Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 9, Issue 2, pp: (147-157), Month: May - August 2022, Available at: www.noveltyjournals.com

Assessment of Extremities Muscle Contracture for Critically Brain Injured Patients

Ahmed Shaaban Attia Mousa[1], Zienab Hussien Ali[2], Mona Mohamed Saad Elbably[3]

[1]Assistant Lecturer of Medical Surgical Nursing, Faculty of Nursing, Helwan University, Egypt.

[2]Professor of Medical Surgical Nursing, Faculty of Nursing, Helwan University, Egypt.

[3]Lecturer of Physical Medicine, Rheumatology and Rehabilitation, Faculty of Medicine, Ain Shams University, Egypt.

DOI: https://doi.org/10.5281/zenodo.6788522

Published Date: 01-July-2022

Abstract: **Traumatic brain injury (TBI) constitutes a major health and socioeconomic problem throughout the world. Traumatic brain injury is a common cause of disability worldwide. Contractures are a common complication of traumatic brain injury and may occur in up to 84% of cases. Aim of this study was to assess extremities muscle contracture of critically brain injured patients. Design: A descriptive research design was utilized in this study. Sample: A purposive sample of 30 adult patients from both genders admitted to hospital with traumatic head injury was involved in this study. Setting: data were collected from the Surgical Intensive care units at the surgical hospital affiliated to Ain Shams University Hospitals. Data collection tools: three tools were used for data collection (I) A structured interview questionnaire sheet, which included (a) Socio Demographic Assessment Sheet, (b) Clinical Data Assessment Sheet, (c) Glasgow Coma Scale Assessment Sheet. (2) Muscle Contracture Assessment Sheet, which included (a) End feel of the affected extremity Assessment Sheet, (b) Observational Checklist of upper and lower extremities and (3) Goniometer Scale Assessment sheet. The results: the study revealed that, after 4weeks of admission, 23 % of the studied patients had muscle contracture. Conclusion: patients with traumatic brain injury are liable to have muscle contracture because of prolonged bed rest. Recommendations: Application of passive range of motion exercises and passive stretch as a routine nursing care for each patient with traumatic head injury.**

Keywords: **Extremities, Muscle contracture, Traumatic brain injury.**

1. INTRODUCTION

Head injury is a broad classification that includes injury to the scalp, skull, or brain. It is the most common cause of death from trauma in the United States. Approximately 1.4 million people receive treatment for head injuries every year. Of these, 235,000 are hospitalized, 80,000 have permanent disabilities, and 50,000 people die. Traumatic brain injury is the most serious form of head injury. The most common causes of traumatic brain injury are motor vehicle crashes, violence, and falls. An estimated 5.3 million Americans today are living with a disability as a result of a traumatic brain injury **(Hinkle & Cheever, 2018).**

Traumatic brain injury (TBI) constitutes a major health and socioeconomic problem throughout the world. It is the leading cause of mortality and disability among young individuals in high income countries, and globally the incidence of TBI is rising sharply, mainly due to increasing motor-vehicle use in low-income and middle-income countries **(Shehab, Ibrahim & Abd-Elkader, 2018).**

Traumatic head injury (THI) is a trauma that leads to injury of the scalp, skull, or brain. These injuries can range from a minor bump on the skull to serious brain injury. Injury, including traumatic brain injury (TBI), It has been a major cause

of morbidity and mortality worldwide, especially in children and young adults. It has been continuing a difficult problem in intensive care units **(Seliman et al., 2014).**

Joint contractures are a common complication in patients who are immobilized for a prolonged period. These contractures represent pathologic changes that reduce joint flexibility and mobility, leading to functional impairment and elevated energy expenditure. In turn, increasing pain levels, risk of falls, and pressure ulcers contribute to longterm sequelae, such as greater disability, reduced patient mobility, and increased risk of death. Contractures are not only serious but also widespread **(Born, Gil & Goodman, 2017).**

Contractures are characterized by reduced range of motion (ROM) and increased stiffness. The increased resistance to stretch caused by changes in the mechanical properties of tissues is due to both neurally and non-neurally mediated factors. Non-neural factors include changes in mechanical properties of tissue resulting from stress deprivation, and may be secondary to orthopedic injury, heterotopic ossification, use of a splint or plaster, pain, paralysis, severe spasticity or any disorder that restricts movement. Contractures also produce structural changes within muscles; myofibril shortening and loss of sarcomeres are often observed, as well as the relative increase in connective tissue, causing loss of elasticity **(Baagoe, Kofoed-Hansen, Poulsen & Riberholt, 2019)**.

