RELATIONSHIP BETWEEN BACK PAIN WITH NURSING ACTIVITIES AND THE USE OF BODY MECHANICS AMONG NURSES WORKING IN GENERAL HOSPITALS

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ABSTRACT

Background: Nursing is known as an occupation with a high risk of musculoskeletal injury and back pain. Proper body mechanics are important to a healthy nursing career. **Aim:** This study aimed to find out the relationship between back pain with nursing activities and the use of body mechanics among nurses working in general hospitals. **Subjects and Method: Design:** Descriptive correlational research design was utilized. **Setting**: Study was carried out in Port Said General Hospital, Port-Fouad and EL-Zohor hospital at Port Said City. **Subjects:** A convenience sample of nurses (200) was recruited from above mentioned setting. **Tools: Tool I:** Demographic questionnaire and lifestyles patterns, **Tool II:** Back pain scale, **Tool III:** Body mechanic observation checklist **Tool IV:** Barriers to perform body mechanics questionnaire, **Tool V:** Common nursing care activities questionnaire. **Results:** This study showed that 69 % of the studied nurses had back pain, 95% of them had barriers to perform body mechanics such as lack of lifting equipment and insufficient training in the use of lifting equipment and 81 % of the studied nurses kept their backs bent for a long time. **Conclusion:** The current study revealed that was a statistically positive correlation between barriers to perform body mechanics, degree of back pain, and nursing activities of the studied nurses. **Recommendations:** The study recommended a program for nurses to enhance the safe nursing practice of body mechanics and develop strategies to prevent back pain.

Keywords: *Back pain, General hospitals, Nursing activities, Use of body mechanics.*

INTRODUCTION

Back pain is one of the most common occupational health problems in nurses. The nurses performed many physical tasks in the job exposed them to back pain complications. The incidence rates continue to climb and the direct and indirect costs associated with back injuries for nurses are estimated to be 20 billion annually (Ross, 2021).

Worldwide, nurses facing a significant problem of back pain and it is mainly due to the manual lifting and handling the heavy objects and patients. Back pain might develop major disruptions in physical, social, and mental well-being, which could affect their occupations. Physical impact includes the loss of physical function and deteriorated general health. Social impact includes decreased participation in social activities. Psychosocial impacts are manifested through insomnia, anxiety, and depression (Alziyadi & Elgezery, 2021).

Back pain affects nurses' productivity at work and consequently reduces the overall quality of healthcare and safe patients care. In addition, back pain have many negative impacts on different aspects of the healthcare system including healthcare workers' absence from the workplace, loss of optimal performance, low job satisfaction, rising medical costs and occupational disability (Rawat, et al., 2017).

Body mechanics is a term that indicates a coordinated effort of the musculoskeletal and nervous systems to maintain balance, posture, and body alignment in daily life, which is directly related to effective bodily functioning. Improper working posture increases the risk of damage to the body. Body mechanics refers to the method of efficiently using the body when making movements, such as bending the body, lifting a heavy object or person, stretching an arm, sitting, standing, or lying while performing tasks (Ibrahim, Elsaay, 2015, Richardson, McNoe, Derrett, Harcombe, 2018).

The actions of walking, turning, lifting and carrying are essential component in the provision of nursing care such activities require to the muscle exertion by nurse. The nurse must know and practice proper body mechanics to prevent back injury. Nurses engage in various activities from the time of a patient’s admission to his or her discharge from the hospital, helping patients to meet their needs (Samawi & Awad, 2017).

Nurses need to work supportive environment to help them properly apply body mechanics, a technique to perform their duty safely. The barrier encountered in body mechanics for the majority of nurses having difficulties in practicing body mechanics techniques as they have a lack of knowledge and because un-cooperated patients make the situation difficult (Sepulveda, Soderman, Kertesz, 2016).

The use of proper body mechanics is important to reduce the risk of injury to the musculoskeletal system and also to facilitate body movement allowing physical mobility without muscle strain and excessive use of muscles energy. In addition, proper body alignment enhances lung expansion and promotes efficient circulatory renal and gastrointestinal function (Soylar & Ozer, 2018).

Significance of the study:

The nurse is at risk every day to back injuries while providing patient care, as perform patient hygiene strenuous physical effort such as patient transfers in and out of bed during daily care. Back pain is costly for both the nurse and the hospital, for the nurse as it results in pain, disability and hinders effective nursing performance, and is costly for the hospital because the injured nurse is not able to provide the required level of nursing care and because treatment is costly. In Egypt, back pain affects nearly 60% of the country's population and the nursing profession presents the highest prevalence of back work-related injuries compared with any other occupation (Ibrahim& Elsaay, 2015).

