Knowledge of Body Mechanics Techniques and Associated Factors among Nurses Working in East Shewa Zone Public Hospitals, Oromia Region, Ethiopia, 2022

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Abstract

Background: *Work-related musculoskeletal disorders have been consistently high in nursing sectors. Having good knowledge is one of the methods that help to fellow principles of body mechanics techniques. However, there is paucity of information on practice of body mechanics techniques among nurses in Ethiopia.*

Objectives: *-To assess Knowledge of body mechanics techniques and associated factors among nurses working in East Shewa zone public hospitals, Oromia regional state, Ethiopia, 2022.*

Methods: *- An institution-based cross-sectional study design was conducted in east Shewa zone public hospitals from August 05 to September 04, 2022. A simple random sampling technique was used to select 422 participants. Data was entered into Epi-data version 4.6 and was exported to SPSS version 26 for analysis. Bivariate and multivariable logistic regression was applied to see association between dependent and independent variables. Odds ratio with 95% confidence interval was used to declare associations between dependent and independent variables. P value less than 0.05 were considered as statistically significant. Results were summarized and presented by texts, tables and figures.*

Results: *The overall mean was (6.32 $\pm$ 3.28) for knowledge of body mechanics techniques. 39.1% of studied participants had good knowledge of body mechanics technique. BSc Degree qualification [AOR 3(1.51-5.95)], comprehensive specialized hospital level [AOR 2.25(1.251-4.05)], outpatient unit [AOR 3.16(1.69-5.87)] were associated with knowledge of body mechanics techniques.*

Conclusion: *The degree of knowledge towards body mechanics techniques among nurses working in east Shewa zone public hospital was poor. Level of education, hospital level and unit of working were statistically significant with knowledge of body mechanics techniques.*

Recommendations: *Providing educational opportunities and working in collaboration of nurses of each hospital and shifting working unit were recommended.*

Keywords: Body Mechanics Techniques, Knowledge, Nurse, East Shewa, Ethiopia.

1. Background

Body mechanics is the organized movements of the musculoskeletal and neurological systems to maintain balance, posture, and body alignment in daily activities [1,2]. It may be correct or incorrect based on techniques of performances. The fundamentals of body mechanics include asking friends for help while carrying heavy patients, when lifting a thing, bend your knees and hips, transport heavy patients using a sheet of cloth, and lower your canter of gravity while maintaining your weight front and supported on your outer feet. Keep everything you are carrying close to your body when carrying it. Body mechanics techniques should be properly used to avoid tiredness, injuries, deformities, and back issues.

Additionally, it assists in enhancing bodily physiologic processes, maintaining body equilibrium without placing unnecessary strain on body parts, saving energy, and operating medical equipment in a safe manner [3,4].

Inappropriate body mechanics practices in the workplace like manual handling, repeated duties, extended standing or sitting, uncomfortable postures, and carrying large goods alone that weigh more than ten kilograms are key contributing factor to work-related musculoskeletal diseases (WRMSD) [5,6].

Improper practice of body mechanics techniques always causes back pain and other work-related musculoskeletal problems [7,8]. Nurses are more likely to develop a work related musculoskeletal disorders (WRMSD) than other health professionals as their job is often physically demanding [9,10]. Every year, thousands of nurses throughout the world obtain medical reports or quit their jobs early as a result of inadequate body mechanics skills used during patient care tasks that need them to bend, push, pull, carry, and lift patients Most nurses seek a change of duty from a busy department and transfer to a job in education or management since poor body mechanics typically lead to impaired physical performance at work, WRMSD, and even disability [11-15].

Globally, due to improper practice of body mechanics techniques yearly over 45 billion dollars in medical costs were paid [16]. Improper practice of body mechanics techniques is major contributory in a high prevalence of WRMSDs which varies among countries. In Iran, 71.9% of hospital nurses experienced musculoskeletal disorders and the prevalence varied between 33.0% and 88.0 % in Turkey, 47.8% in Thailand 45.9% in Italy 65.4% in Tunisia 95.7% in Zimbabwe and 60.8% in Jimma Ethiopia [12, 17-22]. Improper application of body mechanics affects the upper extremities more than the lower extremities [20,23].

In order to ensure adequate application of body mechanics techniques several previous studies identified significant factors associated with good practice of body mechanics techniques like back school program, rotation of working unit, adequate knowledge of body mechanics and its proper use in their daily activities [24-27].

