Effect of Educational Program on Nurses' Performance Regarding Body Mechanics

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Abstract

Background: Nursing is an occupation with high risk of musculoskeletal injury. Nurses' perceptions of the risk of injury have a role in preventing such injury. Uses of proper body mechanics reduce risk of injury to the musculoskeletal system. ***Aim of the study*** was to evaluate the effect of educational program on nurses' performance regarding body mechanics. ***Subject and Methods: Research design:*** A quasi experimental research design was used. ***Setting:*** The study was conducted in the Intensive Care Units, Dialysis Units, Orthopedic Units and Surgical Units at Zagazig University Hospital. ***Subjects:*** composed of 76 nurses who performing actual patient care. ***Tools of data collection:*** Four tools were used to collect data included nurses interviewing assessment questionnaire, body mechanics observational checklist, nurses' pain assessment questionnaire and Oswestry low back pain disability questionnaire. ***Results:*** revealed that***,*** the majority of studied nurses had back pain and all studied nurses had no training course of body mechanics. There was highly statistically significant difference between pre/post and pre/follow up program phase as regarding to nurses' knowledge, practice, pain intensity and disability but some decline occurred in the follow up program phase compared with post phase. ***Conclusion:*** The effect of health educational program had improved nurses' knowledge, practice regarding body mechanics, pain intensity and disability. ***Recommendations:*** Educational programs should be held periodically for nurses on proper body mechanics and correct lifting techniques should be introduced in the workplace to reduce the burden of musculoskeletal pain among the nurses working in different setting.

Key words: Body mechanics, Educational program, Nurses performance.

Introduction:

Body mechanics" is a two-word phrase used to describe the movements we make each day during normal activities, including lying in bed, sitting, standing, lifting, pulling, pushing and walking. Good body mechanics will help remedy and prevent future back problems, while bad body mechanics contribute to back problems and other muscle and bone problems [(1)].

A nurse should have thorough scientific knowledge of body mechanics and its proper use in their daily practice, muscles which cannot provide the best support and strength are forced into exertion, strain, injury, fatigue of the body tissue [(2)].

The nursing profession is a very demanding job, both physically and emotionally. Nurses are exposed to poor working condition. The Work Related Musculoskeletal disorders (WRMSDs) are known as major causes of significant human suffering, and loss of productivity on nursing profession. In addition, WRMSDs may result in discomfort, difficulty in performing jobs and absence from work. Others are; low work efficacy, economic impact due to reduced working hours, high costs of medical treatment, effects on daily life and premature retirement from the profession [(3)]**.**

Disability is strongly associated with musculoskeletal conditions such as arthritis, low back pain and other soft

tissue and joint disorders. The burden of these conditions may become exponentially high [4]. Disability is defined as an impairment of the body functions and body structure and limited activity and restricted participation and can be influenced by environmental and personal factors. There is a global lack of accurate information on the prevalence and causes of physical disability in low income countries [5].

Nursing is one of the most risky occupations for nonfatal occupational musculoskeletal injuries and it has the highest incidence of all types of nonfatal work-related injuries in the United State of America [6]. The Occupational Safety and Health Administration (OSHA) have calculated that nearly half of all health care workers suffer at least one work-related musculoskeletal injury during their career. More than half of all nurses (52%) complain of chronic pain and 38% of registered nurses (RNs) have suffered occupation related back injuries severe enough to require time away from work [7].

The most common body regions that are affected by WRMSDs are the lower back, neck and shoulders [8]. Most employees including nurses complained of back pain followed by neck and shoulder as a result of their day to day work activities. The WRMSDs are very common health problem experienced by health care workers and a major cause of disability throughout the world in the workplace [9].

Low back pain (LBP) is a nonspecific condition of acute or chronic pain in or near the lumbosacral spines that can be caused by inflammatory, degenerative, neoplastic, gynecologic, traumatic, metabolic, or other disorders[10]. LBP is a universal health problem. It is a common experience in the life of almost every human being, as well as a growing cause of direct and indirect costs for the social systems in many industrialized countries[11]. There is a strong association between LBP in nurses and postures in physical work such as lifting of heavy objects or transferring patients and equipment [12]. Nurses in developing countries have a higher incidence of work-related back pain due to lack of equipment and planes of work [13].

