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The Impact of Wrong Body Mechanics and Musculoskeletal Disorder among Nursing Staff of Hafr Albatin Hospital on the Quality of Patient Care

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Abstract

Background: Back pain is an international economic and social issue within healthcare. It is the main reason stated for sickness and absence and is a significant occupational health problem that has an influence in all areas of health care provision. Ergonomic and musculoskeletal problems are regarded as the leading occupational issue affecting the global healthcare workforce. Healthcare workers constantly rank amongst the main occupations with permanent back injuries which occur mainly from the handling of patients. Back pain studies in healthcare workers have shown a correlation between the symptoms of back pain and being in a poor posture

Aim: This study aimed to assess the Wrong Body Mechanics and Musculoskeletal Disorder among Nursing Staff and relationship between back pain with nursing activities and the use of body mechanics among nurses working in hospitals.

Design: a cross-sectional research design was utilized.

Setting: Study was carried out in Hafr Albatin Saudi Arabia Hospitals.

Subjects: A convenience sample of nurses (158) was recruited from above mentioned setting.

Tools: Tool I: Demographic questionnaire and lifestyles patterns, Tool II**:** Back pain scale, body mechanics observation and Common nursing care activities questionnaire.

Results: This study showed that 72.3 % of the studied nurses had back pain in intensive care unit ,emergency ,acute kidney unit and operation room , 100% of them had daily work hours 8and 9 and 66.7% was listed in marital status , 87.5% had barriers to perform body mechanics pain intensity in female gender and have significant result of the studied nurses in age ranged 36-40.

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: body mechanics, moving and handling practice, lifestyle change, nurses; preventive program; musculoskeletal diseases

Introduction

Musculoskeletal disorders (MSDs) are common health problems among healthcare providers, particularly among nurses. Nursing staff recognized developing Musculoskeletal Disorder, and low back pain (LBP). Nursing daily care of patients especially with bedridden patients or non-autonomous cause a lot of Musculoskeletal Disorder or low back pain. The variation of the studies in Musculoskeletal disorders pain among nurses. Whereas, pain related to musculoskeletal disorders has been reported in different locations in female nurses more than in male nurses. The pain is not related to the number of years of experience, age, or body mass index. (Latina et al.2020). In Saudi Arabia according to the Ministry of Health in Saudi Arabia, the total number of Total Nurses and Midwives was 89,415 in 2021 who worked in different areas such as MOH, other governmental hospitals, and the private sector that serve 497 hospitals including 77,224 beds Ministry of Health, (2022). By 2030 the need for nurses will be more than doubled as predictable as the continuous population growth rate to cover the shortage of nurses in Saudi Arabia to recover from the coronavirus and to increase the quality of patient care (Alsufyani et al., 2020). The role of Musculoskeletal disorders among nurses leads to the onset of absenteeism and reduction in productivity decreasing the quality of care which has a bad influence on the business level of the hospitals (Sousa et al., 2023).

Furthermore, (Lin et al.2020) found out that the nurse's years' experiences and experiences in the current unit were correlated with different Musculoskeletal pain. Spending time sitting using a computer among nurses can lead to prolonged improper work posture. (Attar S. M. ,2014) found that about 85% of nurses have musculoskeletal symptoms regarding extended working hours, especially when working in the surgical department increases low back pain. the study was also conducted on general ward nurses and intensive care units according to (Senthilkumar & Gokul, 2019) the musculoskeletal symptoms among nurses correlated with the sort of hospital and shift time. The patient-turning movement was a risky body movement among nurses who worked in the intensive care unit and general ward.

According to (Du et al., 2021) many studies have a prevalence rate for musculoskeletal diseases among nurses and it was the main cause of sickness absenteeism which caused economic losses. Nurses' duty and overload in daily nursing performance lead to a significant correlation in musculoskeletal diseases among nurses. In other words, nurses reported that they have a higher rate in experiences of MSD symptoms in the upper body than lower back. The quality of care of patients can be affected by nurses' mental and physical health problems.