Poor practice of body mechanics is the major cause of WRMSD and even changing their department among nurses [13-15]. To avoid these injuries, nurses have to know their level of implementing body Mechanics techniques that describe the correct way to use the muscular system [28]. However, to the best of researcher knowledge, there is a paucity of information on the practice of body mechanics techniques among nurses in Ethiopia in general and East Shewa zone public hospital in particular. Thus, the finding of this study will help nurses, nurses to identify techniques of good body mechanics to reduce burden of back pain and other work related musculoskeletal disorders. This will improve productivity and efficiency of nurses. This in turn boosts patient to get quality care. This finding helps Hospital managers to develop and implement an educational program on body mechanics for patient attendants. Thus, this study aimed to determine the practice of body mechanics techniques and its associated factors among nurses working in East shew zone public hospitals.

2. Methods
2.1 Study Area and Period
The study was conducted in six public hospitals in East Shewa Zone, from August 5 – to September 4 (for one month), 2022. East Shewa Zone is one of the 21 zones of the Oromia Regional State in Ethiopia. Its bordered on the south by the West Arsi Zone, on the southwest by the Southern Nations, Nationalities, and Peoples, on the west by Southwest Shewa Zone and Oromia Special Zone Surrounding Finfinnee, on the northwest by North Shewa Zone, on the north by the Amhara Region, on the northeast by the Afar Region, and on the southeast by Arsi zone.

Based on the information from 2014/15 Census of the Central Statistical Agency of Ethiopia (CSA), the zone has a total population of 1,356,342, of whom 696,350 are male and 659,992 are women. The total area of this zone is 8,370.90 square kilometers.

In this zone there are six public hospitals (Adama comprehensive specialized hospital, Bishoftu general hospital, Mojo primary hospital, Batu General Hospital, Olenchiti primary hospital and Meki primary) Adama comprehensive specialized hospital one of the oldest public hospitals in the country and it is found in Adama city which is located 90 km to the East of Addis Ababa. Bishoftu general hospital is located in Bishoftu city, which is located 45 km southeast of Addis Ababa. Mojo primary hospital is found in mojo city which is located 74 km southeast of Addis Ababa. Batu General Hospital is located in Batu city, which is 148 km far away from the Southeast direction of Addis Ababa. Olenchiti primary hospital is found in Olenchiti town which is located in the East Shewa Zone of the Oromia Region. Meki primary hospital is located in Meki city, which is 118 km far away from the Southeast direction of Addis Ababa.

There are 712 enrolled nurses in East Shewa zone public hospitals among these 371 of them were in ACSH, 122 in Bishoftu general hospital, 70 in Olanchiti primary hospital, 61 in Batu general hospital, 43 in Mojo primary hospital and 35 in Meki primary Hospital.

2.2 Study Design
Institutional based cross-sectional study using quantitative data collection methods was used.

2.3 Population
Source and Study population of this study was all nurses who were working in East Shewa Zone Public Hospitals during data collection period. All nurses those had greater than 6 months' work Experience were included in the study while nurses those were critically ill during data collection Period, pregnant nurses and disabled were excluded from the study.

2.4 Sample Size Determination and Sampling Technique

The sample size was determined by using a single population proportion formula for sample size calculation. Using the Assumptions, d = margin of error of 5% with 95% confidence interval, $\alpha = 0.05$ (level of significance), P=50% assumed the proportion of knowledge and practice of nurses on body mechanics techniques (p=50%) (Since there is no similar research conducted in Ethiopia). After adding 10% non-response rate, the final sample size was 422.

The numbers of nurses with their unit of working were obtained from their respective human resource department. Then proportional allocation to sample size was done to each unit of each hospital. Then sampling frame was developed based on lists taken from human resource department. Then participants were obtained by simple random sampling (computer generated random number) from their services unit.

3. Operational Definitions

3.1 Body Mechanics

It is the utilization of correct muscles to complete a task safely and efficiently in our daily lives [2].

3.2 Knowledge of Body Mechanics

Familiarity or awareness of participants/nurses about the risk factors of work-related musculoskeletal disorders and use of body mechanics techniques [29].

3.3 Good Knowledge

The participants who scored greater than or equal to 6.32 of the knowledge question of body mechanics techniques [3].

3.3 Poor Knowledge

The participants who scored less than 6.32 of the knowledge question of body mechanics techniques [3].

