



E-ISSN: 2663-2268
 P-ISSN: 2663-225X
 IJARMSN 2020; 2(1): 05-12
 Received: 04-11-2019
 Accepted: 06-12-2019

Mervat ABD El-Fatah Ismael
 Assistant Lecturer, Medical
 Surgical Nursing Department,
 Faculty of Nursing, Assiut
 University, Assiut, Egypt

**Zienab Abd-El-lateef
 Muhammad**
 Professor, Medical Surgical
 Nursing Department, Faculty
 of Nursing, Assiut University,
 Assiut, Egypt

**Hesham Abd EL- Rahim El-
 Kady**
 Professor, Orthopedic Surgery
 Department, Faculty of
 Medicine, Assiut University,
 Assiut, Egypt

Hala Mohamed Ghanem
 Assistant Professor, Medical
 Surgical Nursing Department,
 Faculty of Nursing, Assiut
 University, Assiut, Egypt

Corresponding Author:
Mervat ABD El-Fatah Ismael
 Assistant Lecturer, Medical
 Surgical Nursing Department,
 Faculty of Nursing, Assiut
 University, Assiut, Egypt

International Journal of Advance Research in Medical Surgical Nursing

Impact of nursing rehabilitation protocol on tibial plateau fracture surgery complications

Mervat ABD El-Fatah Ismael, Zienab Abd-El-lateef Muhammad, Hesham Abd EL- Rahim El-Kady and Hala Mohamed Ghanem

Abstract

Background: Tibial plateau fracture is a break in the continuity of the bone occurring in the proximal part of the tibia. It constitutes 1% of all fractures.

Aim: To evaluate the effect of implementing the nursing rehabilitation protocol on tibial plateau fracture surgery complications.

Research design: Quasi-experimental research design.

Setting: Trauma unit at Assiut University Hospital.

Patient and Methods: Sixty adult patients undergoing tibial plateau fracture surgery. This sample divided into two equal groups (30 patients for each). The study group who received the nursing rehabilitation protocol while the control group received the routine hospital instructions.

Tools: I "Patient's health needs assessment sheet ", II "Postoperative complications after tibial plateau fractures surgery ".

Results: There was a statistically significant difference between the study and control group regarding incidence of knee stiffness (p-value 0,001) and post traumatic arthritis (p-value 0,020) as a complications after tibial plateau fracture surgery.

Conclusion: Providing nursing rehabilitation protocol booklet for patients was much more effective on minimizing the incidence of complications after tibial plateau fracture surgery.

Recommendations: Simple nursing rehabilitation protocol booklet should be available for patients with tibial plateau fracture surgery to minimize the incidence of complications.

Keywords: Nursing rehabilitation protocol, tibial plateau fracture surgery, complications

Introduction

Tibial plateau fracture is a medical condition in which there is a partial or complete break in the continuity of the upper part of the tibia (shinbone) that involves the knee joint. The tibial plateau fracture can occur on the lateral side (most common), the medial side, or both. It can be thought of as a broken knee because the main concern in treating this injury is the preservation of the knee's cartilage (Chen *et al.*, 2015) ^[11].

Tibial plateau fractures comprise 1% of all fractures. The incidence of tibial plateau fractures is 10.3 per 100,000 people annually. Overall, men more commonly sustain tibial plateau fractures than women. About 200 patients had tibial plateau fractures in trauma unit at Assiut university hospital in 2018 (Mthethwa & Chikate, 2017) ^[13].

Treatment for tibial plateau fractures: The aim of treatment for tibial plateau fractures is achieving painless, aligned, stable and mobile joint and minimization of post-traumatic osteoarthritis risks. Non-operative and operative treatment plans are considered by doctors to achieve this. Neurological and vascular compromise, extent of injury to menisci and ligaments, displacement and depression fracture, risk of complications and severity are physical criteria to base the compromise ((Lowe *et al.*, 2011) ^[12].

Complications after tibial plateau fractures surgery: Early complications (compartment syndrome, vascular injuries, swelling and wound-healing problems, infections, deep vein thrombosis and nerve injuries). Late complications (knee stiffness, knee instability, angular deformities, late collapse, post-traumatic arthritis, malunion, osteoarthritis, intra-articular infection and joint instability) (Yoon *et al.*, 2015) ^[15].

The primary focus of rehabilitation for patients undergone tibial plateau fracture surgery is to reduce pain, swelling and stiffness, increase muscle strength, and to return the range of movement in the knee. Rehabilitation protocol must consider both the patients subjective

response to injury and the physiological mechanisms of tissue healing; both are essential in relation to a patients return to optimal performance (Mehin *et al.*, 2012) [14].

Significance of the study

While collecting data for my Master's Thesis, it was founded that 33.3% of patients with lower limb fractures, who developed compartment syndrome, were having fractures of the tibial plateau. After tibial plateau fracture surgery, rehabilitation protocol is needed to prevent deep venous thrombosis and to restore range of motion, strength, movement control and return to the highest level of activity and function.