Significance of the study

The safety of nurses from low back pain is remains challenge and important to nurses as well as to the patients they serve. The presence of healthy and well-rested nurses is critical to provide vigilant monitoring, empathic patient care and vigorous advocacy. In hospital, most nurses are not aware of consequences of bad body mechanics. Nurses have attributed the onset of LBP to their patient handling activities. About half of all back pain episodes and three quarter of compensable back injuries appear to be related to lifting, transfer or movement of patients [14].

Despite the known of the important of body mechanics techniques, there are nurses who are still not practicing correct body mechanics techniques because of certain obstacles and reasons. Thus, the main goal is to improve the knowledge and practice of body mechanics techniques among nurses and helps to reveal their understanding toward body mechanic techniques [15].

Aim of the study:

The aim of this study was to evaluate the effect of educational program on nurses' performance regarding body mechanics through:

- Assess nurses' knowledge and practice regarding body mechanics during performing general physical tasks.
- Design and implement educational program for nurses based on nurses' actual needs.
- Evaluate the effect of educational program on nurses' knowledge, practice regarding body mechanics, pain intensity and disability.

Research hypothesis:

The present study hypothesis that:

- The mean knowledge scores of nurses regarding body mechanics post program are higher than that of the preprogram scores.
- The mean practice scores of nurses regarding body mechanics post program are higher than that of the preprogram scores.
- The educational program will have positive effect on nurses' performance regarding body mechanics.
- The educational program will improve pain and decrease disability among the nurses throughout the study phases.

Subjects and methods:

Research design:

A quasi experimental design was conducted to achieve the aim of the study.

***Study setting*:**

The study was conducted in the Intensive Care Units, Dialysis Units, Orthopedic Units and Surgical Units at Zagazig University Hospital.

Study subjects:

A purposive sample of nurses who performing actual patient care had been taken from the previously mentioned study settings. The total number was 76 nurses were females, with different age, educational levels and years of experience and willing to participate in the study. Exclusion criteria:Those who are pregnant and those who are unavailable during study.

Tools of data collection:

Four tools were utilized for data collection:

Tool I: Nurses Interviewing Assessment: designed by the researcher after reviewing related literature to identify nurses' needs as a basis to develop health educational program. The questionnaire covered two parts as the following:

Part 1: Nurses' demographic Characteristic:

Concerned with assessment demographic characteristics of the nurses as the following: age, gender, height, weight, body mass index, marital status, having children, ….etc.

Part 2: Nurses' Knowledge Questionnaire:

Concerned with assessment nurses' knowledge regarding body mechanics for developing the booklet of educational program, it was designed by researcher in Arabic form and applied as pre, post and follow up test for study subjects based on the related literature covered the following items: Nurses' knowledge about anatomy and physiology of musculoskeletal system, body mechanics, principles of proper body mechanics and back pain,

Scoring System for Nurses' Interviewing Assessment Questionnaire:

1. **Nurses' body mass indexes (BMI)** were estimated pre guidelines intervention. BMI = weight (Kg) / height (m) 2. It was considered that underweight if BMI < 18.5, normal weight if BMI 18.5 – 24.9, over weight if BMI 25 – 29.9 and obese if BMI > 30(16).
2. **Nurses' knowledge Questionnaire**: Each question is scored "zero" for the incorrect answer or no answer and "one" for the correct answer, and these points are counted for each nurse. The total score was calculated for each nurse. The general nurses' knowledge is classified into satisfied

knowledge if the score is ≥ 60% from the maximum score and unsatisfied knowledge if it is < 60%.

Tool II: Observational check list to assess nurses' practice regarding body mechanics:

It was adapted from Nettina, Perry & Potter & Hinkle et al [17] [18] [19] and modified by the researcher to assess nurses' practice regarding body mechanics before and after the program then in follow up. It was contained five parts: Applying body mechanics, maintaining proper body alignment, using coordinated movements, using basic principles of body mechanics and assessing patient for safe moving and handling.