Most countries have a great demand for nurses jobs regard of the population increase. Safety and a healthy environment are the main concern in Developed countries because it contributes to human resources productivity. The risk factor from an unsafety environment in nurses' work like long working hours and nursing shortage contributes to the increased development of musculoskeletal disorders. Female nurses have more development to musculoskeletal disorders than male nurses because they have family responsibilities and other housework. Similarly, all nurses' job demands impact patient safety in clinical practice (Krishnan et al., 2021)

Research Aim: this study aims to assess the wrong body mechanics and musculoskeletal disorder among nursing staff and find out the relationship between back pain with nursing activities and the use of body

mechanics among nurses working in general hospitals in KSA

Research hyposis :

To fulfill this, the following Questions will be answered:

1. What is Musculoskeletal Disorder among Nursing Staff?
2. What is the level of pain among nurse's staff regarding Musculoskeletal Disorder?
3. Is there any correlation between age and weight in the Musculoskeletal Disorder?
4. Is there any correlation between experience and department on the Musculoskeletal Disorder?
5. Is there any correlation between job title and Musculoskeletal Disorder?
6. Is there any correlation between patients that nurses usually treat and Musculoskeletal Disorders?

Subject and Methods

Research Design

The study used a cross-sectional questionnaire design to evaluate the effect of wrong body mechanics and musculoskeletal disorders among nursing staff.

Subject

Structured questionnaires were administered among the Ministry of Health hospital (Government) and privet hospitals in Hafr Albatin city Saudi Arabia. The population for the study was made up of all Saudi and non-Saudi staff nurses in Saudi Arabia hospital. The sample included male and female staff nurses with different qualifications and worked in 10 areas of assignments: in Intensive care unit, Emergency department, Acute Kidney Unit, Orthopedic department, Operation department, surgical department, Medical department, Delivery Room, Rehabilitation center and Psychiatric unit. We accepted all participants who had completed the questionnaire.

Inclusion criteria:

Adult nurses of both sex

Working with patients in clinical areas (ICU, CCU, ER, Orthopedic department, Surgical, medical department,)

Have experience 1 year or more

Exclusion criteria

Nurses working in administrative areas and not dealing with patients

Sitting:

The study was conducted in MOH, a private hospital in KSA

Data Collection

The researchers started data collection from **January 2023** to the end of **March 2023** after obtaining permission to apply for this study. The questionnaire was the main instrument for data collection

Tools:

Before the questionnaires were distributed to the nurses, ethical considerations were discussed, and the concepts of anonymity and voluntary participation were emphasized. The questionnaire was divided into two Sections:'

Section A' was related to demographic characteristics related to nurses: It consisted of (11) items, which include gender, age, academic qualification, years of work experience, area of assignment, martial state, nationality, height, weight, type of hospital (government or privet), and daily work hours. (Choi et al 2020)
Section B' Prevalence and type of musculoskeletal disorders experienced in nursing: a 21-item instrument was designed to measure the Prevalence of musculoskeletal disorders (13 items) and type of musculoskeletal disorders experienced in nursing (8 items). (Seo and et al 2020)

Validity and Reliability:
Validity was used for the modified tool to ensure that it covers the objectives. The phase was developed by a Jury of five experts from Medical-surgical and critical Health nursing staff; two Assistant professors of critical health nursing at the College of Nursing, Qassim University, and three Assistant Professors of Medical-Surgical at Nursing College, Hafr Elbatin University.
The reliability of the proposed tool was done using Cronbach's alpha test which revealed high reliability (.930)
Operational Design
The operational design included the preparatory phase, content validity, the pilot study, and fieldwork. **A. Preparatory phase:** This included a review of relevant studies and theoretical knowledge of various aspects of the study problem using textbooks, articles, medical websites, periodicals, and magazines concerned with the topic of breast cancer and mammogram. These were available in PubMed, Ovid, and Cochrane Library.
B. Pilot study: A pilot study was carried out to test the study tools' clarity, applicability, objectivity, and feasibility. To achieve this, the tools were tested on 10% of the participants.