4. Data Collection Tools and Procedure

The data collection instrument was adapted after reviewing of relevant literatures (2–4,28,30,31). The questionnaire has both open and close-ended structure. Face to face validity was checked by the experts to see the validity of the tools and the questionnaire was arranged according to specific objective it addresses. It has four parts; Part I: Socio-demographic characteristics, Part II: organizational characteristics, Part III: work-related characteristics, Part IV: knowledge related questions. A total of five Diploma Nurses and one health officer as supervisor were involved in data collection facilitation.

4.1 Data Quality Control

Earlier to the real data collection, pre-testing was done on 5% of the total study subjects (21 nurses) at Asella teaching and referral hospital, which is not included in analysis of the actual study. Wording, organization and structuring of the questionnaire were checked and amended accordingly such as sequences, relevancy, clarity or repeated ideas. Data collection facilitators and supervisor were trained for one day intensively about questionnaires and data collection procedure which includes the relevance of the study, objective of the study, confidentiality of the information, and informed consent. Daily close supervision was done by supervisor and each filled questionnaire was checked daily for completeness. Finally, the data were carefully entered and cleaned before the beginning of the analysis.

4.2 Data Processing and Analysis

After data collection, each questionnaire was checked for completeness, then coded and entered into Epi data version 4.6, and then exported to SPSS version 26.0 for analysis. Descriptive analysis was carried out to generate percentage, frequency, mean and standard deviation. Knowledge of Body mechanics techniques were dichotomized into either good or poor Knowledge based on the mean value of practice question. Accordingly, the score equal to or above mean value represented a good Knowledge and the score below the mean value represented poor Knowledge. Bivariate and multivariable logistic regression analysis was done to see the association between the independent and the outcome variable. Those variables with P-value <0.25 in bi-variable logistic regression analysis were included in multivariable logistic regression analysis. A P-value less than 0.05 were used to declare the observed association is statistically significant. The magnitude of association between independent variables and the outcome variable was measured by odds ratio (OR) with a 95% confidence interval (CI). A collinearity diagnostic test was undertaken and showed there was no problem of multicollinearity. The normality of the data was checked and showed there were no detected outliers in the data. Model goodness-of-fit test such as Hosmer and Lemeshow test was undertaken. Accordingly, Hosmer and Lemeshow test statistics indicated that the logistic regression model was of good fit (Chi-square = 5.904, P-value = 0.658). The results were presented in the form of tables, figures, and text.

4.3 Ethical Consideration

Before data collection, ethical approval and clearance to conduct the study were obtained from the Institutional Review Board (IRB) of Jimma University; Institute of Health. An official letter of permission was obtained from each study hospital. Written consent was obtained from each nurse for participation in the study. Privacy and confidentiality were ensured during the interview, and the name and address of the interviewee were not recorded in the questionnaire.

5. Results

5.1 Sociodemographic Characteristics of the Study Participants

Four hundred twenty two questionnaires were distributed, and 409 nurses returned questionnaires this makes response rate of 96.9%. Among the participants, just over-a third (35.2%) of the study participants were in the age category between 25-30. Majority of them (56.7%) were males, nearly half (49.9%) of the study participants were married, seven out of ten (70.2%) were holding bachelors of Science degree in nursing. Concerning monthly income majority (42.1%) of the nurses was earning 5359-7071 ETB per month (Table1).

Variable	Category	Frequency	Percent
Sex	Male	232	56.7
	Female	177	43.3
Age category	<25	119	29.1
	25-30	144	35.2
	31-35	92	22.5
	>35	54	13.2
Marital status	Single	179	43.8
	Married	204	49.9
	Divorced	22	5.4
	Widowed	4	1
Ethnicity	Oromo	174	42.5
	Amhara	154	37.7
	Tigre	18	4.4
	others*	63	15.4
Religion	Muslim	108	26.4
	Orthodox	173	42.3
	Catholic	62	15.2
	Protestant	31	7.6
	Waqefatta	35	8.6
Educational level	Diploma	98	24
	Degree	287	70.2
	Masters	24	5.9
Salary(monthly income)	<5358	77	18.8
	5359-7071	172	42.1
	7072-9056	160	39.1
Note: Others* = Afar, Gurage, Sidama			

Table 1: Socio-demographic characteristics of nurses working in east Shewa zone in public hospitals, Oromia region, Ethiopia, 2022 (n=409)

Work related information of respondents

From a total of 409 participants, just over a third (34.5%) of nurses was working in the inpatient unit of hospitals during the study period. Nearly half (48.2%) of the study participants had 1 to 5 years of work experience. In terms of work load, most (69.7%) of participants in the study worked an average of greater than forty hours per week. Concerning training on manual handling majority (60.1%) of nurses had no trained. Furthermore almost all (95.1%) of the nurses was working in their hospital as staff nurses (they have no position) (Table 2).