Scoring system:

The items observed to be done were scored (1) and the items were not done (0). For each area, the scores of the items were summed up and the total divided by the number of the items, giving a mean score of this part. These scores were converted into a percent score. The practice considered adequate if the percent score was 60% or more and inadequate if less than 60%.

Tool III: Nurses' Pain Assessment Questionnaire:

It was adopted from Bell& Duffy [20] to assess nurses' pain and description of pain characteristics. as the following: occurrence, sites of pain, frequency, time of feeling pain…etc. Each items scores answered by Yes= 1 or No= 0.

Pain Intensity Scale:

Intensity of pain was assessed by using pain assessment with the "0—10 Numeric Pain Intensity Scale). This scale is often displayed as a line numbered from zero to ten asking the person in pain to assign a number, from zero to ten, and it was adopted from [21].

Scoring system for tool III:

Pain Assessment with the "0—10 Numeric" (Pain Intensity Scale). The values on the pain scale correspond to pain levels as follows: 1 – 3 = mild pain, 4 – 6 = moderate pain and 7 – 10 = severe pain.

Tool IV: Oswestry low back pain disability questionnaire (appendix IV):

It was adopted from Fairbank & Pynsent, [22] (Pre, Post and follow up test)**.** This questionnaire was filled by the researcher to measure functional disability and to assess how the back pain affected on the ability to manage in everyday life. It was included 10 sections namely: pain intensity, personal care (dressing, bathing, etc.), lifting, walking, sitting, standing, sleeping, sex, social life and traveling. Every section included 6 box and mark in each section only one box which applies.

Scoring Systems:

Simply count up the points and plug the total in below: For each question there are a possible of 5 points: 0 for the first question, 1 for the second question, 2 for the third question etc. The score 0-4 considered there are no disability, the score 5-14 considered there are mild disability, the score 15-24 considered there are moderate disability, the score 25-34 considered there are sever disability and the score 35-50 considered there are completely disabled.

Content validity & reliability:

Content validity was used for the modified tools and the designed booklet to determine whether the tools covered the aim or not. It developed by a jury of 5 experts three professors from faculty of Nursing, Zagazig University and two professors of rheumatology from Faculty of Medicine, Zagazig University. Reliability was done by using Cronbach

test and retest. It was used to examine whether the questionnaire and checklist had internal consistency or not. The knowledge and practice tools had good internal consistency or not, the test was done. The agreement percentage was 97%.

***Field work**:*

After an official permission was taken from the dean of the faculty of nursing, from manager of Zagazig University Hospitals and from supervisor of nurses in the Intensive Care Units, dialysis units, orthopedic Units and surgical Units at Zagazig University Hospital.

Assessment phase:

This phase aimed to identify the studied nurses' characteristics ; to assess nurse's knowledge and practice regarding body mechanics and back pain.

Planning and preparatory phase: Based on the assessment phase, the program content and media (in the form of the program booklet and visual materials) were prepared by the researcher. Based on the opinion of a panel of expertise some modifications were done, and then the final forms were developed.

Implementation phase:

Include data collection started as following: The selection of nurses, the collection of data and the implementation of the educational program lasted over a period of 14 months, starting from July 2015 to August 2016, which classified as following: 3 months pretest (from July 2015 to September 2015), 5 months implementation the program & posttest (from October 2015 to February 2016), 3 months follow up test after 3 months from posttest (from June 2016 to August 2016).

The programme consisted of (26) sessions; one third of the sessions (9) were theoretical, and two thirds (15) were practical. In addition (2) sessions were revision on theoretical and practical parts. Each interview took approximately 30 minutes in each theoretical session and 45 minutes in each practical session.

Evaluation phase:

The evaluation phase was emphasized on estimating the effect of educational program on nurses 'knowledge and practice regarding low back pain and body mechanics post-program implementation to determine the level of improvement in nurses' knowledge and practices. Also, the evaluation phase was emphasized on estimating the effect of the educational program on disability level and intensity of low back pain for nurses.

During follow up (after 3 months of post-test):

The nurses had filled the questionnaires and checklists again in the Intensive Care Units, dialysis units, orthopedic Units and surgical Units. For Oswestry low back pain disability questionnaire, it was filled by researcher.