Nurses need to receive frequent training programs about the proper use of body mechanics during patients handling. It has long been said that for nurses "back pain is part of the job" without clearly defining "back pain". Nurses, in particular, are at higher risk than other health professionals to suffer from injuries and work-related musculoskeletal disorders such as back pain (Sandhya et al., 2015, Taulaniemi, Kankaanp, Tokola, Parkkari, Suni, 2019). Despite the importance of body mechanics techniques, some nurses are still improper practice body mechanics techniques. Back pain is significantly associated with the use of body mechanics and job stress in nurses working in hospitals. So it's very important to assess the association between back pain with nursing activities and the use of body mechanics among nurses working in hospitals.

Despite this fact, there are a very limited number of studies on the assessment of back pain in nurses who work in units. Studies conducted on this subject in our country are also not very common. It was considered important to provide suggestions at the end of this study for taking necessary precautions to reduce back pain in nurses who work in units (Samawi & Awad 2015, Soylar, Ozer, 2018).

AIM OF THE STUDY

This study aimed to find out the relationship between back pain with nursing activities and the use of body mechanics among nurses working in general hospitals.

This will be achieved through the following research objectives:

- Assess nurse's back pain with nursing activities.
- Assess nurse's practice of body mechanics techniques.
- Correlate between use of body mechanics and back pain.
- Assess barriers to maintaining body mechanics.

Research question

What are the relationship between back pain with nursing activities and the use of body mechanics among nurses working in general hospitals?

SUBJECTS AND METHOD

I. Technical design:

The technical design revolves around research design, setting, and subjects of the study and tools of data collection.

Research design:

The design that was utilized in this study is a descriptive correlational research design.

Setting:

The study was conducted at General hospital Port Said, Port-Fouad and EL-Zohor hospital at Port Said City in Intensive Care Units (ICU), Operating Rooms, and Orthopedic Departments.

Subjects:

A convenience sample of all available nurses in General hospitals in Port Said City. The total number of nurses was (200).

Tools of data collection:

Data for this study were collected using the following tools:

Tool (I): Demographic Questionnaire and Lifestyles patterns:

It was included demographic characteristics of studied nurses such as (age, qualification, years of experience, marital status, and a number of children). Lifestyles patterns were included (weight, height, body mass index, exercise and activity).

Tool II: Back pain scale:

It was adopted from **McCaffery et al 1999** for the assessment of back pain. It is used to initial pain assessment regarding back pain it included a description of pain characteristics, when the pain starts, quality, location, onset, frequency, duration, time of worse pain, the difference in intensity with time, tolerance, factors aggravating pain, pain management strategies. Pain assessment was assessed by using a numeric pain rating scale (Visual Analogue Scale). This scale was displayed as a line numbered from zero to ten asking the person in pain to assign a number as zero no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 severe pain. Assessment sheet for measuring weight and height and calculated the body mass index (BMI) according to the **WHO** (**2017**) four classifications: normal BMI= 18.5-24.9 kg/ M2, overweight BMI= 25.0-29.9 Kg/M2, obesity BMI= 30.0-39.9 kg/M2 and the extreme obesity BMI=40.0kg/M2.

Tool III: Body Mechanics Observation Checklist:

Observation Checklist: This form included the right steps of the frequently performed nursing movements to determine their body mechanics. The correct performance of these movements was determined based on information in the literature **(Bibbin, 2018).** Components of the observation checklist were as follows a stable center of gravity, wide base of support, the line of gravity, proper body alignment in fourteen statements **(Craven et al., 2019, Kang, 2017).**

Tool (IV): Barriers to perform body mechanics questionnaire:

It was adopted from **Wardell (2007)** to assess barriers to perform body mechanics. The studied nurses responded to 10 statements by rating each statement 1 (No), 2 (Yes). The statements focused on the adequate amount, availability, and using of equipment and training about use of equipment. The ratings were entered and each statement's responses were averaged for a number and percentage.

Tool (V): Common Nursing Care Activities questionnaire:

It was developed to assess common nursing care activities among studied nurses. It consists of two parts:

Part (1): This section included a list of nursing care activities. Nurses rated 11 statements using a 4-point (i.e., 1 (doesn't perform), 2 (perform from time to time), 3 (often performed), 4 (perform daily). The ratings were entered and each statement's responses were averaged for a mean rating.

Part (2): Two open-ended questions to assess nursing care activities that provide nurses comfort or pain:

- Describe three activities that nurses do in daily tasks that provide them with the most comfort?
- List three activities nurses do in daily tasks that provide them with the greatest degree of pain?