Aim of the study

The aim of this study was to evaluate the effect of implementing the nursing rehabilitation protocol on tibial plateau fracture surgery complications.

Research hypothesis

The incidence of post tibial plateau fracture surgery complications after implementation of the rehabilitation protocol in the study group will be lesser than those in the control group.

Subjects and methods

Research design

Quasi-experimental research design was utilized in this study.

Setting

This study was conducted in the trauma unit at Assiut University Hospital. The trauma unit consists of one floor, it consists of ten rooms each room has eight beds and there was the nursing room in this floor.

Sample

Sixty adult patients (male and female) undergoing tibial plateau fracture surgery who were willing to participate in the study their mean age was 34.47 ± 9.69 years old. Patients were followed up for a period of 6 months (two weeks, one month and six months post operatively). This sample divided into two equal groups (30 patients for each). The study group who received the nursing rehabilitation protocol while the control group received the routine hospital instructions. The sample was calculated by using power analysis according to the patients flow with precision levels 5% at confidence levels 95% and $p < 0.05$.

Tools

Tool I: Patient's health needs assessment sheet

This tool consisted of three parts and it was used four times (preoperatively, two weeks, one month and six months post operatively).

Part 1: Sociodemographic characteristics of patients

It was developed to assess the patients' socio demographic characteristics. It included age, sex, residence, and educational level, and occupation, date of admission and date of discharge.

Part (2): Assessment of patient's physical status using the Modified Cincinnati Rating System Questionnaire (Barber SD *et al.*, 2003)

It was used to assess patient's physical status this scale

includes 8 sections concerning knee assessment. Scoring system of Modified Cincinnati Rating System Questionnaire: - Pain intensity, giving Way and overall activity level (section 1, 3 and 4) scored from (0-20), swelling, walking and stairs (section 2, 5 and 6) scored from (0-10). Running activity and jumping (section 7 and 8) scored from (1-5). Grading the Modified Cincinnati Rating System Questionnaire (Bentley *et al.*, 2003).

Table 1

Poor	<30
Fair	30-54
Good	55-79
Excellent	>80

Part 3: Measurement of quadriceps muscle strength

This part was developed for measurement of the patient's quadriceps muscle strength. This was done by using the digital strength measuring device (Beurer GmbH), while the patient is sitting and a belt is attached for measurement of isometric knee extension strength, a sensor pad is attached to the front of the distal lower extremity by rope 35cm in the other side of the machine with a hard object, the patient is asked to push frontally as he can, the power of pushing was translated by number.



Fig 1: Beurer GmbH. Adopted from (<https://www.virtualmarket.ifa-berlin, 2018>).

Tool II: Postoperative complications after tibial plateau fractures surgery

It was developed to assess the complications following tibial plateau fracture surgery. It included early complications such as compartment syndrome, vascular injuries, wound-healing problems, wound infections, deep vein thrombosis and nerve injuries and late complications such as knee stiffness, knee instability, angular deformities, late collapse, post-traumatic arthritis, malunion, nonunion, osteoarthritis and intra-articular infection.

Procedure

This study was carried out in three phases:

I: Preparatory phase

Tools development

A review of current and past, local and international related literature in the various aspects using books, articles, periodicals and magazines were done.

Content validity and reliability

Content validity was done by expertise (2 medical staff from orthopaedic surgery department) & (3 nursing staff from the Medical-Surgical Nursing department) who reviewed the tools for clarity, relevance, comprehensiveness, understanding and applicability and then the tools were designed in their final format and tested for reliability using internal consistency for all of the tools which was measured using Cronbach test. The tools proved to be reliable (0.827 and 0.825 respectively).

A pilot study

- A pilot study was carried out to test the feasibility, clarity and practicability of the study tools on 10% of sample (6 cases). It also provided an estimate of time needed to fill out the tools, and those patients were included in the main study as there was no modification.
- Data were collected from trauma unit at Assiut University Hospital during the period from March 2018 to September 2018.

II- Implementation phase

- The researcher meet with each patient individually and consent for voluntary participation in the study are taken from the patients after the study and its aims were explained to the patient.
- The researcher filled out the patient's health needs assessment sheet. Initial assessment of patient's physical status using the Modified Cincinnati Rating System Questionnaire, measurement of quadriceps muscle strength (Tool I).
- For the study group the researcher was explained to the patient the nursing rehabilitation protocol in one session. The session took about 20-30 minutes. One family member was present in the session for patient's support and increasing their sense of responsibility. Patients were allowed to ask questions in case of misunderstanding while listening and expressing interest.
- After completing the session there were about 5-10 minutes for discussion and feedback. At the end of the session the researcher emphasized on the importance of follow up visits and arranged with them the time and place for follow up.

III- Evaluation phase

The last phase of rehabilitation protocol is the evaluation

phase. In which the patients was evaluated after two weeks, then one month and six months postoperative for reevaluating the patient's condition for both control and study group by using tool I and tool II.