Significance of the study:

The Centers for Disease Control and Prevention (CDC) estimates that there are 2.5 million emergency department (ED) visits in the United States each year, the majority of which are for a mild TBI. As a result of TBI, approximately 52,000 people die (contributing to about 30% of all injury-related deaths), 275,000 are hospitalized, and 80,000 to 90,000 will have long-term disabilities **(CDC, 2016).**

Head injury (HI) is one of the most common cause of death and disability worldwide. Every year, millions of people succumb to traumatic brain injuries most of them products of car crashes. It is unfortunate that Egypt occupies first place worldwide in the incidence of road accidents at a rate of 60 victims per day and that based on latest statistics carried out by the Egyptian Central Agency for Mobilization and Statistic Egyptian Central Agency in 2016 **(Mohammad, 2018)**.

Traumatic brain injury is a common cause of disability worldwide. Contractures are a common complication of traumatic brain injury and may occur in up to 84% of cases. The most commonly affected joints are: the hip, shoulder, ankle, elbow and knee, with a significant percentage of patients developing contractures in five or more joints **(Hickey & Strayer, 2019)**.

A common complication following a TBI are contractures. Contractures can be defined as a loss of joint mobility due to structural changes of muscles, tendons, and ligaments and other non-bony structures. The performance of daily routine tasks can be significantly impaired due to the prevalence of contractures. Although the passive movement of joints and stretching are standard treatments performed by physiotherapists for patients with TBI in the ICU. This is most likely due to the patients' rather brief length of stay in the ICU. In addition, mobility is seldom limited in the long term and contractures occur relatively infrequently **(Hellweg, 2012).**

Aim of the Study

The aim of this study was to assess extremities muscle contracture of critically brain injured patients.

Research Questions:

What is the incidence of muscle contracture after traumatic brain injury?

2. SUBJECTS AND METHODS

Research design:

A descriptive research design was utilized in this study.

Setting:

The study conducted in the Surgical Intensive care units at the surgical hospital affiliated to Ain Shams University Hospitals.

Subjects:-

A purposive sample of 30 adult patients from both genders admitted to hospital with traumatic head injury was involved in this study from the above mentioned setting with the following criteria:-

Inclusion criteria:

1. Adult Patients from both genders from20-60 years old.
2. Moderate and severe brain injury**.**
3. Newly admitted patient within 48 hours of admission.

- **Exclusion criteria:**

1. Musculoskeletal problem.

Tools of data collection:-

The investigator used three tools to collect the data during the study:-

I. Tool I: Structured Interviewing Questionnaire: which developed by

the researcher based on literature review and divided into three parts:

Part I: Socio Demographic Assessment Sheet which used to assess the patient's medical data as age, sex, level of education, marital status, occupation, level of education, and previous hospitalization.

Part II: Clinical Data Assessment Sheet which used to assess Patients medical diagnosis, past medical history, intubation, mode of ventilation, the patient's weight, height, upper and lower extremities length, vital signs and type of feeding.

Part III: Glasgow Coma Scale Assessment Sheet which adopted from **Winkler, Rosen, &Alfry, (1984)**, which used to assess patients' conscious level for four weeks during nursing intervention. The GCS is divided into 3 items; eye opening, motor response, and verbal response.

II. Tool II: Muscle Contracture Assessment Sheet which adopted from **(Thomas, 2008)**, which divided into two parts:

Part 1: End feel of the affected extremity Assessment Sheet which used to assess the degree of muscle contracture and end feel of affected part which varies from a fixed to a springy end feel. A springy or bouncy end feel at end range indicates a good elasticity, while a hard end feel represents poor elasticity. Fixed contractures manifest as a rock-hard end feel. Non-fixed contractures generally allow for at least 10 degrees of passive range of motion. Performing a passive stretch to a patient's comfortable end range. End feel can be documented as follows:

Fixed contracture = Rock-hard end feel, no play (this means that when the researcher tries to move the patient`s arm or leg it doesn't move in a different range of motion).

Poor = 1-3 degrees of play at the end feel (means that the patient's extremity moves with a small degree).

Fair = 4-6 degrees of play at the end feel (means that the patient`s extremity moves with a little angle).