***Administrative and ethical considerations**:*

An official permission was obtained from the Dean of the faculty of Nursing and from the director of Zagazig University Hospital before conducting the study. Additional oral consents were taken from the nurses who participated in the study after explaining its purpose. They were given an opportunity to refuse the participation, and they were assured that the information would be used for research purposes only. All ethical issues were taken into consideration during all phases of the study. The ethical research

considerations in this study included the following: The research approval was obtained before the program implementation, the objectives and the aims of the study were explained to the participants, the researcher confirmed the anonymity and confidentiality of subjects, and subjects were allowed to choose to participate or not and they had the right to withdraw from the study at any time without penalty.

Pilot study:

The pilot study commenced once ethical approval had been obtained. A pilot study was conducted on eight nurses within selected criteria who were excluded from the study sample. In order to test the tools for clarity, relevance, comprehensiveness, understanding, applicability and ease for implementation. Based on the result of the pilot study, modifications and omissions of some details were done and then the final forms were developed.

Statistical analysis:

All collected data were organized, categorized, tabulated, entered, and analyzed by using SPSS (Statistical Package for Social Sciences); a soft-ware program version 20, which was applied to frequency tables and statistical significance. Associations were assessed by using One-Sample Kolmogorov-Smirnov Test, ANOVA, Mont Carlo exact test and Fishers exact test, Friedman test, and coefficient correlation (r) to detect the relations between variables. Significant if $p \leq 0.05$

Results:

Figure 1: This table showed that demographic characteristics of the studied nurses. About two thirds 60.5 % of them were more than 35 years old and all of them 100% were female. Concerning marital status, 89.5% of the studied nurses were married and 84.2% of them had children. Concerning nursing qualifications 72.4% of the studied nurses had diploma degree while 15.8% had bachelor degree. all studied nurses had no training course of body mechanics. In relation to work schedule, 77.6 % of them had shift work schedule. Also 81.6 % of them had years of experience more than ten years.

Figure 2: This table showed that, there was a highly statistically significant difference between pre / post and pre / follow up program phase as regarding to the total nurses' knowledge about body mechanics with p value 0.000 %.

Table3: This table showed that, there was a highly statistically significant difference between pre / post and pre / follow up program phase regarding to the total score for nurses' practice about applying body mechanics with p value 0.000 %.

Table 2: This table clarified that, there was a highly statistically significant difference between pre / post and pre / follow up program phase as regard to total score for pain intensity of study subjects with p value 0.000 %.

Table 3: This table clarified that, there was a highly statistically significant difference between pre / post and pre / follow up program phase as regard to total score for functional disability level with p value 0.000 %.

Table 4: This table clarified that, there was a statistically significant relation between the studied subjects' knowledge and their qualification in preprogram phase (p = 0. 004).

Table 5: This table showed that, there were statistically significant

relation between satisfied practice and demographic data of study nurses including age in pre and post program phase. On the other hand there was statistically significant relation between the studied subjects' practice and their qualification of nurses and years of experience in post program phase with p value at 0.013 and 0.047 respectively.

Discussion:

Regarding to demographic characteristics of the studied nurses. The result of the present study illustrated that about two thirds of them were more than 35 years old and all of them were female. This might be due to that the majority of nursing force working in Zagazig university hospitals are females. This finding due to nursing education in the past was specialized only to females.

This finding is in agreement with Salah et al [23] who reported in study at Ain-shams University Hospitals, about "Effect of educational program on performance of intensive care nurses to decrement the low back pain" that, about two thirds of study nurses were more than 35 years old and the majority of them were female.

The current results showed that, the majority of the studied nurses were married and had children. This result is in agreement with Bin Homaid, Abdelmoety & Alshareef [24] who stated in study about "Prevalence and risk factors of low back pain among operation room staff at a Tertiary Care Center, Makkah, Saudi Arabia" that, the majority of study sample were female, married whose more than half of them had one to three child.

Concerning nursing qualifications, the results of the present study showed that the majority of the studied nurses had diploma degree while less than one quarter of them had bachelor degree. This finding might be related to shortage of high graduated nurses attached and working at Zagazig University Hospital who were always busy with administrative duties.