II. Operational Design:

The study, to be completed, has passed through different phases as follows: the preparatory phase, content validity, reliability, pilot study and fieldwork.

A- Preparatory phase:

During this phase, the researcher reviewed related current, past, local, international literature covering the various aspects of the problem using books, articles, periodicals, magazines, and internet explorers to help the researcher to be more acquainted with the problem and develop the tools for data collection.

B- Content Validity:

It was ascertained by (9) expertise from nursing and medical staff members. Their opinions were elicited as regards clarity and comprehensiveness of questions and items on the sheets and tool.

C- Reliability:

Tools' reliability was tested through Cronbach's Alpha test, however, the Arabic version of back pain scale score was = 0.794 indicating that the Arabic version demonstrated excellent scale reliability. In addition, the tool of the Arabic version of body mechanics observation checklist questionnaire was tested for reliability using Cronbach's Alpha test was and it scored = 0.838 indicating that the Arabic version demonstrated excellent scale reliability. Also, the tool of the Arabic version of barriers to perform body mechanics questionnaire was tested for reliability using Cronbach's Alpha test and it scored = 0.752 indicating that the Arabic version demonstrated excellent scale reliability. In addition, the tool of the Arabic version of common nursing care activities questionnaire was tested for reliability using Cronbach's Alpha test and it scored = 0.854 indicating that the Arabic version demonstrated excellent scale reliability.

D- Pilot Study:

It was carried out to test the validity and applicability of the tools and estimate the time required to fill in the sheets. The assessment sheet was applied to 20 Nurses. Based on the results of a pilot study and the revision of the tool by expertise, and taking into consideration their comments, necessary modifications were done. All Nurses who shared in the pilot study were excluded from the studied sample.

E- Field Work:

Data collection of this study was carried out through six months, in the period from the beginning of December, 2018 and completed by May, 2019. The researcher attended Hospitals from 10.00 a.m. to 2.00 p.m. twice weekly during morning and afternoon shifts in Intensive Care Units (ICU), Operating Rooms, and Orthopedic Departments. The nurse's consent for participation was obtained after illustrating the purpose of the study. Firstly, the researcher observes principles of body mechanics for nurses then the researcher started the interviewing process, which lasted for about 20-25 minutes. After completing the filling of the tool, the researcher reviewed every point within the tool ahead of the nurses to make certain that no points are missed.

III. Administrative design:

An official letter including the title and purpose of the study was sent from the Dean of the faculty of nursing- Port Said University to the director of each set to obtain their approval for data collection of General hospital Port Said, Port-Fouad and EL-Zohor hospital at Port Said City.

Ethical Consideration:

Approval had been taken from hospital administrators or directors to conduct the study after an explanation of the study aim and process. Nurses' consent had been taken to participate in the study after an explanation of the study. The researcher informed the study nurses that they have the right to withdraw from the study at any time they wish to do without any problems. The nurses have been assured about the confidentiality of information gathered and that will be used only for the study.

I. Statistical design:

The data obtained has been organized, categorized; tabulated and analyzed by using SPSS (statistical package for social sciences) Version 19.0 software program was a suitable version, which will be applied to answer the research objectives and hypotheses.

RESULTS

Table (1): Shows that 39.5 % of studied nurses were in the age group from 50 to less than 60 years old with a mean of 38. 45±10.45 years, 66.0 % of them were married, and 29.5 % of them had experience years from 10 to less than 20 years old with a mean of 11. 78±8.72 years, 58.0 % of studied nurses had no receive training program about body mechanics. According to degree of back pain, 44.0 % of the studied nurses had severe back pain, while, 30.0 % of them had no back pain.

Table (2): Represents that 81.0 % of the studied nurses kept their backs bent for a long time; more than half of them (56.0 %) had not bend their knees and hips when holding anything at a lower level. Concerning a wide base of support, only 43.5% of them separated their feet. Regarding the line of gravity 75.5% kept their backs bent. In addition to proper body alignment, 57.0% of nurses kept their buttocks extension for a long time, while 84.5 % of them kept their weight forward centered on the outside of their feet.

Table (3): Reveals that the majority of the studied nurses (95%) were having barriers such as lack of lifting equipment, insufficient training in the use of lifting equipment.

Table (4): Represents that common frequent nursing care activities among studied nurses were patient transfer with a mean ± SD of 2.3 ±.44, taking vital signs was 2.2± .91, while, caring for patient hygiene was 2.1± .73 and dressing change 2.1±.71.