Good = 7-10 degrees of play at the end feel (means that the patient`s extremity moves well, but it doesn't give a full angle of motion).

Excellent= Springy and bouncy end feel; 11+ degrees of play (means that the patient`s extremity moves in a different direction without any resistance).

Part II: Observational Checklist of upper and lower extremities which used to assess upper and lower extremities degree of contracture such as loss of skin elasticity, limited mobility of joint, tightness of most tendon and muscles, passive stretching increase pain, pallor appearance, pulse lessens sings, paresthesia, paralysis, firmness of tissues on palpation, rigidity, closed of hand fingers, and foot drop.

III.Tool III: Goniometer Scale Assessment sheet which adapted from **(Norkin & White, 2016)**, Goniometry scale used to assess the total amount of available motion, such as (flexion and extension) at a specific joint for upper extremities joints such as (shoulder, elbow, forearm, and wrist) and lower extremities joints such as (hip, knee, ankle, and foot) by

using a goniometer. Every joint movement has a normal degree by using a goniometer, which measures the available range of motion at a joint.

Operational Design:

It includes the preparatory phase, content validity, reliability, ethical consideration, pilot study and field work.

Preparatory phase:

It included reviewing of related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Tools validity:

Content validity was conducted to determine whether the tool covers the aim. The tools were revised by a jury of 5 experts: Associate professors and Lecturers of medical surgical nursing from faculty of nursing, Helwan University who reviewed the content of the tools for comprehensiveness, accuracy, clarity, relevance and applicability, minor modification were done.

Ethical Considerations:

An approval was obtained from the study subjects individually and scientific ethical committee of the faculty of nursing at Helwan University. They have been assured that anonymity and confidentiality were guaranteed and the right to withdraw from the study at any time. Ethics, values, culture and beliefs were respected.

Pilot study:-

A Pilot study was carried out with 10% (not less than 10 patients) of the sample under study to test the applicability, clarity and efficiency of the tools. The modifications were done for used tool, then final form was developed. Patients in the pilot study were excluded from the study group.

Field work:

✓ Sampling was started and completed within twelve months from March (2020) until the end of February (2021).

✓ Testing the validity of the proposed tools using content validity added for testing the reliability.

✓ The purpose of the study was simply explained to the patients' family who agree to participate in the study prior to any data collection.

✓ The researcher started to collect data from patients when they admitted.

✓ Data collection was done 3 days/week by the researcher in the morning and afternoon shifts.

✓ The following study tools were filled in and completed by the researcher divided into 4 stages:

✓ - **First stage:** Structured interviewing questionnaire, glasgow coma scale, muscle contracture assessment sheet, and goniometer scale on admission in the first week.

✓ - **Second stage:** glasgow coma scale, muscle contracture assessment sheet, and goniometer scale in the second week from admission to assess degree of every joint motion.

✓ - **Third stage:** Glasgow coma scale, muscle contracture assessment sheet, and goniometer scale in the third week from admission to assess degree of every joint motion.

✓ - **Fourth stage:** Glasgow coma scale, muscle contracture assessment sheet, muscle contracture observational checklist and goniometer scale in the fourth week from admission to assess degree of every joint motion.

✓ Patients' medical records were used to obtain the past and present medical history, cause of injury, date of admission, glasgow coma scale, signs and symptoms, previous hospitalization, history of chronic disease and co-morbidity.

✓ The researcher starts with structured interviewing tool to take present and past medical history, assess the conscious level, assess every joint with the goniometer and record every reading, then starts with the application of the nursing intervention protocol every day.

(III) Administrative Design:

An official permission was obtained from the general manger of the surgical hospital affiliated to Ain Shams university hospitals in which the study was conducted. A letter was issued to them from the faculty of nursing, Helwan University, explained the aim of the study to obtain the permission for data collection.

(IV) Statistical Design:

Qualitative data were presented as frequencies (n) and percentages (%). Chi-square test (or Fissure's Exact test when applicable) were used for comparisons between the group. McNemar's test was used to study the change at the end of treatment for binary variables. Friedman's test and Wilcoxon signed-rank test were used to study the change at the end of treatment for other qualitative variables. Numerical data were presented as mean, median, standard deviation (SD) and range values. Student's t-test was used to compare between mean goniometer scores through the four weeks of the study.

The significance level was set at $P \leq 0.05$. Statistical analysis was performed with IBM SPSS Statistics Version 26 for Windows.