Statistical Design
The collected data were coded and analyzed using the Statistical Package for Social Sciences (SPSS version 25).
Tabulated frequencies and percentages were calculated.
The level of significance selected for this study was
Conflict of Interest:
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Result
Table 1 shows that According to Demographic characteristics of nursing working
One-third of participants are (36-40) years old. Most of them were Saudi (125) and married (113). A third of the participants (54) height in the study were (155 cm-160cm). A quarter of the participants (39) had weights ranging from 60 kg to 70 kg. Three-quarters of the sample in the study were of the female gender. 40% of the participants work as nursing specialists & most of the participants work in the Saudi Ministry of Health. Half of the study participants have 10 to 15 years of clinical experience. Almost a third of the sample work in the ambulance and emergency department and more than a third work in other departments. Almost all of them work 8 hours a day

Table 2 shows that according to the prevalence and types of musculoskeletal disorders experienced in nursing

The majority of participants 83 % experienced work-related pain or discomfort in any part of their body that lasted for more than 3 days in the past 12 months. Less than half of the participants in the study suffered in the lower part of the body and another third suffered in both upper and lower parts together. Half of the study sample complained of injury type Muscle Strain. More than two-thirds of the sample of participants (110) described the onset of pain as gradual. More than half of the study sample's opinion about factors that contributed to your work-related injury was Performing repetitive tasks. More than half of the participants (83) gave their opinion about factors contributing to your work-related injury as performing repetitive tasks. Two-thirds of the study sample (111) officially reported the injury

Cont. Table 2 shows that according to the prevalence and types of musculoskeletal disorders experienced in nursing)

More than half of the participants (96) were see a physician for the injury. Third of the participants applied the kind of treatment as was rest. More than half of the sample have symptoms exacerbated by clinical practice and their injury caused them to alter their work habits. Two-thirds of participants have not ever had training in ways to alter their environment to reduce strain on their body (ergonomics). The sliding board was the lowest to reduce the strain on your body when working by sample options 2.5%. More than a third sample informed about the type of patient I usually treat requires maximum assistance (2 people to assist)

Table 3 reflects the distribution of the studied nurses according to pain

Almost all of the participants in the study have pain. Distribution of the studied nurses according to pain. More than two-thirds of participants have pain. Less than a third sample describe their pain intensity as comes and going and moderate. More than a third sample informed me that pain during a job by normal job activities increases my pain, but I can still perform all that is required of me. Less than a third sample describe the pain duration as the pain lasting from >6 months. More than two-thirds of participants expect changing shifts to have a negative effect as well. Most of the participants who have pain then describe the pain intensity as mild and not very much. More than half of the participants who have pain describe the pain duration as just starting

Table 4 shows the relation between you have pain and Demographic characteristics

One-third of the participants suffering from pain were aged 36 to 40 years, on the other hand, 15 of the 44 participants did not suffer from pain, and the participants were aged 36 to 40 years. Third of the participants who had pain (114) the age were (36-40) years old (29.8%). More than two-thirds of participants who have pain (114) were married (71.1%). Less than a third of participants who have pain (114) weight 51 kg -60 kg (25.4%). More than two-thirds of participants who had pain (114) were female gender (95.6%). Most of the participants who have pain (114) had a job title as a nursing technician or nursing specialist 40.4% for each title equal percentage. Most of the participants who have pain (114) worked at a Government hospital (MOH) (95.6%). Less than a third of participants who have pain (114) were a department of current practice in the surgical department (18.4%). Most of the participants (89.5%) who have pain (114) worked 8 hours & 9 hours

Table 5 shows the relation between Pain intensity if the pain and Demographic characteristics have

20.8% of participants aged 25 and under described the severity of pain as comes and goes and is very mild. 33.30% of participants aged 26-30 and under described the severity of pain as Moderate and not very much. 33.30% of participants aged 31-35 and under described the severity of pain as Comes and goes and is very severe. 46.70 % of participants aged 36-40 and under described the severity of pain as Moderate and not very much. 87.70 % of participants aged more than 40 and under described the severity of pain as Very severe and not very much. Most of the married participants described the intensity of pain as coming and going and being very mild. Two-thirds of the participants whose weight ranged from 61 g to 70 g described the intensity of the pain as Very severe and did not vary much.

