Journal of Engineering & Health Sciences
eISSN 2600-7843
Volume 8 (Bil.1) 2024 116-129

KNOWLEDGE AND PRACTICE OF BODY MECHANIC AMONG INTENSIVE CARE NURSES IN HOSPITAL

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Article History:
Received : 21 Oktober 2024
Revised : 22 Oktober 2024
Published : 31 Disember 2024

To cite this article:
Abu Hassan Ashaari, S. R., Mayilvahanam, S., & Zaimarol, Z. (2024). Knowledge And Practice of Body Mechanic Among Intensive Care Nurses in Hospital. Journal of Engineering & Health Sciences, Volume 8 (Bil 6) 2024 1-7

ABSTRACT
Introduction: Poor body mechanics that result in low back discomfort remain one of the main work-related risks for healthcare professionals, particularly nurses and doctors. Objectives: This research aims to investigate low back pain among intensive care nurses by evaluating their understanding and use of appropriate body mechanics at the Johor Bahru Hospital's Intensive Care Unit. Methodology: Using an internet platform, a self-administered questionnaire in the form of a quantitative study design was distributed to the participants who met the inclusion criteria. The Statistical Package of Social Sciences (SPSS) 26.0 was used to analyse the data using descriptive statistics and the Chi-Square test. Twenty people in all responded to the disseminated questionnaire, which had three sections: body mechanics practice, knowledge, and demographics. Finding: The data indicates that there is a high degree of knowledge among hospitalized intensive care nurses, with a mean percentage of 37.5% for agree and 48% for strongly agreeing, as well as good body mechanics practice, with a mean percentage of 63% for agree and 24.5% for strongly agreeing. Additionally, the results indicate that there is no significant correlation between working experience and body mechanic knowledge among nurses (p=0.125) or between working experience and body mechanic practice (p=0.089). Conclusion: Intensive Care Nurses have strong levels of knowledge and practice, and there is a lack of association between job experience and body mechanics expertise.

Keywords: Nurses, Low Back Pain, Body Mechanics

1.0 INTRODUCTION

One of the most prevalent musculoskeletal conditions affecting healthcare providers, particularly nurses, is low back pain (LBP) (Inaami et al., 2019). Jegnie & Afework (2021) define it as pain or discomfort that is primarily caused by occupational factors and radiates from the lower margin of the 12th rib to the pelvis. Acute or chronic lower back pain can be caused by stretch injuries to the muscles, ligaments, or tendons in the lower back. These could happen when a nurse is lifting, moving, or twisting a patient as part of their regular care. According to the Department of Occupational Safety and Health Malaysia (2023), 40% of cases of musculoskeletal illnesses, including LBP (musculoskeletal disorders), that are recorded in Malaysia involve manual lifting, lowering, pushing, pulling, carrying, restraining, or holding. Body mechanics and manual handling techniques are critical to preventing LBP.

A synchronized movement of the musculoskeletal and neurological systems to sustain balance, posture, and body alignment in daily living is referred to as body mechanics. This movement is directly related to efficient bodily functioning (Kang, 2017). Nursing students are taught body mechanics concepts and exercises as part of their nursing education. This is done to ensure that patients are handled safely and to avoid back pain or musculoskeletal complications. As they study to become nurses, it is emphasized and reaffirmed. Nevertheless, numerous studies have demonstrated the high frequency of low back pain among nurses, even in the face of prerequisite knowledge and experience related body mechanics (Almaghrabi & Alsharif, 2021; Hossein et al., 2019; Ibrahim et al., 2019) and many more. According to several research on nurses around the world, the prevalence of LBP was 75.7% in Nepal (Manandhar & Subedi, 2016), 59% in South Africa (Dlungwane et al., 2018), 33.3% in Nigeria (Johnson & Edward, 2016), 58.1% in Tunisia (Boughattas et al, 2017), 58.7% in Uganda (Mutanda, 2017), 68.2% in Malaysia (Gim, 2017), and 41.4% in Ethiopia (Deksisa Abebe, 2015).