3. RESULTS

Table (1): Socio-demographic characteristics for the studied patients (n=30):-

Variable	No	%
Gender:		
Male	20	66.7
Female	10	33.3
Age group:		
20-40	20	66.6
41-60	8	33.3
Age:	**Mean ± SD** 34.46±13.97	
Educational level:		
Illiterate	6	20
Read and write	3	10
Secondary level	7	23.3
University education	14	46.7
Marital status:		
Single	14	46.7
Married	13	43.3
Widow	3	10
Occupations:		
Employed	11	36.7
Unemployed	16	53.3
Retired	1	3.3
Housewife	2	6.7
Previous hospitalization:		
No previous hospitalization	17	56.7
Once	8	26.7
Twice	2	6.7
Third	3	10

Table (1) shows that, 66.7% of the studied patients were male and 33.3% were female. The mean ±standard deviation values of age in the studied patients were 34.46± 13.97 years old. Half of the studied patients (46.7%) were university graduates, while 20% of the studied patients were illiterate. 43.3% of the studied patients were married. 6.7 % of the studied patients were professional worker, while 53.3 % of them were unemployed.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 9, Issue 2, pp: (147-157), Month: May - August 2022, Available at: www.noveltyjournals.com

Table (2): Descriptive statistics for the studied patients regarding diagnosis and past medical data (n=30):-

Variable	No	%
Diagnosis:		
Epidural hemorrhage	8	26.7
Subdural hemorrhage	7	23.3
Contusion	5	16.7
Skull fracture	4	13.3
Subarachnoid hemorrhage	4	13.3
Intra cranial hemorrhage	0	0
Brain edema	2	6.7
Past medical history of chronic disease:		
No past medical history	24	80
Diabetes mellitus	1	3.3
Hypertension	1	3.3
Heart disease	3	10
Respiratory disease	1	3.3

Table (2) shows that, 26.7% of the studied patients were diagnosed with epidural hemorrhage, while 13.3% of the studied patients were diagnosed with subarachnoid hemorrhage. 6.7% of both the studied patients were diagnosed with brain edema. 80% of the studied patients had no past medical history, while 10% suffered from a heart disease.

Table (3): Descriptive statistics for the studied patients regarding patient oxygenation and modes of mechanical ventilation (n=30):-

Variable	No	%
Level of consciousness:		
• Totally unresponsive	10	33.3
• Comatosed	17	56.7
• Semiconscious	3	10
• Fully conscious	0	0
Oxygenation:		
• Intubated:	26	86.7
• Oxygen mask	4	13.3
Mode of ventilation:		
▪ CMV	2	8.3
▪ SIMV	18	75
▪ CPAP	4	16.7

Table (3) clarifies that, 56.7% of the studied patients were comatosed with glasgow coma scale less than 8, while 86.7% of them were intubated on a mechanical ventilation. 75% of the studied patients were under the SIMV mode of ventilation (synchronized intermittent mandatory ventilation).

Table (4): Comparison between the studied patients regarding end feel muscle contracture in the 1st week and 4th after admission (n=30):-

Variable	1st week		4th week		X2, P
	No	%	No	%	
Fixed contracture	0	0	7	23.3	0.418, 0.05*
Poor	0	0	7	23.3	
Fair	1	3.3	6	20	
Good	15	50	4	13.3	
Excellent	14	46.7	6	20	

*: Significant at $P \leq 0.05$

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 9, Issue 2, pp: (147-157), Month: May - August 2022, Available at: www.noveltyjournals.com

Table (4) illustrates that, 23.3% of the studied patients had a fixed contracture in the 4th week of admission. 20% of the studied patients had a fair joint movement, while 23.3% had a poor joint movement. Only 20% of them had an excellent joint movement.

Also, there was a highly statistically significant difference between the first and fourth week of admission regarding muscle contracture assessment with (p-value = 0.05).