Most of the participants were female and then described the intensity of the pain as very intense and not much different and very severe and does not vary much. Two-thirds of technicians who participated in the study describe the pain intensity as very severe and does not vary much. All MOHs participating in the study describe the pain intensity as Moderate and does not vary much and Very severe and does not vary much. There was no particular difference between the departments associated with pain intensity. All participants who associated the intensity of pain with working 8 to 9 hours a day described it as Mild and does not vary much, Comes and goes, and moderate and Moderate and does not vary much. There was no clear distinction between the departments within the study for Pain Duration and Demographic

Table 6 Show the Relation between Pain Duration and Demographic characteristic

Nearly half of the sample of 21 participants chose Lasting from >1-3 months for Pain Duration and Demographic were age 31 - 35 years old. The third sample of (40) participants who have pain Lasting from >6 months them age > 40 years old. Two-thirds of a sample of (44) participants who have pain Lasting from >6 months were Married. A third of the sample of (44) participants who have pain Lasting from >6 months weigh 51kg -60 kg. Most of the sample of (44) participants who had pain Lasting from >6 months were female gender. Less than half of the sample (19) of (44) participants have pain Lasting from >6 months of their job title, Nursing technician and Nursing specialist. Most of the sample (44) participants who had pain Lasting for>6 months were working in a government hospital (MOH). Less than a third of the sample (9) of (44) participants who have pain Lasting from >6 months were working in Emergency departments. Most of the sample of (44) participants have pain Lasting from >6 months of work duties 8 hours & 9 hour

Table (1): Demographic characteristics of studied nurses according to working in Hafr Albatin hospitals (n = 158)

Section1 Demographic data	No.	%	Section 2 Demographic data	No.	%
Age (years)			Job title		
≤ 25	13	8.2	Nursing Assistant	11	7.0
26 – 30	33	20.9	Nursing technician	60	38.0
31 – 35	42	26.6	Nursing specialist	64	40.5
36 – 40	49	31.0	Senior Specialist	23	14.6
> 40	21	13.3	Hospital		
Marital state			MOH	151	95.6

Single	39	24.7	Privet	7	4.4
Married	113	71.5	Years of experience (years)		
Divorced	4	2.5	1-5	31	19.6
Widow	2	1.3	5	24	15.2
Nationality			10 – 15	77	48.7
Saudi	125	79.1	> 20	26	16.5
Non-Saudi	33	20.9	Department of Current Practice		
Height (cm)			Intensive care unit	13	8.2
<155	25	15.8	Emergency	27	17.1
155 – 160	54	34.2	Acute Kidney Unit	6	3.8
160 – 165	26	16.5	Orthopedic department	10	6.3
165 – 170	35	22.2	Operation department	12	7.6
170 – 175	10	6.3	Surgical department	25	15.8
175 – 180	5	3.2	Medical department	13	8.2
>180	3	1.9	Delivery Room	1	.6
Weight (kg)			Rehabilitation center	2	1.3
≤50	10	6.3	Psychiatric unit	5	3.2
51-60	36	22.8	Other	44	27.8
61-70	39	24.7	Daily work hours		
71-80	35	22.2	8 hours	128	81.0
81-90	23	14.6	9 hours	18	11.4
>90	15	9.5	10 hours	3	1.9
Gender			11 hours	0	0.0
Male	40	25.3	12 hours	9	5.7
Female	118	74.7			

Table (2): Distribution of the studied nurses according to prevalence and types of musculoskeletal disorders experienced in nursing at Hafr Albatin hospitals (n = 158)

prevalence and types of musculoskeletal disorders experienced	No.	%	prevalence and types of musculoskeletal disorders experienced	No.	%
Have you ever experienced work-related pain or discomfort in any part of your body that lasted for more than 3 days in the last 12 months?			Was the onset:		
Yes	132	83.5	Gradual	110	69.6
No	26	16.5	Sudden	42	26.6
What body part was affected? Please check all that apply.			As a result of an accident	6	3.8

Upper back	37	23.4	In your opinion, which of the following factors contributed to your work-related injury? #		
Lower back	60	38.0	Performing repetitive tasks	83	52.5
Both	61	38.6	Treating a large number of patients in one day	34	21.5
What type of injury was it? Please check all that apply? #			Performing manual orthopedics techniques (joint or soft tissue mobilization)	60	38.0
Degeneration	9	5.7	Responding to an unanticipated sudden movement or fall by a patient	24	15.2
Fracture	6	3.8	Lifting heavy equipment or patients	57	36.1
Ligament sprain	8	5.1	Continuing to work when injured or hurt	51	32.3
Vertebral disk problem	19	12.0	Not enough rest breaks during the day	59	37.3
Dislocation	3	1.9	Inadequate training in injury prevention	16	10.1
Muscle Strain	77	48.7	Other	12	7.6
Tear	4	2.5	Did you officially report the injury?		
Neuropathy	24	15.2			
Tendinitis	23	14.6	Yes	47	29.7
Other	49	31.0	No	111	70.3