Every day, nurses perform several tasks involving body mechanics, such as changing beds, helping patients walk, moving supplies and equipment, caring for patients, and performing numerous other tasks. This puts many nurses at risk for back injury and physical strain. Back injuries can be caused by trauma resulting from twisting, bending, or lifting procedures, lifting a heavy object, or overstretching, according to Ibrahim et al. (2019). It is imperative for nurses to possess appropriate knowledge and expertise in body mechanics in order to perform their tasks. Furthermore, regardless of the type of practice, body mechanics should be incorporated into everyday nursing activities since it is essential for a successful nursing profession. Researchers have related inadequate body mechanics to a reduction in healthcare professionals' performance while fatigue, which is defined as a state of low energy, tiredness, or exhaustion (Knupp et al., 2018).

In any hospital, nurses make up around one-third of the staff and are crucial to the healthcare system. Nurses who work for the protection, development, and enhancement of health in cases of health concerns for individuals and families spend more time with patients and give direct care than other health professionals (Akinci et al., 2014). One significant contributor to the present increasing shortage of healthcare professionals is the potential for musculoskeletal injuries to cause permanent

impairments. Nurses' lower back pain (LBP) may have an impact on clinical field efficiency, which in turn affects work constraints and attendance. Study has shown the effect of LBP on duty performance to include the inability to care for patients as appropriate (43%), absenteeism at work (35%), intention to change workplace (15%), and intention to quit the nursing profession (40%) (Ijabadeniyi & Fasae, 2023) which will leads to poor quality of care, and effect the safety of both patient and nurses (Machitidze, 2022). LBP not only affect patient but also may distort nurses' performance regarding their daily life activities and hinder their interpersonal relations, result in various psychological problems, and affect the quality of life adversely (El-Soud et. al., 2014).

Intensive treatment Unit (ICU): An exclusive hospital ward where patients with life-threatening illnesses receive thorough, precise, and continuous treatment. Critically sick patients receive crucial care from ICU nurses (Yang et al., 2021). Patients in the ICU need nurses' assistance every minute of their life including assisting in moving, lifting, carrying and all other activities related to care. Bending, twisting, heavy lifting on a regular basis, improper static posture, and psychological stress are all part of these tasks, and are thought to be the primary causes of many back problems. Wanless (2017) reports that research on back pain in healthcare professionals has demonstrated a connection between back pain symptoms and bad posture. Most nurses deal with postural dangers, which directly affect patients, for the majority of their workdays. It is not surprising that low back pain and lower back injuries are the most common kind of musculoskeletal problems caused by moving and handling.

Low back pain may be varying from one person to another person and while eliminating low back pain entirely may not be possible. Numerous factors, including age, sex, occupation, workplace environment, and static standing or sitting jobs, might contribute to back pain issues. Medical disorders and lifestyle choices are additional factors that might cause back pain and influence an individual's low back discomfort. Gaining knowledge of the fundamentals of healthy body mechanics might be a sensible approach to avoid back discomfort and learn how to maintain proper vertebral posture and ergonomics when going about daily tasks. Thus, it is evident that body mechanics knowledge and application are essential and have a big influence on the standard of patient care as well as the lives of nurses. For this reason, the purpose of this study was to evaluate the body mechanics knowledge and practice of Johor Bahru's intensive care unit nurses.

2.0 LITERATURE REVIEW

A number factors, including sociodemographic, physiological, work-related, psychological, and lifestyle factors, can all contribute to low back pain among nurses.

Work-related factor

Ibrahim et al. (2019) reported that exhaustion, working longer shifts than seven hours a day, twisting one's body while working, and manually treating patients in wards were factors linked to lower back pain (LBP) among nurses. Stress and pain, including muscle spasms and stiffness, can result from inadequate sleep (Thinkkhamrop & Laohasiriwong, 2015). According to a study by Rezaei (2021), the biggest risk factors for LBP in healthcare providers were stress, inactivity, and body posture at work. Another risk factor for LBP is body mass index. While normal body weight lessens the strain on the spine,

excess belly weight on the vertebrae may result in long-term lower back spasms that eventually lead to LBP.