Table (5): Comparison between mean scores of goniometer scale for upper extremities joints in the 1st and 4th week from admission for the studied patients (n=30):-

Variable		Mean ± SD		T	P
		1st week	4th week		
Shoulder Flexion	RT	138.60±18.21	94.50±46.78	4.007	0.00*
	LT	138.67±13.40	91.50±7.49	3.598	0.001*
Extension	RT	34.17±7.59	21.67±8.44	0.215	0.003*
	LT	35.33±5.56	22.23±8.45	0.321	0.002*
Abduction	RT	144.37±15.29	96.67±41.07	3.753	0.000*
	LT	143.3±16.91	93.83±35.88	4.325	0.000*
Internal rotation	RT	65.67±11.59	44.50±13.53	0.112	0.000*
	LT	65.67±12.17	44.83±19.45	0.547	0.001*
External rotation	RT	72.17±15.57	52.83±19.45	0.080	0.000*
	LT	73.33±13.81	49.17±15.98	1.214	0.000*
Elbow Flexion	RT	138.21±18.21	84.83±19.45	0.510	0.001*
	LT	137.33±25.73	83.67±47.93	0.125	0.000*
Wrist Flexion	RT	54.83±7.25	33.57±17.17	2.271	0.027*
	LT	54.33±9.73	30.33±17.12	2.812	0.001*
Extension	RT	55.33±6.94	35±17.27	4.501	0.000*
	LT	54.5±7.96	34.7±15.96	4.981	0.000*
Radial deviation	RT	18.33±3.30	11.33±5.07	0.126	0.05*
	LT	18±1.44	11.17±5.03	0.645	0.003*
Ulnar deviation	RT	26.67±4.61	18.53±8.40	0.786	0.05*
	LT	25.87±4.43	17.17±8.82	0.542	0.002*

*: Significant at P ≤ 0.05

Table (5) clarifies that, there was ahighly statistically significant difference between the studied patients regarding mean scores of goniometer scale of upper extremities joints during the 1st week with (P-value= 0.665 to 0.288). Also, there was a highly statistically significant difference between the study and control groups regarding mean scores of goniometer scale of upper extremities joints during 4thweek with (P-value= 0.000 to 0.000).

Table (6): Comparison between mean scores of goniometer scale for lower extremities joints in the 1st and 4th week from admission (n=30):-

Variable		Studied patients (n=30)		t	P
		Mean ± SD			
		1st week	4th week		
Hip Flexion	RT	95.167±8.04	66.83±13.37	1.431	0.01*
	LT	94.50±10.06	66.33±14.4	1.215	0.000*
Extension	RT	29.83±4.29	17.17±4.37	2.429	0.01*
	LT	29.51±2.42	16.13±4.24	2.658	0.002*
Abduction	RT	39.60±2.68	22.57±4.29	0.074	0.000*

	LT	39.83±3.13	22.80±6.14	0.217	0.000*
Adduction	RT	19.83±0.91	12.33±2.78	3.979	0.000*
	LT	18.90±2.06	12.83±2.49	4.211	0.000*
Internal rotation	RT	38.50±4.38	23.67±6.39	0.363	0.003*
	LT	38.50±2.98	23.87±6.77	0.487	0.001*
External rotation	RT	48.33±4.61	29.17±6.44	1.599	0.001*
	LT	48.53±3.09	29±9.41	2.254	0.000*
Knee Flexion	RT	141±26.87	95.50±48.7	2.861	0.01*
	LT	140±26.22	93.17±49.73	3.954	0.000*
Ankle Planter flexion	RT	35.83±5.17	18.07±10.7	2.185	0.000*
	LT	36.57±4.09	17.40±2.79	3.215	0.000*
Dorsi-flexion	RT	17.33±3.65	10.97±6.72	6.394	0.01*
	LT	17.07±2.67	9.30±5.53	5.654	0.000*
Inversion	RT	25.5±3.51	13.37±8.24	0.697	0.002*
	LT	24.3±2.91	12.97±7.68	0.554	0.001*
Eversion	RT	18.63±3.60	7.27±5.48	0.839	0.000*
	LT	19.70±1.15	7.07±5.14	0.954	0.000*

*: Significant at $P \leq 0.05$

Table (6) illustrates that, there was no statistically significant difference between the study and control groups regarding mean scores of goniometer scale of lower extremities joints during the1st week with (P-value=0.665to0.288). Also, there was a highly statistically significant difference between the study and control groups regarding mean scores of goniometer scale of lower extremities joints during 4thweek with (P-value=0.00 to 0.009).

4. DISCUSSION

The result considering gender of the studied patients, the present study showed that, two thirds of patients in the studied patients were male. This finding could be due to nature of hard work and its hazards, males are working on it such as driving cars and increasing motor-vehicle used by males in low-income and middle-income countries which increase the rate of accidents. This result is in accordance with **Leung, (2014),** in their study, which about "Physiotherapy management of contractures after acquired brain injury", who reported that, the majority of the studied patients were male.