#: More than one answer

Cont. Table (2): Distribution of the studied nurses according to prevalence and types of musculoskeletal disorders experienced in nursing at Hafr Albatin hospitals (n = 158) "continue"

prevalence and types of musculoskeletal disorders experienced	No.	%	prevalence and types of musculoskeletal disorders experienced	No.	%
Did you see a physician for the injury?			Have you ever had training in ways to alter your environment to reduce strain on your body (ergonomics)?		
Yes	96	60.8	Yes	51	32.3
No	62	39.2	No	107	67.7
What kind of treatment was applied?			Which of the following do you use to reduce the strain on your body when working?		
Nothing	9	5.7	Adjustable bed/plinth	27	17.1
Surgical	11	7.2	Sliding board	4	2.5

Medical	37	24.2	Patient lifting belt	10	6.3
Rest	48	31.4	Splint	31	19.6
Exercises	20	13.1	Other	36	22.8
Personal knowledge of physical therapy postural adaptation ergonomics	31	20.3	None of the above	50	31.6
Pain reliever	1	0.7	The type of patient I usually treat		
Therapy	1	0.7	Requires minimal or no assistance	44	27.8
Since your injury. Have your symptoms been exacerbated by clinical practice?			Requires moderate assistance (1 person to assist)	54	34.8
Yes	92	58.2	Requires maximum assistance (2 people to assist)	58	37.4
No	66	41.8	Critical care patients	1	0.6
Has the injury caused you to alter your work habits?			All of the above	1	0.6
Yes	94	59.5			
No	64	40.5			

Table (3): Distribution of the studied nurses according to activities that provide nurses pain scale (n = 158)

Pain scale	No.	%
You have pain		
Yes	114	72.2
No	44	27.8
Pain intensity if have	(n = 143)	
The pain comes and goes and is very mild.	24	16.8
The pain is mild and does not very much.	26	18.2
The pain comes and goes and is moderate.	40	28.0
The pain is moderate and does not very much.	15	10.5
The pain comes and goes and is very severe.	30	21.0
The pain is very severe and does not very much.	8	5.6
The pain during Job Duties or all time		
I can perform most of my job duties, but pain prevents me from performing more physically stressful activities	43	27.2
My normal job activities do not cause pain	45	28.5
My normal job activities increase my pain, but I can still perform all that is required of me	59	37.3
Pain prevents me from doing anything but light duties.	7	4.4
Pain prevents me from doing even light duties.	2	1.3
Pain prevents me from performing any job chores.1	2	1.3
Pain Duration	(n = 138)	

The pain is just starting	38	27.5
The pain started one month	22	15.9
The pain lasting from >1-3 months	21	15.2
The pain lasting from >3-6 months	13	9.4
The pain lasting from >6 months	44	31.9
Do you expect changing shifts to have a negative effect as well?		
Yes	101	63.9
No	57	36.1

Cont. Table (3): Distribution of the studied nurses according to activities that provide nurses comfort or pain (n = 158)

Items	You have pain			
	Yes (n = 114)		No (n = 44)	
	No.	%	No.	%
Pain intensity if have				
The pain comes and goes and is very mild.	12	10.5	12	27.3
The pain is mild and does not very much.	9	7.9	17	38.6
The pain comes and goes and is moderate.	40	35.1	0	0.0
The pain is moderate and does not very much.	15	13.2	0	0.0
The pain comes and goes and is very severe.	30	26.3	0	0.0
The pain is very severe and does not very much.	8	7.0	0	0.0
Pain Duration				
The pain is just starting	14	12.3	24	54.5
The pain started one month	22	19.3	0	0.0
The pain lasting from >1-3 months	21	18.4	0	0.0
The pain lasting from >3-6 months	13	11.4	0	0.0
The pain lasting from >6 months	44	38.6	0	0.0