This was supported with Ibrahim & E.Elsaay [25] who found in study at Tanta University Hospital, about "The effect of body mechanics training program for intensive care nurses in reducing low back pain" that, the majority of nurses had diploma degree.

The result of the present study revealed that, all studied nurses had no training course of body mechanics. This might be related to lack of in-service training, medical education regarding such topics in hospital related diminished attention, lack of hospital resources and nurses shortage.

American Nurses Association [26] mentioned that, the formed training course plays important role in enhancing and updating nurses' knowledge and performance. In addition delivery of safe evidenced based high quality care of patients.

In relation to work schedule, the results of the present study revealed that the majority of studied nurses had shift work schedule. This may be due to the nature of nursing work which characterized by three shifts; Morning (8am-3pm), Afternoon (8am-5pm) and Night (8pm-7am).also this finding may be related to that the patients' care continuous all over the day.

This finding is in agreement with Abou El-Soud et al [27] who stated in study about "Prevalence of low back pain in working nurses in Zagazig University Hospitals" that, nurses are one of the few professional groups who have to work in shifts during their careers. Work shift implies either long-term night work or work involving rotation between day, evening, and night shifts. Work shifts affect a nurse's health and performance because of disruption of the circadian rhythm. This may result in sleep disturbances, fatigue and impaired work performance and safety awareness.

As regard to work area of study subjects, the current study revealed that the great number of the studied nurses were from Intensive Care Units. This may be

relate to the greater number of intensive care Units compared with other hospital settings.

This finding goes in the same line with Hinmikaiye & Bamishaiye [28] who stated in study at University of Ilorin and Obafemi Awolowo University Teaching Hospital, about "The incidence of low back pain among theatre nurses" that, working positions often are uncomfortable either due to lack of space or movement restriction caused by special circumstances, such as in dialysis unit, operating theatre, intensive care unit. It has been found that nurses have to walk and stand up during their shift more than warehouse workers a lot of times more than 6 hours a day.

As regards to the studied subjects' total knowledge score throughout the study phases, the results of present study revealed that, the majority of study subjects had unsatisfactory knowledge level in preprogram phase, while the majority of them had satisfactory knowledge level in post program phase and the most of them in follow up phase.

Also the results of present study revealed that, there was a highly statistically significant difference between pre/post and pre/follow up program phase as regarding to the total score for studied nurses' knowledge about body mechanics. This indicating the improvement of subjects' knowledge based on educational program about body mechanics. In the same line Tinubu et al [14] in study tilted "Work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria" who reported that, training in body mechanics and body awareness has been shown to be effective in improving knowledge.

As regards to total score for the studied nurses' practice throughout the study phases, the results of present study revealed that, there was a highly statistically significant difference between pre/post and between pre/follow up program phase regarding to the total score for practice about applying body mechanics. This might be related to the effect of body mechanics education on nurses' performance which reflect on their health and well-being. Also, this might be due to success of program, may be attributed to the fact that procedures were practiced under supervision and guidance of the researcher.

This finding was in agreement with Ibrahim & E.Elsaay [25] who reported that, nurses had unsatisfactory practice regarding total performance of body mechanics pre intervention, while about two third them had satisfactory practice post intervention. Also, there were highly statistically significant differences regarding practice pre and post intervention respectively.

This finding was in agreement with Cilliers [29] in study about "Evaluating the knowledge, attitudes and beliefs about the prevention and self-treatment principles for low back pain among nursing staff in Cecilia Makiwane Hospital, East London Hospital" who emphasized the importance of practical demonstration of body mechanics and patient lifting. Moreover, training to prevent low back pain must increase knowledge and result in positive behaviors.

Also, the result of the current study showed that there was a highly statistically significant difference between pre/post and pre/follow up program phase as regard to total score for low back pain intensity of study subjects. These improvements might be attributed to the effect of body mechanics educational program, which emphasized practical training aimed to reduce aggravating activities of in nurses' work such as prolonged sitting and standing, in addition to emphasizing correct lifting and handling techniques. More important is the knowledge acquired during the program, which turned out to be the most significant independent predictor of improvements in pain and disability scores of the nurses.