Variable	Category	Frequency	Percent
Work experience (in year)	1-5	197	48.2
	6-10	126	30.8
	11-15	75	18.3
	>15	11	2.7
Working hours per week	>40hours	285	69.7
	= 40hours	124	30.3
Unit of service	Inpatient Unit	141	34.5
	Outpatient	94	23
	Intensive care unit	49	12
	Operation theatre unit	47	11.5
	Emergency unit	78	19.1

Training on manual handling	Yes	163	39.1
	No	246	60.1
Position of nurse	Staff nurse	389	95.1
	Head nurse	20	4.9

Table 2: Work related information of nurses working in the east Shewa zone in public hospitals, Oromia region, Ethiopia, 2022 (n=409)

From 409 participants, just over half (52.3%) of nurses were working in a comprehensive specialized hospital (teaching hospital), In response to the question of whether there was adequate equipment available for manual patient handling, a large majority of respondents (90.7%) responded no. Almost all (92.7%) of study participants stated that there is work rotation from one working unit to another. Moreover, each hospital has work-shift schedule (Table3).

Variable	Category	Frequency	Percent
Working hospital	Primary hospital	87	21.3
	General hospital	108	26.4
	Comprehensive specialized hospital	214	52.3
Rotation of Working unit	Yes	379	92.7
	No	30	7.3
Work shift schedule	Yes	409	100
Adequacy of Work place equipment	Yes	38	9.3
	No	371	90.7

Table 3: Organizational related information of nurses working in the east Shewa zone in public hospitals, Oromia region, Ethiopia, 2022 (n=409)

Knowledge of nurses on body mechanics techniques
The overall mean (± SD) score of knowledge among study participants was 6.32(±3.28)(Table 4).

Variables	Category				
	Yes	No	Unsure	Mea	SD
	n(%)	n(%)	n(%)		
Does the use of body mechanics reduce back pain?	258 (63.1)	135(33)	16 (3.9)	.63	.483
Does lifting heavier patients/objects by using a bedsheet is Better than hands?	140 (34.2)	225(55)	44(10.8)	.34	.475
Do you have back pain if you don't maintain the good posture While doing the procedure?	200(48.9)	131(32)	78(19.1)	.49	.500
Do Body mechanics practices maintain the proper body function?	152(37.2)	196(47.9)	61(14.9)	.37	.484
Do Body mechanic practices reduce the strain/spasm?	216(52.8)	121(29.6)	72(17.6)	.53	.500
Do Body mechanic practices maintain the balance?	151(36.9)	216(52.8)	42(10.3)	.37	.483
Do the Uses of continuous muscle tension cause injuries and Musculoskeletal pain?	170(41.6)	173(42.3)	66(16.1)	.42	.493
Does Object must be close to the gravity during lifting?	157(38.4)	200(48.9)	52(12.7)	.38	.487
Does The principle of body mechanics is the act of "attractive" may Produce less friction than reject?	180(44	167(40.8)	62(15.2)	.44	.497
Does Injuries can be avoided through the body mechanics?	158(38.6)	210(51.3)	41(10)	.39	.487
Do you know the purpose of using body mechanics?	190(46.5)	165 (40.3)	54(13.2)	.46	.499
Does a Heavy work activity like bending, twisting, and frequent heavy Lifting contribute to low back pain?	196(47.9)	146 (35.7)	67(16.4)	.48	.500

Does Improper use of body mechanics techniques cause spinal injury?	218(53.3)	143(35)	48(11.7)	.53	.500
Does Attire (shoes) play an important role to influence of back pain?	200(48.9)	160(39.1)	49(12)	.49	.500
Note: Mea = mean, **SD** = standard deviation					

Table 4: Frequency distribution of nurses' knowledge of body mechanics techniques at public hospitals in east Shewa zone, Oromia region, Ethiopia 2022