Table (5): Reveals that nurses reporting the activities that considered being comfort as nursing documentation, giving health education. While, nurses reporting the activities that cause pain as emergency situation, wound care and direct patient care as taking vital signs and health assessment.

Table (6): Shows that there were statistically significant relation between nurses' demographic characteristics and observation checklist about use of body mechanics except age, qualification, and working overtime with p value 0.000, 0.002, 0.000, 0.000, 0.029, 0.002 and 0.002 respectively.

Table (7): Shows that there were statistically significant relation between nurses' demographic characteristics and their nursing care activity except for working hours, and

working overtime with p value 0.000, 0.000, 0.003, 0.000, 0.000, 0.034 and 0.001 respectively.

Table (8): Reveals that there were highly statistically positive correlations between barriers to perform body mechanics, back pain, nursing care activity of the studied nurses and observed checklist ($p < .01$).

Table (1): Demographic characteristics of the studied nurses (n=200).

Demographic Characteristics	Studied nurses (n=200)	
	No.	**%**
Age (years)		
20-<30	25	12.5
30-<40	58	29.0
40-<50	38	19.0
50-<60	79	39.5
Min-Max **Mean ±SD**	**20-60** **38.45±10.45**	
Marital Status		
Married	132	66.0
Not married	68	34.0
Educational level		
Diploma	44	22.0
Bachelor	68	34.0
Technical	88	44.0
Experience years		
1-<5	45	22.5
5-<10	52	26.0
10-<20	59	29.5
20-<30	44	22.0
Min-Max **Mean ±SD**	**4-25** **11. 78±8. 72**	
Training program about body mechanics		
Yes	84	42.0
No	116	58.0
Patient numbers responsible for them		
1-3	84	42.0
4-6	116	58.0
Working overtime		
Yes	134	67.0
No	66	33.0
Degree of back pain		
No pain	60	31.0
Moderate	51	25.0
Severe	89	44.0

Table (2): Observation checklist about use of body mechanics (n=200)

Items	Not done		Done	
	No.	**%**	**No.**	**%**
Stable Center of Gravity				
Keep the center of gravity low.	68	34.0	132	66.0
Keep back straight.	162	81.0	38	19.0
Bend knees and hips.	112	56.0	88	44.0
Wide Base of Support				
Keep feet apart.	113	56.5	87	43.5
Place one foot slightly ahead of the other.	96	48.0	104	52.0
Bend knees to absorb the jolts.	31	15.5	169	84.5
The line of gravity				
Keep back straight.	151	75.5	49	24.5
Keep lifting things close to body.	68	34.0	132	66.0
Proper Body alignment				
Flex buttocks.	114	57.0	86	43.0
Pull stomach inside and up.	81	40.5	119	59.5
Keep level back.	106	53.0	94	47.0
Keep head up.	51	25.5	149	74.5
Keep chin in.	108	54.0	92	46.0
Keep weight forward centered on the outside of feet.	31	15.5	169	84.5

Table (3): Barriers to perform body mechanics among the studied nurses (n=200).

Items	No		Yes	
	No.	%	No.	%
Adequate amount of equipment:				
Patient-handling equipment is available.	79	39.5	121	60.5
There is sufficient patient-handling equipment in my unit.	132	66.0	68	34.0
Availability of equipment:				
Can get the patient-handling equipment quickly.	151	75.5	49	24.5
Patient-handling equipment is stored so it is simple to get.	106	53.0	94	47.0
Patient-handling equipment storage areas are convenient	120	60.0	80	40.0
Using of equipment:				
Patient-handling equipment is easy to use.	124	62.0	76	38.0
Patient-handling equipment works properly and needs minimal repairs.	61	30.5	139	69.5
All parts and accessories of the patient-handling equipment are available.	79	39.5	121	60.5
Training in the use of equipment:				
Have been trained to use the patient-handling equipment.	130	65.0	70	35.0
Feel knowledgeable in the use of patient-handling equipment.	123	61.5	77	38.5

Table (4): Common nursing care activities questionnaire among studied nurses (n=200)

Items	Mean ± SD
Physical assessment.	1.1± 1.3
Write progress notes.	1.3± 1.1
Patient admission & discharge.	1.6± .98
Take vital signs.	2.2± .91
Drug administrations.	1.6± .98
Dressing change.	2.1± .71
Caring for patient hygiene.	2.1± .73
Communication with the patient and his family.	1.8± .66
Patient transfer	2.3 ±.44
Care of the surgical drains, urinary catheter.	1.4± 1.2
Interact with a multidisciplinary team.	1.1± 1.2