As well, these results were compatible with **Abdelsalam et al., (2019)** in their study entited "Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture", who showed that, three quarters of the studied subjects were male.

As regards to the age of the studied patients, the present study revealed that, that the mean age of the studied patients were (34.46± 13.97). This finding could be due to that most of the road traffic accident has no age and happened accidentally and could be due to the use of motor vehicles used by youth, which increase the rate of accidents. **As well,** this results supported by **Lennon, Ramdharry and Verheyden, (2018),** in their book "Physical Management for Neurological Conditions", they reported that, most of the age of the studied patient with TBI ranged from15-45 years old.

In relation to studied patients` educational level, half of the studied patients were university graduates, while the minority was illiterate. This result is not consistent with the finding of **Laratta et al., (2021)**, which about "Marital stability and quality of couple relationships after acquired brain injury: a two-year follow-up clinical study, In Healthcare" who reported that, one quarter of the studied patients were university educated.

In relation to marital status, the study result illustrated that, half of the studied patients were married. This finding could be due to the majority of the studied patients were aged between 20-60 years old. This finding is consistent with the finding of **Ghoneim et al., (2012):** which about "Impact of Implementing Nursing Care Protocol on Moderate Head Injured Patient's Outcome", who clarified that, the half of their studied patients were married. **As well,** This result

supported by **Laratta et al., (2021)** which about "Marital stability and quality of couple relationships after acquired brain injury: a two-year follow-up clinical study, In Healthcare" who reported that**,** the majority of the studied patients were married.

Concerning the diagnosis, the finding of the present study clarified that, one quarter of both the studied patients diagnosed with sub-dural hemorrhage. This finding is not in line with by **Hinkle & Cheever, (2018)** in their book, which about "Brunner & Suddarth'S Textbook of Medical-Surgical Nursing", reported that, Epidural hematomas (EDHs) account for approximately 2.7% to 4% of traumatic head injuries.

In relation to level of consciousness, the study result illustrated that, the majority of the studied patients were totally unresponsive in a coma. This finding is consistent with the finding of **Abdelsalam et al., (2019),** in their study, which about "Critically Head Injured Patients: Improving Nurses` Awareness and Self–Efficacy to Control Extremities Muscles Contracture", who clarified that, about half of the studied patients were unresponsive.

The present study clarified that, there were a highly statistically significant difference between the first and fourth week regarding muscle contracture, which there are increasing level of muscle contracture of the studied patients in the fourth week from admission compared with the first week with (P- value =0.000). The result is in line with **Leung, (2014)** in his doctoral thesis, which titled "Physiotherapy management of contractures after acquired" in Sydney School of Medicine, University of Sydney, Australia, who reported that, passive stretch with motor exercises has been the most commonly used physical intervention for prevention and correction of contractures.

Also, This study finding is also congruent with **Skalsky & McDonald, (2012)**, in their study "Prevention and Management of Limb Contractures in Neuromuscular Diseases", who revealed in their study that, prevention of contractures requires early diagnosis and initiation of physical medicine approaches, such as passive ROM and splinting before contractures are present or while contractures are mild.

Similarly, the study result is also in the same line with **Leung, Harvey, & Moseley, (2013),** in their study entitled "An intensive programme of passive stretch and motor training to manage severe knee contractures after traumatic brain injury: a case report" who illustrated that, the use of a high dose of passive stretch in conjunction with motor training may be an option to consider for correcting severe contractures following acquired brain injury.

As well, the study result wasn't agreed with **Harvey et al., (2017)** in their study about "Stretch for the treatment and prevention of contracture: an abridged republication of a Cochrane Systematic Review", who revealed that, stretch does not have clinically important effects on joint mobility. **Also,** The study result is incongruent with **Katalinic, Harvey, and Herbert, (2011)** in their study entitled " Effectiveness of Stretch for the Treatment and Prevention of Contractures in People With Neurological Conditions: A Systematic Review " who mentioned that, regular stretch does not produce clinically important changes in joint mobility, pain, spasticity, or activity limitation in people with neurological conditions.