This finding was supported by Abd El-Hameed et al [30] who identified that, statistically significant differences in relation

to intensity, frequency and duration of pain after using body mechanic principles. This finding goes in same line with Ovayolu et al [31] who found that, nurses who had not received any education on back pain, remained standing for long periods of time, performed interventions that required bending forward, lifted and repositioned patients, and did not use any aiding equipment during interventions, experienced more pain and had higher average pain scores.

Regarding functional disability level, there was a highly statistically significant difference between pre/post and pre/follow up program phase as regard to total score for functional disability level.These results indicated that using body mechanic principles had its positive effect on improving the functional ability of nurses and reflected on their health. Moreover, nurses who play an important role in protecting, maintaining and improving individuals' health, should attach importance to applying protective and improving actions for their own health, so that they can provide nursing care quality, be productive, administer patient care without interruption and minimize disability level.

These findings was in agreement with Abd El-Hameed et al [30] who found that, a highly statistically significant difference in mean of total disability score among study group in immediate posttest and follow up test. This enhancement may be attributed to using body mechanics principles by the study group.

This finding agreement with Keriri [32] in study tilted "Prevalence and risk factors of low back pain among nurses in operating rooms, Taif, Saudi Arabia" who states that, low back pain is the most common cause of job-related disability and a leading contributor to missed work days. It remains the leading cause of disability in persons younger than 45 years old. Also this finding agreement with Lela & Frantz [33] in study tilted "The relationship between low back pain and physical activity among nurses in Kanombe Military Hospital" found that, low back pain is a major health threat which leads to disability in high and low-income countries.

Also this result is in agreement with Sharafkhani, Khorsandi, Mohsen et al [34] in study tilted "The effect of an educational intervention program on the adoption of low back pain preventive behaviors in nurses: an application of the health belief model" reported that, LBP is one of the most prevalent occupational problems. It can cause lifelong physical disability and increases work absenteeism and health service use. Moreover, Barkhordari , Halvani & Barkhordari [35] in study tilted "The prevalence of low back pain among nurses in Yazd, Southeast Iran" stated that, the prevalence of LBP and disability has increased and account for approximately 29-70% in nurses and other health care workers.

There was a statistically significant different relation between the studied subjects' knowledge and their qualification in preprogram phase. In the other hand there was statistically significant relation between the studied subjects' knowledge and their medical department in follow up program phase. Which agrees with Bayomi [36] in the study at Zagazig University Hospital that, there was statistical significant difference between nurses qualification and their level of knowledge.

This result was disagreeing with Alwsaby [37] in the study about "Effect of training program on nurses' performance toward care of patients with myocardial infraction" that, no statistical significant difference nurses characteristics' namely educational level and years of experience with their level of knowledge.

Also, this finding not correspondent with Gireesh et al [38] who reported that, there was no significant association between knowledge sore among staff nurses and demographic variables. In addition, There was no significant association between

practice score among staff nurses and demographic variables.

There were statistically significant relation between satisfied practice and demographic data of study nurses including age in pre and post program phase. On the other hand there was statistically significant relation between the studied subjects' practice and their qualification of nurses and years of experience in post program phase. This fact may be related to the knowledge the nurses' gain due to their fraction with medical team and the more experience they are exposed to in their work.

Conclusion:

On the light of the current study results, all of studied nurses had no training courses regarding body mechanics. Also, improvement of nurses' knowledge and practice of body mechanics for studied nurses in post and following up program phase compared to preprogram phase, but some decline occurred in the follow up program phase compared with post phase. In addition, there was a highly statistically significant difference between pre/post and pre/follow up program phase as regard to total score of pain intensity and disability level of study nurses. Moreover, the present study answered about researcher hypothesis: that the educational program had a positive effect on improving nurses' performance regarding body mechanics, pain intensity and functional disability level.