Based on the overall mean, only 160(39.1%) of respondents were had good knowledge of body mechanics techniques (Figure 1).
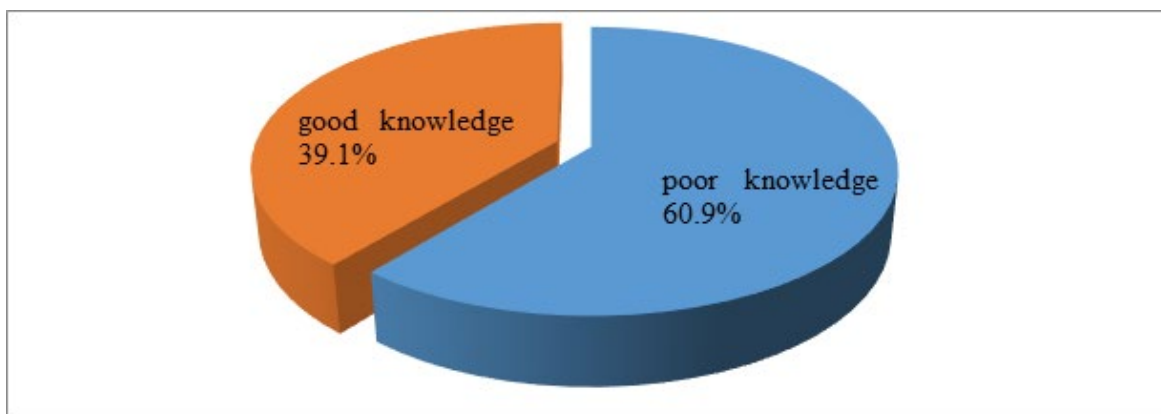
Figure 1: Knowledge of body mechanics techniques among nurses working in east Shewa zone public hospitals, Oromia region, Ethiopia, 2022.

Knowledge of Nurses on the Purpose of Using body Mechanics Techniques
The present study showed that, from the total studied participants only, 158(38.6%) knew that use of the principle of body mechanics avoids injury and 151(36.9%) knew that the use of the principle of body mechanics maintains balance.

Knowledge of Nurses on ill Effect due to Improper Body Mechanics Techniques
The present study showed that, from the total studied participants, only 170(41.6%) and 196 (47.9%) of studied participants knew that improper use of body mechanics causes, musculoskeletal pain and low back pain respectively.

Factors Associated with Knowledge of Nurses towards Body Mechanics Techniques
In order to identify potential factors that may have an association with knowledge of nurses toward body mechanics, bivariate and multivariable logistic regression were runned respectively with those independent variables. Accordingly, those variables which have association with knowledge of nurses on body

mechanics techniques with p value ≤ 0.25 were regressed against the dependent variables by multivariable logistic regression. In bivariate logistic regression educational level, level of hospital, work experience, current unit of working and age category of participants were associated with the knowledge of nurses towards body mechanics techniques as shown in the table below. Whereas in multivariable logistic regression analysis, educational level of respondents, level of hospital they had been working in and unit of working were significantly associated with knowledge of nurses towards body mechanics techniques. Concerning educational status of respondents, nurses with bachelors of degree holders in nursing were 3 times more likely to have good knowledge on body mechanics techniques than diploma holder nurses [AOR 3.002(95% CI, (1.514, 5.952)]. Regarding to nurses unit of working, nurses working in outpatient unit were 3.16 times more likely to have good knowledge on body mechanics techniques than those nurses working in inpatient unit [AOR 3.160 (95%CI, (1.699, 5.877)]. Additionally, nurses working in comprehensive specialized hospital were 2.3 times more likely to have good knowledge on body mechanics techniques than those nurses working in primary hospital [AOR 2.251(95% CI, (1.251, 4.050)] (Table 5)