Concerning muscle contracture, the study finding revealed that, one quarter of the studied patients had a muscle contracture. This finding is agreed by **Kwah et al., (2012)**, in their study "Half of the adults who present to hospital with stroke develop at least one contracture within six months: an observational study" who reported that, About half of all patients with stroke develop at least one contracture within six months of stroke. Incidence of contractures across all joints ranged from 12% to 28%. Muscle strength is a significant predictor of elbow, wrist, and ankle contractures but cannot be used to accurately predict contractures in these joints.

Also, this finding is similarly to **Singer et al., (2004)**, in their study titled "Incidence of ankle contracture after moderate to severe acquired brain injury", wo illustrated that, the incidence of ankle contracture was 16.2% (17/105 cases).

Regarding ankle contracture, the study finding showed that, majority of muscle contracture in the studied patients were an ankle contracture. This finding could be due to foot drop of the foot without any support or ROM exercises. This finding was agreed by **Robinson et al., (2008)**, in their study titled "No difference between wearing a night splint and standing on a tilt table in preventing ankle contracture early after stroke: a randomised trial", who reported that, contracture of the ankle is a common impairment following stroke.

International Journal of Novel Research in Healthcare and Nursing
Vol. 9, Issue 2, pp: (147-157), Month: May - August 2022, Available at: www.noveltyjournals.com

5. CONCLUSION

Patients with traumatic brain injury are more liable to have a muscle contracture.

6. RECOMMENDATION

Based upon results of the current study, the following recommendations are suggested:

Recommendations related to patients:

- Goniometer scale should be available in the critical area to determine the degree of each joint and discover any joint contracture.

Recommendations for furthers researches:

- Replication of the study on large sample selected from different geographical areas from Egypt is recommended for generalizing the study findings.
- Further research is recommended to determine nurses knowledge about contracture after traumatic brain injury.
- Research may also extend to determine the effect of applying educational program about range of motion exercises for patient with traumatic injury and its effect on controlling of joint contracture.

Recommendations for nurses:

- Assess the ability of nurses to use goniometer scale to measure degree for each nurse.
- Teach nurses importance of range of motion exercises and changing patient position to prevent and controlling extremities muscle contracture.

REFERENCES

[1] **Abdelsalam, Sh., Abdelatief, D., Elmetwalley, R., and Nada, M. (2019):** Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture, Vol 9, No 4, Egyptian Journal of Health Care, accessed on 4/8/2021 at 6:00 pm.

[2] **Baagoe, S., Kofoed-Hansen, M., Poulsen, I., & Riberholt, C. (2019):** Development of muscle contractures and spasticity during subacute rehabilitation after severe acquired brain injury: a prospective cohort study, Brain injury, Vol 33, No11, P1460-1466, accessed on 12/5/2020 at 10:30 am.

[3] **Born, C., Gil, J., and Goodman, A. (2017):** Joint Contractures Resulting From Prolonged Immobilization: Etiology, Prevention, and Management, Journal of the American Academy of Orthopedic Surgeons, Vol 25, No 2, accessed on 7/1/2021 at 23:15.

[4] **Centers for Disease Control and Prevention (CDC), (2016):** CDC study finds that adoption of the Brain Trauma Foundation guidelines could result in a substantial reduction in traumatic brain-injury-related deaths, available at www.cdc.gov/traumatic braininjury/brain_trauma_guidelines.html, Retrieved on 2/9/2020 at 5:00 pm.

[5] **Ghoneim, N., Alaa Elden, S., Okab, M. & Elsaay, O. (2012):** Impact of Implementing Nursing Care Protocol on Moderate Head Injured Patient's Outcome, Journal of American Science, Vol 8, No 7, accessed on 12/8/2020 at 12:00 pm.

[6] **Harvey, L., Katalinic, O., Herbert, R., Moseley, A., Lannin, N., & Schurr, K. (2017):** Stretch for the treatment and prevention of contracture: an abridged republication of a Cochrane Systematic Review, Journal of physiotherapy, Vol 63, No 2, P 67-75, accessed on 26/8/2021 at 8:30 am.

[7] **Hellweg, S. (2012):** Effectiveness of physiotherapy and occupational therapy after traumatic brain injury in the intensive care unit, Critical care research and practice, Vol 2012, available at https://doi.org/10.1155/2012/76845 6, accessed on 11/11/2020 at 2:20 pm.

[8] **Hickey, J. & Strayer, A. (2019):** The clinical practice of neurological & neurosurgical nursing, 8th edition, Philadelphia, PA: Lippincott Williams & Wilkins, accessed on 12/11/2020 at 4:50 pm.