Table (4): Relation between demographic characteristics and observation checklist about pain among studied nurses (n = 158)

Demographic characteristics	You have pain				χ^2	p
	Yes (n = 114)		No (n = 44)			
	No.	%	No.	%		
Age (years)						
≤ 25	5	4.4	8	18.2		
26 - 30	28	24.6	5	11.4		
31 - 35	28	24.6	14	31.8	14.316*	0.006*
36 - 40	34	29.8	15	34.1		
> 40	19	16.7	2	4.5		
Marital state						

Single	27	23.7	12	27.3	1.632	MCp= 0.704
Married	81	71.1	32	72.7		
Divorced	4	3.5	0	0.0		
Widow	2	1.8	0	0.0		
Weight (kg)					4.177	0.524
≤50	7	6.1	3	6.8		
51-60	29	25.4	7	15.9		
61-70	28	24.6	11	25.0		
71-80	26	22.8	9	20.5		
81-90	13	11.4	10	22.7		
>90	11	9.6	4	9.1		
Gender					2.483	0.115
Male	25	21.9	15	34.1		
Female	89	78.1	29	65.9		
Job title					8.050*	0.045*
Nursing Assistant	4	3.5	7	15.9		
Nursing technician	46	40.4	14	31.8		
Nursing specialist	46	40.4	18	40.9		
Senior Specialist	18	15.8	5	11.4		
Hospital					0.002	FEp= 1.000
MOH	109	95.6	42	95.5		
Privet	5	4.4	2	4.5		
Department of Current Practice					25.461*	MCp= 0.001*
Intensive care unit	13	11.4	0	0.0		
Emergency	20	17.5	7	15.9		
Acute Kidney Unit	5	4.4	1	2.3		
Orthopedic department	5	4.4	5	11.4		
Operation department	11	9.6	1	2.3		
Surgical department	21	18.4	4	9.1		
Medical department	11	9.6	2	4.5		
Delivery Room	0	0.0	1	2.3		
Rehabilitation center	2	1.8	0	0.0		
Psychiatric unit	4	3.5	1	2.3		
Other	22	19.3	22	50.0		
Daily work hours					5.012*	FEp= 0.021*
8 hours & 9 hours	102	89.5	44	100.0		
10 hours & 12 hours	12	10.5	0	0.0		

χ^2: **Chi-square test** MC: **Monte Carlo** FE**: Fisher Exact** *: Statistically significant at $p \leq 0.05$

Table (5): Relation between demographic characteristics and Pain intensity if have the pain among studied nurses (n = 143)

Demographic characteristics	Pain intensity if have the pain												χ^2	p
	Comes and goes and is very mild (n =24)		Mild and does not vary much (n =26)		Comes and goes and is moderate (n =40)		Moderate and does not vary much (n =15)		Comes and goes and is very severe (n =30)		Very severe and does not vary much (n =8)			
	No.	%	No.	%	No	%	No	%	No	%	No.	%		
Age (years)														
≤ 25	5	20.8	5	19.2	2	5.0	1	6.7	0	0.0	0	0.0	**45.126***	**^{MC}p <0.001***
26 - 30	3	12.5	5	19.2	11	27.5	5	33.3	8	26.7	0	0.0		
31 - 35	7	29.2	8	30.8	8	20.0	2	13.3	10	33.3	0	0.0		
36 - 40	6	25.0	5	19.2	11	27.5	7	46.7	12	40.0	1	12.5		
> 40	3	12.5	3	11.5	8	20.0	0	.0	0	0.0	7	87.5		
Marital state														
Single	7	29.2	5	19.2	10	25.0	4	26.7	7	23.3	2	25.0	12.061	^{MC}p= 0.631
Married	16	66.7	20	76.9	30	75.0	10	66.7	20	66.7	6	75.0		
Divorced	0	0.0	0	0.0	0	0.0	1	6.7	3	10.0	0	0.0		
Widow	1	4.2	1	3.8	0	0.0	0	0.0	0	0.0	0	0.0		
Weight (kg)														
≤50	3	12.5	1	3.8	0	0.0	2	13.3	3	10.0	0	0.0	**34.435***	**^{MC}p= 0.045***
51-60	9	37.5	6	23.1	9	22.5	1	6.7	8	26.7	1	12.5		
61-70	3	12.5	7	26.9	11	27.5	4	26.7	4	13.3	5	62.5		
71-80	2	8.3	5	19.2	10	25.0	2	13.3	12	40.0	1	12.5		