Lifestyle related factors

Research on the impact of lifestyle factors such as alcohol use, physical activity, smoking, and food on health outcomes has been done extensively. A moderate rise in the risk of lower back pain (LBP) in adults, children, and adolescents is linked to sedentary behaviour, whether it be during work or leisure time, according to Baradaran Mahdavi et al. (2021). Sedentary lifestyle factors that have been linked to adult LBP include smoking, being overweight, and spending a lot of time sitting and driving.

Individuals who smoke cigarettes and consume more tobacco are more likely to develop lung cancer. Smoking tobacco narrows blood vessels, which reduces blood flow to all parts of the body, especially the surrounding tissues and spinal discs. Reduced blood flow may make it more difficult for the body to heal and repair damaged or degenerative discs, which raises the risk of back pain associated with discs and increases susceptibility to injury (Vinstrup et al., 2020).

The results of Yoshimoto et al.'s (2020) investigation on the relationship between a few unhealthy lifestyle habits and LBP indicate that, independent of age and BMI, leading an unhealthy lifestyle is linked to an elevated risk of LBP. Investigations of unhealthy lifestyles included smoking, regular alcohol consumption, weight increase, physical activity, food habits, and getting enough sleep.

Knowledge and practice of body mechanic

The body mechanic is the combination used of body parts to produce movement and maintaining balance. Application of correct body mechanics may promote efficient use of tissue and conserves energy. With the knowledge of the proper use of muscles, nurses can teach patients how to use their own. In order to do that, knowledge and practice are important. According to Dewasi and Khan (2020), it was found that information in relation to the correct body mechanic is not good with the knowledge of 11.02 ± 4.96 and mean 36.72%. The finding is significant between the professional levels of staff nurses in terms of body machine accuracy.

Akhtar et al., (2017) conducted a study at the Punjab Institute of Cardiology (PIC) hospital jail road Lahore, India to determine the knowledge and practices of nurses towards body mechanic technique. With study population of 470 nurses and sample size was 216 calculated, shows that majority nurses having job experience of 0-5 years. 80% (n=173) of the sample held a diploma in general nursing and midwifery. 65% of nurses had fair knowledge about the body mechanic technique and 35% with poor knowledge. In term of practices, about 60% of nurses were using body mechanic techniques in their practices, whereas 40% were not.

Contractor (2019) reveals that almost all students and staffs have good knowledge regarding body mechanics but did not practice it well even though they know the importance of this practice. Data was collected from 301 nurses including 184 nursing students and 117 nursing staff various government and non-government hospitals and colleges of Gandhinagar and Ahmedabad, India. Result shows that the extent of knowledge in 301 nurses are,56.4%-Good, 41.4%-Moderate and 2.1% are having poor knowledge and regarding practice shows that 3.6%-Good, 62.9%-Average and 33.6% are

doing Poor practice. There was a weak positive correlation between knowledge and practice of body mechanics among sample.

According to Priyanka et al., (2021) study show that 78.7% sample show poor knowledge score, sample follow average practice (52.9%), poor practices (24.1%), and good practices (23.0%). There was no statistically significant association was found among musculoskeletal problems and body mechanic practices of the subjects. The study was planned to assess knowledge and use of body mechanics among hospital attendants and their association with the musculoskeletal problems among hospital attendants in India.

Study conducts at Sohag University Hospital, Egypt with total respondent of 247 nurses reveal that there was statistically significant difference between age and knowledge, while there was no statistically significant difference between knowledge and sex, level of education and also nurses don't understanding important of practicing body mechanics (Abdelal et. al., 2022) which will affect patient and nurses safety.