Variable	Variables category	Knowledge status		COR (95% CI)	P value	AOR (95% CI)	P value
		Poor	Good				
Sex	Male	137	95	1	1		
	Female	112	65	0.837(0.560,1.251)	0.386		
Educational status	Diploma	83	15	1	1	1	1
	Degree	154	133	4.779(2.631,8.680)	0.000	3.002(1.514,5.952)	0.002*
	Masters and above	12	12	5.533(2.096,14.610)	0.001	2.719(0.850,8.692)	0.092
Level of hospital	Primary	61	26	1	1	1	1
	General	76	32	0.988(10.533,1.832)	0.969	1.036(0.529,2.030)	0.918
	Comprehensive	112	102	2.137(1.256,3.636)	0.005	2.251(1.251,4.050)	0.007*
Position of nurse	Staff nurse	239	150	1	1		
	Head nurse	13	7	1.246(0.330,4.712)	0.746		
Unit of working	Inpatient	111	30	1	1	1	1
	Outpatient	50	44	3.256(1.838,5.767)	0.000	3.160(1.699,5.877)	0.000**
	Intensive care unit	28	21	2.775(1.385,5.559)	0.004	2.715(1.304,5.653)	0.008*
	Operation unit	18	29	5.961(2.922,12.163)	0.000	4.310(1.987,9.348)	0.000**
	Emergency unit	42	36	3.171(1.739,5.783)	0.000	2.911(1.513,5.601)	0.001*
Age category	<25	84	35	1		1	1
	25-30	85	59	1.666(0.995,2.790)	0.052	1,270(0.695,2.323)	0.437
	31-35	49	43	2.106(1.193,3.719)	0.010	1.088(0.503,2.354)	0.830
	>35	31	23	1.781(0.913,3.473)	0.091	0.810(0.303,2.164)	0.675
Work rotation	Yes	229	150	1	1		
	No	20	10	0.763(0.348,1.676)	0.501		
Work experience	<5	144	53	1	1	1	1
	5-10	57	69	3.289(2.053,5.270)	0.000	1.715(0.972,3.092)	0.063
	11-15	44	31	1.914(1.097,3.342)	0.022	1.140(0.487,2.670)	0.762
	>15	4	7	4.755(1.338,16.900)	0.016	3.028(0.638,14.364)	0.163
* = is statistically significant (p<0.05), **=statistically highly significant (p<0.001) and 1 = Reference category							

Table 5: Bivariate and multivariable analysis on factors associated with nurse's knowledge of body mechanics techniques at public hospital in East Shewa zone, Oromia region, Ethiopia 2022

6. Chapter Six: Discussion

This study was conducted to determine the knowledge of nurses towards body mechanics techniques and potentially associated factors in order to contribute in tackling the burden of work-related musculoskeletal problem and their consequences.

The present study illustrated that more than one-third (35.5%) of nurses were in the age category 25-30 years old, these results are consistent with the study conducted in Pakistan which revealed that 43.1% of studied participants were between the age of 26-30 (3). However, these study finding is inconsistent with the study conducted in Ecuador and Egypt which revealed that the mean age of studied participants were 42±9.33 years with a range (24-64) and the majority (39%) of studied participants had an age category between 50-59 respectively (28,30). The present study revealed that the majority (49.9%) of studied nurses had work experience of 1-5 years. this study is supported by study conducted in Malaysia and Pakistan which revealed that the majority (40.9%) of studied participants had age experience of 1-5 years and majority(48.1%) of studied respondents had age experience of 0-5 years respectively (2,3). While, this study is inconsistent with the study done in India which revealed that the majority of studied nurses had work experience of <1 year and study conducted in Ecuador which revealed that the majority of the participants had work experience of age between 11-15 year,(28,31).

These study showed that the majority (61.4%) of studied participants had degree of bachelor science in nursing. this study was supported by study conducted in Ecuador which revealed that the majority (46.8%) of respondents were had BSc degree by their educational qualification(28). While, this studies were inconsistent with the study conducted in Pakistan, India and in Egypt which revealed that 80.1%, 49% and 88% of their studied participants were general nurse, diploma nurse and diploma and technical nurse regarding to their level of educational status respectively (3,30,31). This study revealed that the majority (34.5%) of studied participants were working in the inpatient unit. This study is supported by study conducted in India which revealed that the

majority (54%) of studied participants were working in the ward unit [31]. While this study is inconsistent with the study conducted in Pakistan which revealed that the majority (30.1%) of studied participants were working in an intensive care unit [3].