Recommendations:

The following recommendations are yielded by the results of this study:

- Educational programs should be held periodically for nurses on proper body mechanics and correct lifting techniques should be introduced in the workplace to reduce the burden of musculoskeletal pain among the nurses working in different setting.
- Education programs on prevention and coping strategies for musculoskeletal disorders should be made mandatory for nurses in order to reduce the rate of work related musculoskeletal disorders among them and to promote efficiency in patient care.
- Periodic and continuous in-service training for nurses about regular exercise to strengthen their back muscles and ensure ergonomic adjustment to reduce risk of musculoskeletal pain.
- Manual handling training programs should be specific to the actual work tasks of healthcare workers and should be based on the documented manual handling risk assessments that have been carried out at management level.
- The study should be replicated on large sample and different hospitals setting in order to generalize the results.
- Further study is recommended to evaluate the association between musculoskeletal pain and its associated factors.

Table 1: Frequency and percentage distribution of demographic characteristics of the studied nurses (N=76).

Demographic characteristics	No	%
Age (years):		
<35	30	39.5
>35	46	60.5
Range	21 – 53	
Mean ± SD	36.79±7.38	
Sex: Female	76	100
Marital status:		
Single	4	5.3
Married	68	89.5
divorced	3	3.9
widow	1	1.3
Have Children	64	84.2
Qualification of nurses:		
Diploma nursing	55	72.4
Technical nursing	9	11.8
Bachelor degree nursing	12	15.8
Previous training programs about body mechanics	0	0.0
Work schedule:		
Shift	59	77.6
fixed	17	22.4
Unit:		
Surgical Unit	13	17.1
Dialysis Unit	19	25.0
Intensive Care Unit	33	43.4
Orthopedic Unit	11	14.5
Years of experience in department:		
≤ 10	14	18.4
≥10	62	81.6
Range	2 – 34	
Mean ± SD	16.25±7.65	

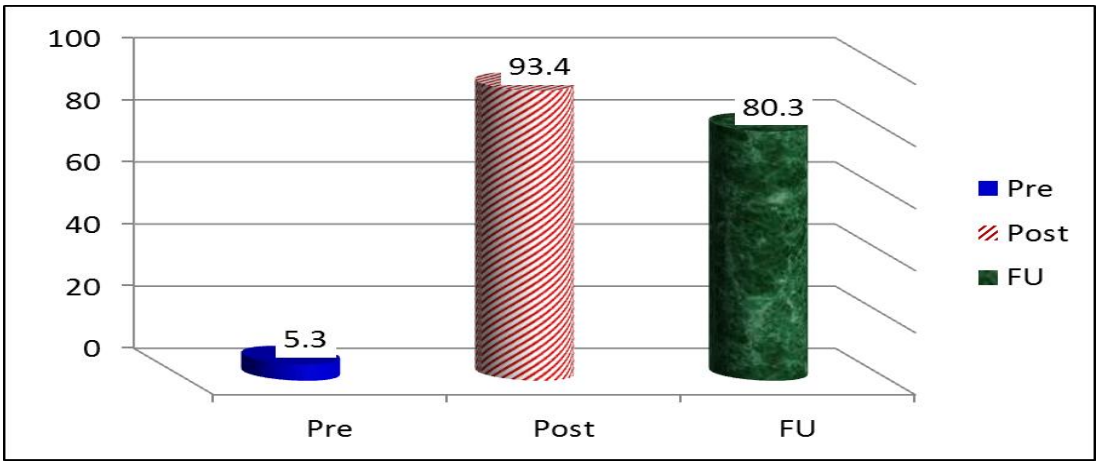

Figure 1: Total satisfactory nurses' knowledge regarding body mechanics throughout the study phases (N=76).