Table (5): Nursing care activities that provide nurses comfort or pain (n=200):

Nursing care activities	Studied nurses (n=200)	
	No.	**%**
Nurses reporting the activities that considered being comfort as:		
Nursing documentation	63	31.5
Preparing medication	57	28.5
Giving health education	61	30.5
Nurses reporting the activities that cause pain as:		
Direct Patient care as taking vital signs and health assessment	36	18.0
Wound care	48	24.0
Patient transfer	32	16.0
Emergency situation	84	42.0

Table (6): Relation between demographic characteristics and observation checklist about use of body mechanics among studied nurses (n=200)

Items	observation checklist of body mechanics		χ^2 Test	P Value
	No.	%		
Age (years)				
20-<30	25	12.5		
30-<40	58	29.0	19.426	0.201
40-<50	38	19.0		
50-<60	79	39.5		
Marital Status				
Married	132	66.0	61.802	0.000**
Not married	68	34.0		
Educational level				
Diploma	44	22.0		
Technical	68	34.0	2.217	0.330
Bachelor	88	44.0		
Experience years				
1-<5	45	22.5		
5-<10	52	26.0	66.915	0.002**
10-<20	59	29.5		
20-<30	44	22.0		
Learning principles of body mechanics at school				
Yes	84	42.0	17.625	0.000**
No	116	58.0		
Training program about body mechanics				
Yes	57	37.9	13.697	0.000**
No	143	62.1		
Working hours				
1-<6	46	27.9	4.786	0.029*
6-12	154	72.1		
Patient numbers				
1-3	84	42.0	9.779	0.002**
4-6	116	58.0		
Working overtime				
Yes	134	67.0	1.716	0.190
No	66	33.0		
Degree of back pain				
No pain	60	31.0		
Moderate	51	25.0	43.797	0.000**
Severe	89	44.0		

χ^2: Chi-Square test ***Significant at P≤0.05** *** *Significant at P≤0.01**

Table (7): Relation between demographic characteristics and nursing care activity among studied nurses (n=200)

Items	Nursing care activity		Test of sig.	P Value
	No.	Mean ±SD		
Age (years)				
20-<30	25	12. 84±0. 37	F= 28.24	0.000**
30-<40	58	20. 67±4. 82		
40-<50	38	13. 52±4. 22		
50-<60	79	17. 71±5. 02		
Marital Status				
Married	132	18. 84±5. 41	T= 47.805	0.000**
Not married	68	13. 89±3. 26		
Educational level				
Diploma	44	14. 88±4. 82	F= 6.071	0.003**
Technical	68	17. 26±5. 50		
Bachelor	88	18. 22±5. 13		
	0			
Experience years				
1-<5	45	14. 02±2. 72	F= 39.019	0.000**
5-<10	52	19. 67±4. 37		
10-<20	59	20. 38±5. 20		
20-<30	44	13. 09±3. 94		
Learning principles of body mechanics at school				
Yes	90	15. 26±4. 92	T= 23.039	0.000**
No	110	18. 71±5. 16		
Training program about body mechanics				
	84	16. 22±4. 90	T= 4.570	0.034*
Yes	116	17. 84±5. 54		
No				
Working hours				
1-<6	92	17. 08±5. 34	T= 0.036	0.849
6-12	108	17. 23±5. 34		
Patient numbers				
1-3	84	15. 28±4. 53	T= 19.680	0.000**
4-6	116	18. 52±5. 47		
Working overtime				
Yes	134	18. 03±4. 85	T= 2.615	0.107
No	66	16. 73±5. 52		
Degree of back pain				
No pain	60	18. 35±5. 29	F= 6.954	0.001**
Moderate	51	14. 88±2. 91		
Severe	89	17. 62±6. 03		

***Significant at P≤0.05** ****Significant at P≤0.01**

Table (8): Correlation between observation checklist about use of body mechanics, barriers to perform body mechanics, back pain and nursing care activities among studied nurses (n=200)

Item	observation checklist of body mechanics	
	r	P
Barriers to perform body mechanics	- 0.218	0.002**
Back pain	- 0.179	0.011*
Nursing care activity	- 0.678	0.000**

r=Pearson correlation *significant at P≤0.05 **significant at P≤0.01

DISCUSSION

Nursing has one of the highest incidences of work-related back problems. The nurses performed many physical tasks in the job exposed them to back pain and complications. The incidence rates continue to climb and the direct and indirect costs associated with back injuries for nurses are estimated to be 20 billion annually **(Ross, 2021)**. Over three-quarters of a million workdays are lost annually as a result of back injuries and related complications in nursing; with an estimated 40,000 nurses reporting illnesses from back pain each year **(Alziyadi & Elgezery, 2021)**.