81-90	2	8.3	5	19.2	6	15.0	5	33.3	1	3.3	1	12.5		
>90	5	20.8	2	7.7	4	10.0	1	6.7	2	6.7	0	0.0		
Gender														
Male	3	12.5	12	46.2	9	22.5	5	33.3	4	13.3	1	12.5	**12.026***	**0.034***
Female	21	87.5	14	53.8	31	77.5	10	66.7	26	86.7	7	87.5		
Job title														
Nursing Assistant	1	4.2	5	19.2	2	5.0	1	6.7	0	0.0	0	0.0		^{MC}p= 0.380
Nursing technician	10	41.7	10	38.5	12	30.0	7	46.7	11	36.7	5	62.5	15.211	
Nursing specialist	9	37.5	8	30.8	19	47.5	3	20.0	15	50.0	3	37.5		
Senior Specialist	4	16.7	3	11.5	7	17.5	4	26.7	4	13.3	0	0.0		
Hospital														
MOH	22	91.7	24	92.3	38	95.0	15	100.0	29	96.7	8	100.0	1.997	^{MC}p= 0.885
Privet	2	8.3	2	7.7	2	5.0	0	0.0	1	3.3	0	0.0		
Department of Current Practice														
Intensive care unit	1	4.2	3	11.5	1	2.5	0	.0	5	16.7	3	37.5		
Emergency	6	25.0	3	11.5	3	7.5	2	13.3	10	33.3	1	12.5		
Acute Kidney Unit	0	0.0	1	3.8	0	0.0	0	0.0	2	6.7	2	25.0		
Orthopedic department	1	4.2	3	11.5	0	0.0	2	13.3	2	6.7	0	.0	**72.329***	**^{MC}p <0.001***
Operation department	0	.0	1	3.8	4	10.0	3	20.0	3	10.0	1	12.5		
Surgical department	4	16.7	1	3.8	12	30.0	2	13.3	4	13.3	0	0.0		
Medical department	0	0.0	1	3.8	7	17.5	2	13.3	1	3.3	0	0.0		
Delivery Room	0	0.0	1	3.8	0	0.0	0	0.0	0	0.0	0	0.0		

Rehabilitation center	0	0.0	1	3.8	1	2.5	0	0.0	0	0.0	0	0.0		
Psychiatric unit	1	4.2	1	3.8	2	5.0	1	6.7	0	0.0	0	0.0		
Other	11	45.8	10	38.5	10	25.0	3	20.0	3	10.0	1	12.5		
Daily work hours														
8 hours & 9 hours	23	95.8	26	100.0	40	100.0	15	100.0	25	83.3	2	25.0	**31.718***	**MCp <0.001***
10 hours & 12 hours	1	4.2	0	0.0	0	0.0	0	0.0	5	16.7	6	75.0		

χ^2: **Chi square test** MC: **Monte Carlo** *: Statistically significant at $p \leq 0.05$

Table (6): Relation between demographic characteristics and Pain Duration among studied nurses (n = 138)

Demographic characteristics	Pain Duration										χ^2	p
	Just starting (n =38)		Starting one month (n =22)		Lasting from >1-3 months (n =21)		Lasting from >3-6 months (n =13)		Lasting from >6 months (n =44)			
	No.	%	No.	%	No.	%	No	%	No.	%		
Age (years)												
≤ 25	7	18.4	3	13.6	0	0.0	0	0.0	1	2.3		
26 - 30	8	21.1	4	18.2	4	19.0	3	23.1	12	27.3		
31 - 35	13	34.2	6	27.3	9	42.9	1	7.7	6	13.6	34.480*	MCp= 0.002*
36 - 40	9	23.7	5	22.7	8	38.1	7	53.8	12	27.3		
> 40	1	2.6	4	18.2	0	0.0	2	15.4	13	29.5		
Marital state												
Single	14	36.8	6	27.3	4	19.0	3	23.1	11	25.0		
Married	22	57.9	16	72.7	16	76.2	9	69.2	31	70.5	9.940	MCp= 0.545
Divorced	0	0.0	0	0.0	1	4.8	1	7.7	2	4.5		
Widow	2	5.3	0	0.0	0	0.0	0	0.0	0	0.0		
Weight (kg)												
≤50	4	10.5	1	4.5	1	4.8	0	0.0	3	6.8		
51-60	9	23.7	6	27.3	4	19.0	1	7.7	13	29.5		
61-70	9	23.7	5	22.7	6	28.6	4	30.8	10	22.7	14.726	MCp= 0.788
71-80	7	18.4	4	18.2	7	33.3	2	15.4	11	25.0		
81-90	4	10.5	2	9.1	3	14.3	4	30.8	4	9.1		
>90	5	13.2	4	18.2	0	0.0	2	15.4	3	6.8		
Gender												