Barrier to body mechanic

In the demanding and crucial field of nursing, the effective application of proper body mechanics is essential for the well-being of both patients and nurses themselves. However, several barriers often impede nurses from executing these essential techniques, consequently increasing the risk of back pain. Maintaining correct body mechanics is crucial for a sustainable and healthy nursing profession. Understanding and addressing the barriers is crucial to ensuring the health and longevity of nursing careers while minimizing the prevalence of back pain among healthcare professionals.

Poor workplace ergonomics presents a significant barrier for nurses, affecting their ability to execute proper body mechanics and contributing to back pain. A study revealed that 69% of the surveyed nurses experienced back pain. Of these, 95% encountered obstacles in executing proper body mechanics, including a lack of lifting equipment and inadequate training in its use. Additionally, 81% of the nurses examined tended to maintain prolonged periods with their backs bent (Moustafa et al., 2022). Nurses often have heavy workloads and are required to attend to multiple patients, leading to time constraints. This rush may result in neglecting proper body mechanics during patient handling. Most nurses fail to apply proper body mechanics when repositioning, moving, lifting, or transferring patients, and as a result, 88% of these nurses experienced pain in their lumbar region (Hossein et al., 2018).

Moreover, nursing involves physically demanding tasks, including lifting, repositioning patients, and long hours on their feet. The cumulative effect of these tasks can strain the body, leading to back pain. Moreover, more than 70% of nurses experience recurring lower back pain. This discomfort adversely impacts their well-being, job satisfaction, and overall quality of life (Tariq et al., 2023). One major obstacle may be inadequate instruction or reinforcement in appropriate body mechanics skills. Inadequate instruction and infrequent training regarding patient lifting, patient transfer, and proper posture may lead to unintentional behaviours by nurses that exacerbate the risk of back pain. Research among nurses at Hospital Kluang found that all of the participants knew that back discomfort may be reduced by using appropriate body mechanics. But 68.2 percent did not know that it would be more efficient to use a bed sheet from a mass hand while lifting heavy patients (Jaafar & Ghazali, 2013).

The body's reaction to a variety of demands or obstacles, such as pressure from the workplace, personal problems, or big life transitions, is stress. On the other hand, clinical practice fatigue refers to the emotional, mental, and physical weariness that healthcare workers endure as a result of the demanding nature of their jobs. A nurse's capacity to maintain appropriate body mechanics may be impacted by stress and exhaustion. When exhausted or emotionally drained, individuals are more likely to adopt poor postures or rush through tasks, increasing the risk of injury. According to research, approximately 63.41% of nurses said that they felt pressure from their jobs (Jradi et al., 2020). Furthermore, there was a negative association ($r = -0.379$, $p<0.001$) between clinical-practice weariness and the application of body mechanics principles (Kang, 2017). Prolonged stress and fatigue can weaken muscles and impair coordination. This can affect a nurse's ability to execute proper body mechanics, increasing vulnerability to back pain due to improper lifting or movement techniques. Moreover, stress and fatigue can lead to increased muscle tension and strain, making individuals more susceptible to maintaining poor postures or compensating with incorrect movements, thereby leading to back pain and musculoskeletal issues (Kang, 2017).

The well-being of nurses may not always be given priority in the workplace, and there may be a lack of support for reporting pain or seeking assistance. As a result, nurses may choose to work through their discomfort, which exacerbates the problem. It may be more difficult for nurses to follow appropriate body mechanics in some healthcare settings due to a lack of resources, such as lifting apparatus, adjustable beds, or other assistive devices (Moustafa et al., 2022). Moreover, workplace cultures that prioritize speed or productivity over safety may inadvertently encourage nurses to compromise on proper body mechanics to meet targets or deadlines. Such pressures can lead to hurried movements or inadequate use of lifting equipment, increasing the risk of back strain or injury. A complex strategy is needed to address these barriers, including thorough ergonomic assessments, ongoing training, sufficient staffing, encouraging a positive work environment, and spending money on tools and assistive technology to reduce the risk of back pain in nurses. Furthermore, it is critical to promote open discussion regarding pain and make sure that nurses feel supported when they seek care for any injuries or discomfort.