Body mechanics is a term that indicates a coordinated effort of the musculoskeletal and nervous systems to maintain balance, posture, and body alignment in daily life, which is directly related to effective bodily functioning. Improper use of body mechanics increases the risk of musculoskeletal injury and back pain. Nurses need to use body mechanic techniques during performing every procedure. They can use body mechanics more effectively if they have well knowledge about it **(Almaghrabi & Alsharif, 2021).**

Nursing activities require bending, standing for long hours, and care of dependent patients when activities associated with improper use of body mechanics were the main cause of back injury. The use of proper body mechanics is important to reduce the risk of injury to the musculoskeletal system and also to facilitate body movement allowing physical mobility without muscle strain and excessive use of muscles energy, In addition, proper body alignment enhances lung expansion and promotes efficient circulatory renal and gastrointestinal function **(Soylar & Ozer, 2018).**

The current study aimed to find out the relationship among use of the body mechanics principle, nursing activities and back pain among nurses working in General Hospitals.

The present study illustrated that more than one-third of studied nurses were in age 38 years old, these results are consistent with **Kang (2017)** who reported that most of the nurses ranged from 30 to 40 years, it might be related to being still in the fitness and have tolerated physical job demand. In addition, **Kochitty (2015)** reported that back pain prevalence was reported between the ages of 35–45. In addition to, **Shieh, et al. (2016)** reported that back pain is increasing in nurses who are 40 years old or more related to hormonal change may be altered bone density.

The present study revealed that there was no statistically significant relation between apply principles of body mechanics and their age. These results are consistent with **Iawim, & Dutta (2020)** who reported that there were no significant associations between apply principles of body mechanics and age. These results are inconsistent with **Ibrahim & Elsaay (2015)** who revealed that poor use of body mechanics are associated with the incidence of back pain among healthy ageing. Many studies pointed to the correlation between ageing and back pain **(Ross, 2021).**

The current study revealed that nurses have experience despite they have back pain and also no receive training programs since graduation in body mechanics. The study conducted by **Kang (2017)** concluded the adequate experience that protects nurses to engage in harmful patient handling and nurses were expertise to perform proper body mechanics. While the study conducted by **Sethi, Kaur, Anthony, (2020)** recommended that body mechanics training are important to a healthy nursing career and should be used daily, regardless of where you practice.

The present study revealed that there was a statistically significant relationship between apply principles of body mechanics and their experience years. These results are consistent with **Agualongo et al., (2020)** who reported that there was a significant association between apply principles of body mechanics with a year of clinical experience in the general ward. In addition, **Kang (2017)** found that the majority of the sample was with 10-15 years' experience and with age less than 40 years.

The current study showed that there was a statistically significant relationship between nursing care activity and their experience years. These findings are consistent with **Rayan, Adam, Abdrabou, (2021)** they found that most of the nurses worked in standing positions for long durations, performed interventions that required bending

forward, lifted and repositioned patients, and these nurses had higher average back pain scores. In addition, **Rustoen (2018)** reported that nurses frequently performed interventions that may have back pain, such as standing for long durations, performing interventions that require bending forward and lifting and repositioning patients, and although they knew the proper application in using aiding equipment; they did not reflect this knowledge in their interventions.

In addition to, **Shieh, et al. (2016)** reported that Nurses are often required to carry out work activities in an awaking posture for many hours, transfer patients (depending on the patients' level of consciousness), and move medical devices, all of which require the application of the body mechanics principle to avoid physical harm and to effectively use the body while nursing. These results are inconsistent with **Terzi & Altin, (2020)** who showed a significant correlation between getting back pain and hours of physical load such as working, standing, and walking. The risk of back pain increases by 35% for every additional daily work hour. The prolonged working shifts are associated with an elevated risk of back pain.

The present study revealed that nurses had obesity. Many literatures proved that back pain is associated with obesity and overweight increases back strain. As the weight increases, it becomes a burden on the musculoskeletal system, which leads to back pain so this affects the nursing work. These results are consistent with **Margadant (2020)** who reported that nurses who are obese sustain the severest back injuries.