Male	10	26.3	6	27.3	3	14.3	5	38.5	9	20.5	3.128	0.537
Female	28	73.7	16	72.7	18	85.7	8	61.5	35	79.5		
Job title												
Nursing Assistant	3	7.9	1	4.5	0	0.0	2	15.4	1	2.3		
Nursing technician	12	31.6	7	31.8	8	38.1	7	53.8	19	43.2	10.328	MCp= 0.552
Nursing specialist	17	44.7	9	40.9	10	47.6	2	15.4	19	43.2		
Senior Specialist	6	15.8	5	22.7	3	14.3	2	15.4	5	11.4		
Hospital												
MOH	37	97.4	22	100.0	19	90.5	13	100.0	42	95.5	2.749	MCp= 0.494
Privet	1	2.6	0	0.0	2	9.5	0	0.0	2	4.5		
Department of Current Practice												
Intensive care unit	2	5.3	5	22.7	1	4.8	1	7.7	4	9.1		
Emergency	8	21.1	4	18.2	2	9.5	1	7.7	9	20.5		
Acute Kidney Unit	0	0.0	0	0.0	2	9.5	0	0.0	3	6.8		
Orthopedic department	1	2.6	1	4.5	1	4.8	1	7.7	2	4.5		
Operation department	2	5.3	2	9.1	3	14.3	1	7.7	4	9.1		
Surgical department	7	18.4	3	13.6	5	23.8	1	7.7	8	18.2	34.062	MCp= 0.656
Medical department	1	2.6	1	4.5	4	19.0	2	15.4	4	9.1		
Delivery Room	1	2.6	0	0.0	0	0.0	0	0.0	0	0.0		
Rehabilitation center	0	0.0	0	0.0	0	0.0	1	7.7	1	2.3		
Psychiatric unit	2	5.3	1	4.5	0	0.0	1	7.7	1	2.3		
Other	14	36.8	5	22.7	3	14.3	4	30.8	8	18.2		
Daily work hours												
8 hours & 9 hours	37	97.4	22	100.0	21	100.0	13	100.0	33	75.0	16.086*	MCp <0.001*

10 hours & 12 hours	1	2.6	0	0.0	0	0.0	0	0.0	11	25.0		

χ^2: **Chi square test** MC: **Monte Carlo** *: Statistically significant at $p \leq 0.05$

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)**.

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 present study illustrated that more than one-third of studied nurses were in age 36-40 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 statistically significant relation between apply principles of you have pain in wrong body mechanics and their age. These results are consistent with **Iawim, & Dutta (2020)** who reported that there were significant associations between apply principles of you have pain in wrong body mechanics and age. These results are consistent 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 present study revealed that there was a statistically significant relationship between apply principles of you have pain in wrong body mechanics and their weigh. These results are consistent with **Agualongo et al., (2020)** who reported that there was a significant association between apply principles of you have pain in wrong body mechanics with body weigh in the intensive care unit . In addition, **Kang (2017)** found that the majority of the sample was with 61-70 kg ’ with age less than 40 years.

The current study showed that there was a statistically significant relationship between pain intensity and their job title. 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 Port Said Scientific Journal of Nursing Vol.9, No. 1, April 2022 135 .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.

The present study revealed that nurses had no 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 body mechanics and their intensity 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 current study showed that there was no statistically significant relation between applied principles of body mechanics, pain duration and their department of current practice. 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 (2017)** 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.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. 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

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 significant correlation between methods 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.

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