Various barriers significantly impede nurses from effectively implementing proper body mechanics, consequently contributing to an increased risk of back pain. Factors such as inadequate workplace ergonomics, heavy workloads, lack of training, physical demands, emotional stress, and a shortage of resources collectively impact the ability of nurses to maintain correct body mechanics. Addressing these barriers is essential to safeguard the well-being of nurses and reduce the prevalence of back pain within the profession. Implementation of ergonomic improvements, comprehensive training programs, supportive workplace cultures, and adequate resource allocation are vital steps to mitigate these barriers and promote the practice of proper body mechanics among nurses, thereby reducing the occurrence of back pain.

3.0 METODOLOGY

Quantitative research design was adopted by using self-administered questionnaires distributed among intensive care nurses in Johor Bahru. All nurses working in the ICU were selected as respondent exclusion of nurses who were on leave including study leave, maternity leave, unpaid leave, long leave and those who were refuse to participate in the study. Sample selected using convenience sampling where researchers choose sample based solely on convenience.

Questionnaire consist of 24 items categorize into four sections, which are Section A, B, C and D. Section A consist of demographic data which comprise of 4 item including age, gender, marital status, education level and length of services. Section B regarding knowledge of body mechanic which include 10 question which will determine their level of knowledge based on respondent understanding. Section C regarding practice of body mechanic which include 10 questions to assess body mechanic practice in working area. The respondents had to tick the answer which employs a Likert-type scale of 1 – 5 for Section B and C with available responses of 1 = Strongly Disagree, 2 = Disagree, 3 = Unsure, 4 = Agree and 5 = Strongly Agree.

Data was sorted and analyse using Statistical Package for the Social Sciences (SPSS) version 20 and the result displayed by using frequency table.

4.0 RESULTS AND DISCUSSION

Demographic Data

Total number of nurses who respondents in this study was 20. Table 1 summarize the demographic data of the respondent show most of the respondent is female with 85% (n=17) and male 15% (n=3). Meanwhile most of the respondent age less than 30 years old; age 20 – 30 is 75% (n=15) and more than 30 years 25% (n= 5) from total number of respondents. Analysis also shows that respondents with years of services length, there were 8 respondents (40%) with 2-5 years of working experience, 9 respondents (45%) with 5-10 years of working experience and 3 respondents (5%) with 10 -15 years of working experience.

Table 1: Respondent Demographic Data

	Frequency (n)	Percent (%)
Gender		
Male	3	15.0
Female	17	85.0
Age		
20-30	15	75.0
>30	5	25.0
Marital Status		
Married	15	75.0
Single	5	25.0
Years of Service		
2-5 years	8	40.0

5-10 years	9	45.0
11-15 years	3	15.0

Knowledge on body mechanics

Table 2 show the distribution based on respondent knowledge on body mechanic. It shows that most of the respondent aware that "Body mechanic means maintaining good posture when moving" and "Bend at the knees rather than your waist when lifting" with 55% from total respondent. However, 45% from total respondent respond toward "Low back pain related to poor body posture and poor body mechanic', "Proper body mechanic reduce risk in low back pain", "Stand tall, keep feet shoulder width apart is proper body mechanic", "Keep your back straight when your carry heavy box", "Avoid bending, twisting and straining to reach your patient" and "Breath out as you lift". Mean percentage for knowledge on body mechanic are 37.5% for Agree and 48% for Strongly Agree which shows that good level of knowledge among Intensive Care Nurses. This result similar to Contractor (2019) that almost all staffs have good knowledge regarding body mechanics.