The current study showed that more of the studied nurses had back pain; this may be due to improper use of body mechanics, long working hours. The study conducted by **Fakhradin, Parnia & Fatemeh (2019)** recommended that back pain at the time of the survey ranged from moderate to severe with symptoms of weakness, numbness, discomfort and having interrupted sleep. Nursing activities as lifting and transferring patients need physical efforts that cause injuries **(Rawat et al., (2017).**

The current study showed that there was a statistically significant relation between applied principles of body mechanics and their degrees of back pain. The study conducted by **Olalla, Naranjo, López, Muñoz, & Bayas, (2020)** found that most nurses have severe back pain which leads to disability. In addition to **Sharma, Shrestha, Jensen, (2017)** found that nurses who had not received any workshop about body mechanics remained standing for long periods, 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.

The present study revealed that direct care as emergencies, manual lifting, prolonged static work posture and indirect care as bending, walking and pushing, causing the greatest pain for nurses, these results are consistent with **Jin (2020)** who revealed that direct activities contribute to back pain among nurses. Most nurses use improper body mechanics while sitting, standing, carrying, pulling or pushing so, most nurses have back pain. In addition, **Agualongo et al., (2020)** reported that patients handling tasks often performed by nurses as well as nurses place them at risk for musculoskeletal injuries.

The present study revealed that most of the studied nurses were having barriers to perform body mechanics principles due to poor unite layout(poor ergometric designs) thus contribute to back strain. These results are consistent with **Rawat et al., (2017)** they reported that most of the studied nurses had improper use of body mechanics, especially regarding turning, moving, lifting, positioning, moving, and transferring the patients. Also, **Kalyani, (2019)** revealed that there was a highly statistically significant difference regarding knowledge about back pain, body mechanics knowledge, and performance.

The present study revealed that there was a statistically significant relation between apply principles of body mechanics and having a training program about body mechanics. These results are consistent with **Amer (2020)** who found that nurses, who had not received any training program about back pain, remained standing for long periods, 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.

The current study showed that there was no statistically significant relation between applied principles of body mechanics and their Qualification. These results are consistent with **samawi & Awad, (2015)** they found that nurses participated continuing training program on the proper use of body mechanics could help them to improve their safe practice skills and prevent back strain. According to, **Sharma, Shrestha, & Jensen (2016)** revealed that the importance of training and education level to prevent back pain so training about body mechanics and patient lifting must increase skills to prevent back pain. These results are inconsistent with **Dewasi, khan, (2020)** who revealed that there were no significant associations between total principles of body mechanics with a professional qualification. This result is consistent with **Deng et al., (2019)** who reported that no relationship between applied principle of body mechanics and back pain.

The current study showed that there were highly statistically positive correlations between barriers to use of body mechanics, back pain, nursing care activity of the studied

nurses and apply principles of body mechanics. This may be due to low ergo metric equipment, excessive workload and abuse of body mechanics principles harm nurse's Observed checklist. These results are consistent with **Yan, et al. (2018)** who reported that there was a positive significant correlation between the use of the body mechanics principle and nursing activities and back pain. Also, the co-relation indicated that staff nurses gained in the use of body mechanics in selected nursing interventions after administration of planned teaching programs on body mechanics in selected nursing interventions. Also, **Sandhya, et al. (2015)** reported that the correct use of the body mechanics principle can have a positive influence on nursing activities and have positive effects on the performance and emotional state so; it is difficult to confirm the effect due to the lack of studies related to body mechanics.

According to, **Ibrahim & Elsaay (2015)** revealed that multidimensional factors to working behaviors, physical fitness, and environments that consider valuable causes of back injuries among nurses. In addition to, **Markus, Sundstrup, Brandt (2018)** revealed that there was a positive significant correlation between back pain related to work and stress of work, duration of work, and body mass index among the studied nurses.

In addition to, **Fusz, Kives, Pakai, Kutfej, Deak, Olah, (2020)** found that using body mechanic principles had a 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 health, so that they can provide nursing care quality, be productive, administer patient care without interruption and minimize disability level.

In addition, **Kochitty (2015)** reported that most nurses experienced back pain, and working in shifts had higher average pain scores so there was a positive significant correlation between back pain prevalence and body mechanics practice among the studied nurses. According to, **Shieh, et al. (2016)** reported that there was a significant correlation between the level of physical activity and back pain. These results are inconsistent with **Cici, &Yilmazel, (2020)** who studied the relationship between backache and body mechanics in nurses, which showed negative correlations between backache and use of the body mechanics principle. In addition to, **Jambarsang, & Anoosheh, (2020)** reported that bad postural habits were the major cause of backache. Because of stress felt by nurses, clinical practice can be reduced if body mechanics are used correctly, educating nurses about the content and application of the body mechanics method before clinical

practice is necessary. Also, **Aruja, Poopady, (2020)** reported that no statistically significant relationship between intensity, frequency and duration of pain after using body mechanic principles.

