nearly one third of the nurses (28.3%) had very mild pain, (20.8%) nurses felt uncomfortable pain. However, few number of nurses (17%) had tolerable pain and least of the nurses (7.5%) had distressing pain.

Table 4. Effectiveness of exercise program to reduce LBP among nurses before and after the intervention

(N = 53)

Intervention Variable	Exercise Program				
	Pre-test	Post-test	$M_d \pm SD_d$ *	T	P
	Mean ±SD	Mean±SD			
LBP	5.40±0.74	1.51±1.27	3.89 ± 0.53	- 20.68	0.000

*Md = mean differences, SDd = Standard Deviation differences

Table 4 shows the differences in nurses' pre- and post-test LBP scores. Nurses had a mean pre-test LBP score of 5.40 (SD = 0.74) and a post-test LBP score of 1.51 (SD = 1.27). The mean difference was 3.89, indicating that there was a significant difference between the before and after intervention scores. A significant mean difference between pre and post-test of VRSP was found in a matched paired t-test analysis among nurses with LBP (t = - 20.68, p= 0.001). As a result, after a 5-week exercise program with a 1-week follow-up session, nurses' LBP was statistically significantly reduced.

Table 5. Relationship between Socio-demographic Characteristics and pre- and post-test of VRSP among Nurses (N = 53)					
Variables	**Categories**	**Pre-test**		**Post-test**	
		Mean±SD	**t(p)**	**Mean±SD**	**t(p)**
Age (years)	< 38	5.44±0.69	0.68 (0.49)	1.50±1.23	-0.07(0.94)
	> 38	5.29±0.84		1.53±1.37	
BMI (Body Mass Index)	18.5 - 24.9 (Normal)	5.56±0.63	1.07 (0.29)	1.31±1.25	-0.74(0.46)
	25 - 39.9 (Obese)	5.32±0.78		1.59±1.28	
Monthly family income (BDTK*)	< 83000	5.29±0.79	-1.35(0.18)	1.62±1.39	0.91(0.37)
	> 83000	5.58±0.61		1.32±1.00	
Working experience (years)	< 16	5.44±0.72	0.50(0.62)	1.63±1.21	0.82(0.42)
	> 16	5.33±0.79		1.33±1.35	
Religion	Islam	5.38±0.79	-0.26(0.79)	1.59±1.32	0.74(0.46)
	Others	5.44±0.63		1.31±1.14	
Number of children	One child	5.33±0.77	-0.44(0.66)	0.94±0.99	-2.66(0.01)
	More than one child	5.43±0.74		1.80±1.3	
Professional Education	Basic Education in Nursing	5.42±0.71	0.43(0.69)	1.60±1.28	3.27(0.009)
	Higher Education in Nursing	5.20±1.09		1.53±0.55	
Professional Designation	Senior Staff Nurse	5.33±0.77	-2.09(0.06)	1.53±1.34	0.48(0.64)
	Nursing Supervisor	5.75±0.46		1.38±0.74	
Working area	Critical unit	5.35±0.75	-0.48(0.64)	1.46±1.24	- 0.27(0.79)
	General unit	5.44± 0.75		1.56±1.31	

In table 5, an independent t-test was used to investigate the relationships between socio-demographic characteristics and pre- and post-test VRSP. Pre-test analysis revealed that participants' age (p=0.49), BMI (p=0.29), monthly family income (p=0.18), working experience (p=0.62), religion (p=0.79), number of children (p=0.67), professional education (p=0.69), professional designation (p=0.06), and working area (p=0.64) were all non-significant. However, in post-test analysis, the number of nurses' children (p=0.01) and professional education (p=0.009) were statistically significant with VRSP. In post-test analysis, the number of nurses' children was statistically significant with VRSP (t = -2.66, p <0.05). On the other hand, nurses with basic professional education had lower LBP after exercise programs than those with higher professional education (t = 3.27, p <0.01). As opposed to, age, BMI, monthly family income, working experience, religion, professional designation, and working area were all unrelated to VRSP in post-test analysis.

DISCUSSION

This study tried to investigate the effectiveness of exercise program on LBP through conducting quasi experimental study design among nurses working at a medical college hospital in Dhaka, Bangladesh.

It was found that all nurses eligible for the pre- and post-intervention of this study had LBP and it made it difficult for them to perform their normal activities. This finding highlights the suitability of the study participants and the credibility of the study. Patino and Ferreira (2018) stated that broad inclusion criteria that produce a study population that more closely mimics patients in real-world settings can boost validity of a study [29]. They again opined that the reliability of a research study's findings in predicting actual outcomes among people who behave similarly outside of the study is referred to as validity. In this regard, the current study can be considered valid as it has yielded very similar results to a previous study conducted in Egypt in terms of the presence of LBP among nurses [30]. Gim (2017) identified heavy workload, long duty hours and improper body handling of patients in health care setting as the contributing factors for the occurrence of LBP among nurses [11]. Unlike a previous study [3], the current study's mean suffering duration of LBP was 5.15 years among nurses which indicates their unawareness about health, lack of support staff, huge workload and inappropriate management strategies in Bangladesh. On the other hand, some of the nurses in this study had diabetes, hypertension, obesity, and other health-related problems along with LBP which may signify an association among them. However, no association test was done among these variables which can be considered as the limitation of this study.

To observe the effectiveness of exercise programs on LBP among nurses, participants in this study underwent an exercise program schedule for 5 weeks. Before starting and after completing the exercise program, a pre- and post-test was conducted. The results showed that the LBP of the nurses changed from moderate to mild as a result of the exercise program, indicating the effectiveness of the exercise program in reducing LBP. Similarly, the usefulness of exercise programs on LBP among nurses was also evident in some previous authors' studies [2, 31]. On the other hand, looking at the effectiveness of this study's exercise program, it was found to be more effective than the exercise program in other studies. For instance, Pakbaz et al., 2019 showed that the LBP score of nurses after the back school exercise program was 4.03 [2] which reduced minimum pain whereas the current study's exercise program reduced maximum pain as the mean LBP score of nurses after the

intervention was 1.51. Although, an exercise program namely "Acharya" was found similarly effective as the present study exercise program in reducing LBP in nurses as the mean LBP score of nurses after applying the "Acharya" program was 1.67 for Intensive Care Unit and 2.40 for Operation Theater [31].

The present study illustrated that number of nurses' children (p<0.05) and professional education (p<0.01) were statistically significantly different with VRSP in post-test analysis. It indicates that nurses having low number of children had experienced   reducing their LBP after receiving 5 weeks' exercise programs effectively (t = -2.66, p < 0.05). Functional changes of the spine might be reason of this finding. On the other hand, nurses who had basic professional education had been noticed the reduction of LBP significantly after receiving exercise programs than those who had higher professional education (t = 3.27, p<0.01). The finding is nearly consistent with pervious study conducted by Ibrahim and Elsaay (2015) in Egypt [3]. However, unlike a prior study [31], this study did not find any relationship between LBP and nurses' age, BMI, monthly family income, working experiences, religion, working area, and professional designation, which is suspicious, therefore, a comprehensive study focusing on the socio-demographic characteristic of LBP among nurses is suggested to carry out.

CONCLUSION

The study showed a significant difference between the pre-and post-test of nurses with LBP. Results also presented that the professional education and number of nurses' children were statistically significantly correlated with the post-test of nurses with LBP. Based on the results of this study, it can be concluded that this program can be suitable for preventing and reducing pain among nurses working in hospital settings.

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