6.1 Knowledge of Nurses on Body Mechanics Techniques

Nurses need to use body mechanics techniques during performing every procedure. They can use body mechanics more effectively if they have well knowledge about it [32]. However, in the present study out of 409 studied participants, only 160(39.1%) of respondents had good knowledge of body mechanics techniques. This is slightly similar to a study conducted in Odisha India which revealed that 42% of studied participants had good knowledge of body mechanics techniques [31]. On the other hand, The result of this study was lower than the previous study conducted in Pakistan which revealed that the majority 140 (65%) of studied participants had good knowledge of body mechanics techniques [3]. The cross-sectional study conducted in Malaysia showed that all studied nurses were had knowledgeable about the practices of body mechanics techniques [2]. The possible explanations for the observed discrepancy might be due to differences in sample size and study setting: a study in Pakistan (used 216 studied participants from only one hospital),study in Malaysia (used 110 sample size and one hospital) [2,3]. However, the result of this study was greater than the finding of the previous studies conducted in Rajasthan India (1.7%), Ecuador (1.6%), Trujillo University in Peru (5.5%) and Minia university in Egypt(32%) [4,28,33]. The possible explanations for the observed differences might be due to differences in sample size, number of study setting, methods of measurements, and sampling techniques: study in Ecuador (used 124 nurses, one hospital and classified participants into four groups according to their knowledge on body mechanics), a study in Rajasthan India (used 60 nurses, one hospital and classified participants into three groups) and a study in Trujillo University in Peru (used 20 nurse ,one hospital and classified participants into three groups) and this might lead to a decrement in the number of studied participants grouped in good knowledge on body mechanics techniques [4,28,33].

The present study showed that, from the total studied participants only, 158(38.6%) knew that the principle of body mechanics avoids injury and 152(37.2%) knew that the principle of body mechanics maintains balance. the finding of this study was lower than the finding of the study done in Malaysia which revealed that all studied nurses (100%) knew that using body mechanics techniques avoids injury and maintains balance. The present study also showed that, only 170(41.6%) and 196 (47.9%) of studied participants knew that improper use of body mechanics musculoskeletal pain and low back pain respectively. This finding was lower than the results of a study conducted in Malaysia [2]. The variation might be due to study site and a number of the hospital included in the study.

The present study showed that nurses with bachelor of degree holders were 3 times more likely to be good in knowledge of body mechanics techniques than diploma holders nurses [AOR 3.002(95% CI, (1.514,5.952)].This study is supported by the study

conducted in Ecuador which revealed that of studied nurses with high knowledge regarding body mechanics 81.25% are among nurses and the remaining (18.75%) among assistants [28]. And a study conducted in Pakistan revealed that nurses who had high qualification have more knowledge about the body mechanic technique as compared to the nursing diploma holders [34]. The study conducted in India also support this finding which revealed that the qualification of nurses were significantly associated with knowledge of nurses on body mechanics techniques [31]. In addition to that, Regarding to nurses unit of working, nurses working in the outpatient unit were 3.16 times more likely to be good in knowledge on body mechanics techniques than those nurses working in inpatient unit [AOR 3.160 (95%CI, (1.699, 5.877)]. The cross-sectional study conducted in India on knowledge and practice of body mechanics techniques supported this finding and revealed that the department of service is a significant variable with knowledge of nurses regarding body mechanics techniques [4]. Another cross-sectional study conducted in India Rajasthan revealed that the department of service did not find a high association with the level of knowledge on body mechanics techniques [31]. Furthermore, Nurses working in the comprehensive specialized hospital level were 2.3 times more likely to be good in knowledge on body mechanics techniques than those nurses working in the primary hospital level [AOR 2.251 (95% CI,(1.251,4.050)].

6.2 Strength and Limitation of the Study

To the best of our knowledge, this topic was not studied in Ethiopia; so, it will be used as baseline for next studies, The study was conducted at large sample size (422 nurses) and in multicenter (six hospitals) as compared with previous study to make it stronger and generalize, this study has gathered rich data as compared with previous conducted study.

Limitation of this study was, comparison was held with other countries because of limitation of literatures on this topic in Ethiopia where the hospital setup, health policy and socioeconomic status of nurses might differ across the country.

7. Conclusion

Based on this study, the following conclusions were made. Nurses working in east Shewa zone public hospital had poor knowledge of body mechanics techniques.

The study revealed that knowledge of nurses on body mechanics techniques was significantly associated with nurses' level of qualifications, level of hospitals and unit of working. Around half of nurses knew that improper use of body mechanics techniques causes back pain. Only 5.4% studied participants used principles of body mechanics always during transferring patients from bed to chair.

Recommendations

On the basis of the most important finding of the study, the following recommendations are suggested. Since nursing activities and conditions vary depending on unit of service, it is important to have a reasonable nurse to patient ratio in those areas where

long-term patients, dependent patients, and unnatural working postures are prevalent. This will help to get knowledge regarding to body mechanics techniques. Oromia regional health bureau should provide more possibilities for nurses to receive education and should set a condition in which Nurses working in different hospitals collaborate and share their knowledge. Further research should be done to determine if nurses' knowledge & performance related to body mechanics is adequate to maintain safety.

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