Finally, Back pain is a serious health problem affecting nurses and they should give importance to their well-being. This will, in turn, ensure the best quality of care is delivered to patients. The findings of the current study alarming and point to a need for solutions and certain strategies should be adopted toward reducing the burdens and challenges of back pain such as nurses must ask for assistance when performing patient handling activities, scheduling adequate rest breaks, and doing relaxing and stretching exercises during work hours. The results are hoped that this study will provide the groundwork for more elaborated and elucidative studies in the future. Based on the findings of the current study, it can be concluded that there was a highly statistically positive relationship among use of the body mechanics principle, nursing activities and back pain at General hospital Port Said, Port-Fouad and EL-Zohor hospital at Port Said City.

CONCLUSION

Based on the findings of the current study, most of the studied nurses had back pain and the majority had reported lack of lifting equipment and insufficient training in the use of lifting equipment as the barriers to perform body mechanics. This study revealed that was a statistically positive correlation between barriers to perform body mechanics, degree of back pain, and nursing activities of the studied nurses.

RECOMMENDATIONS

In the light of the results of the present study, the following recommendations are suggested:

1- A health training program about proper body mechanics is important to a healthy nursing career.
2- Developing a simplified and comprehensive booklet including guidelines about the use of body mechanics.
3- Develop policies for safe patient's transfer and handling (no lift policy), and ensure the availability of ergonomic chairs and automatically adjustable patient beds to control occupational health hazards.

Further Research:-

1- Further study is recommended to evaluate the association between back pain and its associated factors.
2- Further research should be done on a larger sample to validate these findings and to determine if nurses' knowledge & performance related to body mechanics is adequate to maintain safety.

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العلاقة بين آلام الظهر وأنشطة التمريض واستخدام آليات الجسم بين الممرضات العاملات في المستشفيات العامة

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الخلاصة

يعتبر التمريض من المهن التي بها مخاطر عالية للإصابة بأمراض العضلات والعظام وآلام الظهر لذا فأن استخدام ميكانيكا الجسم المناسبة مهمة جدا لمهنة التمريض حيث تتطلب أنشطة رعاية المريض التقليب والرفع والحمل لتوفير الرعاية للمرضى ، وبالتالي فإن الأستخدام غير السليم لميكانيكا الجسم يؤثر علي الجسم و يسبب آلام الظهر. **هدف البحث :** تهدف هذه الدراسة إلى معرفة العلاقة بين أستخدام مبادئ ميكانيكا الجسم وأنشطة التمريض وآلام الظهر. **طرق وادوات البحث :** تم أستخدام تصميم مبني على البحث الوصفي الأرتباطي علي عينة من (200) ممرضة من مستشفى بورسعيد العام ومستشفي بورفؤاد ومستشفى الزهور بمدينة بورسعيد. تم تجميع البيانات عن طريق المقابلة الشخصية لكل ممرضة بأستخدام خمس أدوات وهي أستبيان بيانات شخصية ،استمارة لتقييم آلام الظهر ، استمارة لملاحظة استخدام تقنيات ميكانيكا الجسم اثناء العمل ، استمارة لتقييم معوقات أداء ميكانيكا الجسم ، استمارة لتقييم أنشطة الرعاية التمريضية الشائعة. **النتائج :** أظهرت هذه الدراسة أن 69٪ من الممرضات الخاضعات للدراسة يعانون من آلام الظهر ، بينما 95٪ لديهم عوائق كبيرة لأستخدام مبادئ ميكانيكا الجسم مثل نقص الأدوات اللازمة لرفع المريض و عدم كفاية التدريب لأستخدام هذه الأدوات. **الاستنتاجات :** يمكن أن نستنتج أن معظم الممرضات الخاضعات للدراسة يعانون من آلام الظهر وأن الغالبية لديهم عوائق عالية لأستخدام مبادئ ميكانيكا الجسم كما أوضحت الدراسة وجود ارتباط أحصائي أيجابي بين العوائق لأستخدام ميكانيكا الجسم ودرجة آلام الظهر وأنشطة التمريض. **التوصيات :** أوصت الدراسة بعمل برنامج لتعزيز معرفة الممرضات فيما يتعلق بميكانيكا الجسم والممارسة الآمنة له، ووضع استراتيجيات للتخفيف من آلام الظهر.

الكلمات المرشدة : *آلام الظهر، المستشفيات العامة ، أنشطة التمريض، استخدام ميكانيكا الجسم.*