[9] **Hinkle, J., and Cheever, K. (2018):** Brunner & Suddarth'S Textbook of Medical-Surgical Nursing, 14th edition, Wolters Kluwer, China**,** P5295-5340, accessed on 10/1/2021 at 5:00 pm.

[10] **Katalinic, O., Harvey, L., Herbert, R., Moseley, M., Lannin N., and Schurr, K. (2010):** Stretch for the treatment and prevention of contractures (Review), JohnWiley & Sons, Ltd company, P 2-30, accessed on 8/1/2021 at 11:00 am.

[11] **Kwah, L. K., Harvey, L. A., Diong, J. H., & Herbert, R. D. (2012):** Half of the adults who present to hospital with stroke develop at least one contracture within six months: an observational study, Journal of Physiotherapy, Vol 58, No 1, P 41-47, accessed on 23/9/2021 at 11:30 pm.

[12] **Laratta, S., Giannotti, L., Tonin, P., Salvatore Calabro, R., & Cerasa, A. (2021):** Marital stability and quality of couple relationships after acquired brain injury: a two-year follow-up clinical study In Healthcare, Vol 9, No 3, p 283, Multidisciplinary Digital Publishing Institute, accessed on 29/8/2021 at 12:05 am.

[13] **Lennon, SH., Ramdharry, G., and Verheyden, G. (2018):** Physical Management for Neurological Conditions, 4th edition, Elsevier, Poland, accessed on 12/8/2020 at 10:00 pm.

[14] **Leung, J. (2014):** from the doctoral thesis titled Physiotherapy management of contractures after acquired, Sydney School of Medicine, University of Sydney, Australia, 2/5/2021 at 10:30 am.

[15] **Mohammad, E. (2018):** Intensive Care Unit Nurses' Performance Regarding Caring Patients With Head Injury: An Educational Intervention, International Journal of Studies in Nursing, Vol 3, No 3, Available https://doi.org/ 10.20849/ijsn.v3i3.524, accessed on 1/1/2021 at 10:30 am.

[16] **Norkin, C., & White, D. (2016):** Measurement of joint motion: a guide to goniometry, 5th edition, Davis company, Philadelphia, accessed on 22/10/2020 at 6:00 pm.

[17] **Robinson, W., Smith, R., Aung, O., & Ada, L. (2008):** No difference between wearing a night splint and standing on a tilt table in preventing ankle contracture early after stroke: a randomised trial. Australian journal of physiotherapy, Vol 54, No 1, P33-38, accessed on 26/8/2021 at 10:50 am.

[18] **Seliman, A., Morsy, W., Sultan, M., Elshamy, K., & Ahmed, H. (2014):** Impact of a designed head trauma nursing management protocol on critical care nurses' knowledge and practices at emergency hospital Mansoura University, Journal of American science, Vol 10, No12, P13-25, accessed on 12/6/2021 at 8:00 am.

[19] **Shehab, M., Ibrahim, N., & Abd-Elkader, H. (2018):** Impact of an educational program on nurses' knowledge and practice regarding care of traumatic brain injury patients at intensive care unit at Suez Canal University Hospital, International Journal of Caring Sciences, Vol 11, No 2, P1104, accessed on 25/8/2020 at 4:00 pm.

[20] **Singer, B., Jegasothy, G., Singer, K., Allison, G., & Dunne, J. (2004):** Incidence of ankle contracture after moderate to severe acquired brain injury. Archives of physical medicine and rehabilitation, Vol 85, No 9, P1465-1469, accessed on 22/9/221 at 6:00 pm.

[21] **Skalsky, A., & McDonald, C. (2012):** Prevention and Management of Limb Contractures in Neuromuscular Diseases, Elsevier Inc, available at http:// dx.doi.org /10.1016/j.pmr.2012.06.009, 25/12/2020 at 11:20 pm.

[22] **Thomas, B. (2008):** Managing Contracture in Long term Care, Archieve of Physical Medicine, Vol 19, No 6, Page 47, accessed on 4/1/2020 at 6:30 pm.

[23] **Winkler, J., Rosen, P., & Alfry, E. (1984):** Pre hospital Use of the Glasgow Coma Scale in Severe Head Injury, Emerg Med journal, Vol 2, No1, accessed on 20/8/2020 at 3:05 pm.