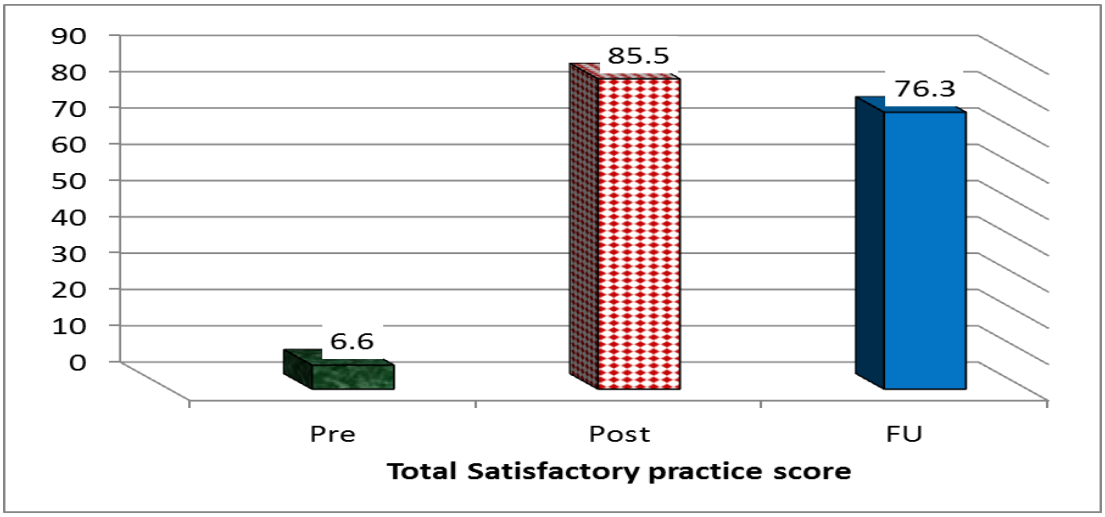

Figure 2: Total satisfactory nurses' practices score regarding body mechanics throughout the study phases (N = 76).

Table 2: Frequency distribution of pain intensity among the studied nurses throughout the study phases (n= 76).

Intensity Of Pain	pre		post		FU		Pre / post		Pre / FU	
	No	%	No	%	No	%	Z	P	Z	P
Mild	11	14.5	53	69.7	55	72.4				
Moderate	44	57.9	13	17.1	13	17.1	5.380	.000**	5.815	.000**
Severe	21	27.6	10	13.2	8	10.5				

(**)Highly significant at P < 0.01

Table 3: Distribution of level of disability of the studied nurses throughout the study phases (N=76).

Disability level	Pre		Post		FU		Pre/Post		Pre/FU	
	No	%	No	%	No	%	Z	P	Z	P
No disability	7	9.2	25	32.9	34	44.7				
Mild disability	17	22.4	30	39.5	25	32.9				
Moderate disability	31	40.8	17	22.4	15	19.7	5.236	.000**	5.814	.000**
Severe disability	21	27.6	4	5.3	2	2.6				
Completely disabled	0	0.0	0	0.0	0	0.0				

(**)Highly significant at P < 0.01

Table 4: Relation between demographic characteristics and total satisfied knowledge about body mechanics of study nurses throughout the study phases (N=76)

demographic data	Pre Satisfactory knowledge=4		Post Satisfactory knowledge =71		FU Satisfactory knowledge =61	
	X2	P	X2	P	X2	P
Age (years)	2.754	.097	.850	.357	.405	.525
Body mass index	1.543	.462	.513	.774	.530	.767
marital status	.497	.920	6.292	.098	1.085	.781
children	.792	.374	.071	.789	.085	.771
Daily working hours	.871	.351	.032	.859	.110	.740
Work schedule	.017	.897	.958	.328	2.653	.103
Qualification of nurses	11.184	.004**	.474	.789	.635	.728
medical department	3.071	.381	4.092	.252	11.191	.011*
Years of experience	.122	.727	.009	.925	.031	.860

(*) Statistically significant at p<0.05 (**)Highly significant at P < 0.01

Table 5: Relation between demographic characteristics and satisfied practice of study nurses throughout the study phases (N=76).

demographic data	Pre Satisfactory practice =5		Post Satisfactory practice =65		FU Satisfactory practice =58	
	X2	P	X2	P	X2	P
Age (years)	3.679	.045*	3.143	.036*	.003	.954
Body mass index	4.120	.127	.865	.649	1.023	.600
marital status	.630	.890	1.474	.688	3.480	.323
children	1.004	.316	1.276	.259	.734	.392
Daily working hours	.032	.859	.938	.333	1.895	.169
Work schedule	1.542	.214	.178	.673	1.721	.190
Qualification of nurses	.737	.692	8.697	.013*	3.711	.156
Years of experience	1.658	.198	2.755	.047*	1.374	.241

(*) Statistically significant at p<0.05..

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