Table 2: Knowledge on Body Mechanic Among Respondent

Item	**D %**	**U %**	**A %**	**SA %**	**Total Percentage**
Body mechanic means maintaining good posture when moving.	-	5	40	55	100
Low back pain related to poor body posture and poor body mechanic.	5	5	45	45	100
Proper body mechanic reduce risk in low back pain.	5	5	45	45	100
Stand tall, keep feet shoulder width apart is proper body mechanic	15	10	30	45	100
Avoid bending and twisting your back.	10	25	15	50	100
Bend at the knees rather than your waist when lifting.	-	10	35	55	100
Keep your back straight when your carry heavy box.	-	5	50	45	100
Move body closer to patient with one of feet forward when your move patient to other side of bed.	-	5	45	50	100
Avoid bending, twisting and straining to reach your patient.	10	10	35	45	100
Breath out as you lift.	10	10	35	45	100
Mean Percentage	5.5	9	37.5	48	100

** Disagree (D), Unsure (U), Agree (A) and Strongly Agree (SA).*

Practice on body mechanics

Table 3 show that most of the respondent practice safe body mechanic with mean percentage of 63% for Agree and 24.5% Strongly Agree which shows that good practice among Intensive Care Nurses. This result are similar as reported by Akhtar et al., (2017) and Priyanka et al (2021).

Table 3: Practice of Body Mechanic Among Respondent

Item	SD %	D %	U %	A %	SA %	Total Percentage
Balancing the body weight equally to each foot while lifting up an object.	-	5	5	75	15	100
Paying attention, the position of supine while lifting something.	10	-	10	35	45	100
Getting closer to the object while lifting up the object which is on the floor.	-	5	5	80	10	100
Paying attention not to carry an object above shoulder line.	-	10	15	60	15	100
Balancing the body weight on each foot while walking.	-	5	-	75	20	100
Bending the knees while lifting an object from the floor.	-	5	5	55	35	100
Paying attention suitable sitting position.	-	-	25	45	30	100
Paying attention to the position of head, shoulder and back while walking.	-	-	10	70	20	100
Putting both feet to the ground while sitting.	-	5	5	60	30	100
Balancing the body weight equally on each foot while sitting.	-	-	-	75	25	100
Mean Percentage	1	3.5	8	63	24.5	100

** Strongly Disagree (SD), Disagree (D), Unsure (U), Agree (A) and Strongly Agree (SA).*

Association between working experience with knowledge and practice of body mechanics

Table 4 shows the association between working experiences and knowledge of body mechanic. Result shows that p=0.125 ((p>0.05), there is no significance association between working experience with knowledge of body mechanic among nurses in Intensive Care Unit in Johor Bahru. This indicate that working experience is not associate with level of knowledge.

Table 4: Association between working experience and knowledge of body mechanic

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.222[a]	4	.125
Likelihood Ratio	6.530	4	.163
Linear-by-Linear Association	.070	1	.792
N of Valid Cases	20		

Table 5 represent the association between nurses working experiences and practice of body mechanic. Result shows that p=0.089 (p>0.05), there is no significance association between working experience with practice of body mechanic among nurses in Intensive Care Unit in Johor Bahru. This indicate that years of working experience is not related to practice of body mechanic.

Table 5: Association between working experience and practice of body mechanic

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	10.990[a]	6	.089
Likelihood Ratio	10.111	6	.120
Linear-by-Linear Association	2.962	1	.085
N of Valid Cases	20		

5.0 CONCLUSION

Low back pain among nurses can be due to lifting weights beyond the individual's capacity, inadequate staff, incorrect use of body mechanics, and lack of training. Exercise, proper body mechanics, reduction or elimination of risk factors such as stress, obesity, and smoking, ergonomic arrangements, and the use of patient lifting devices are suggested. The training program included basic concepts, rules, and behaviours to prevent low back pain and should be designed to be both theoretical and practical.

AUTHOR CONTRIBUTIONS

Abu Hassan Ashaari, S. R.: Original Draft Preparation, Conceptualization, Methodology & Data Analysis, Writing-reviewing and Editing.
Mayilvahanam, S: Literature reviewing, Manuscript preparation, Writing-reviewing.
Zaimarol, Z: Literature reviewing & Manuscript preparation.

CONFLICT OF INTEREST

The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its submission, and declare no conflict of interest on the manuscript.

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