Ethical consideration

- Research proposal was approved from ethical committee in the faculty of nursing.
- There is no risk for study subject during application of research.
- An informed consent was obtained from patients to participate in the study and the nature and purpose of the study were explained to them.
- The researcher initially introduced herself to all optional subjects and they were assured that collected data would be absolutely confidential.
- They were informed that participation is voluntary and that they could withdraw at any time of the study.
- Confidentiality of the patient's data was ascertained.

Statistical analysis

The data were tested for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percent (N, %), where continuous variables described by mean and standard deviation (Mean, SD). Chi-square test and fisher exact test used to compare between categorical variables where compare between continuous variables by t-test and ANOVA test. A two-tailed $p < 0.05$ was considered statistically significant. We are used person correlation to appear the association between scores. All analyses were performed with the IBM SPSS 20.0 software.

Results

Table 1: Comparison between study and control group of the studied patients regarding sociodemographic characteristics (No = 30 for each group)

Sociodemographic characteristics	Study (n= 30)		Control (n= 30)		P. value
	No.	%	No.	%	
Age					
18 < 30years	13	43.3	14	46.7	0.985
30<40 years	10	33.3	10	33.3	
40< 50 years	5	16.7	4	13.3	
50 – 60 years	2	6.7	2	6.7	
Mean± SD	34.47±9.69		33.4±11.29		0.696
Sex					
Male	27	90.0	25	83.3	0.448
Female	3	10.0	5	16.7	
Residence					
Urban	15	50.0	14	46.7	0.698
Rural	14	46.7	16	53.3	
Level of education					
High education	5	16.7	5	16.7	.551
Secondary school	16	53.3	16	53.3	
Read and write	5	16.7	2	6.7	
Illiterate	4	13.3	7	23.3	
Occupation					
Work	18	60.0	14	46.7	0.437
Not work	12	40.0	16	53.3	

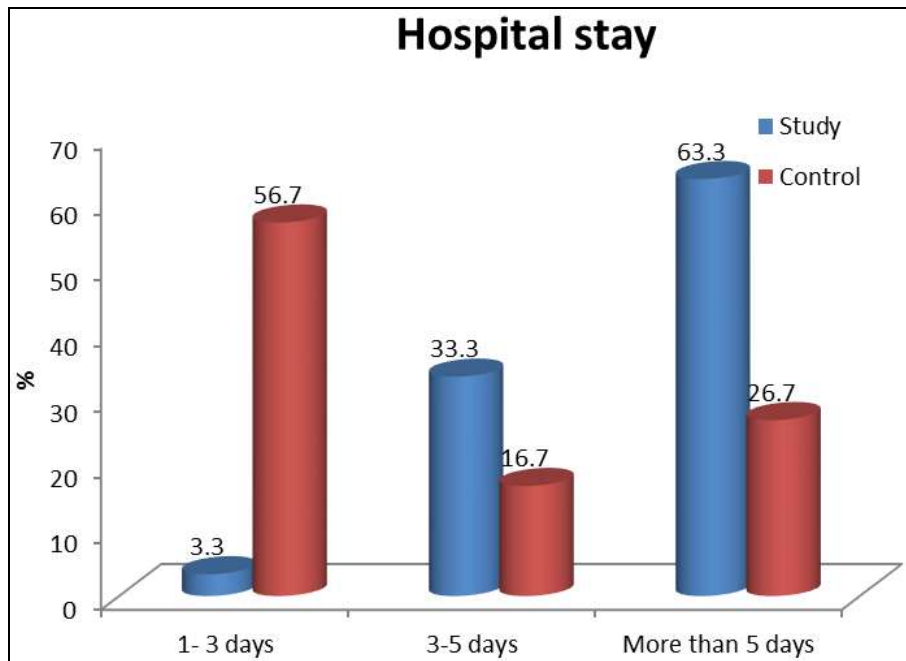


Fig 2: Percentage distribution of the studied patients (both study and control group) according to length of hospital stay (No = 30 for each group)

Table 2: Comparison between study and control group of the studied patients regarding Cincinnati scale level (No = 30 for each group):

Cincinnati scale level	Study (n= 30)		Control (n= 30)		P. value
	No.	%	No.	%	
Preoperative					
Poor	30	100.0	25	83.3	0.065
Fair	0	0.0	4	13.3	
Good	0	0.0	1	3.3	
Excellent	0	0.0	0	0.0	
Two weeks postoperative					
Poor	0	0.0	25	83.3	<0.001**
Fair	9	30.0	4	13.3	
Good	21	70.0	1	3.3	
Excellent	0	0.0	0	0.0	
One month postoperative					
Poor	0	0.0	13	43.3	<0.001**
Fair	0	0.0	14	46.7	
Good	3	10.0	3	10.0	
Excellent	27	90.0	0	0.0	
Six months postoperative					
Poor	0	0.0	6	20.0	<0.001**
Fair	0	0.0	19	63.3	
Good	3	10.0	2	6.7	
Excellent	27	90.0	3	10.0	

Table 3: Comparison between study and control group of the studied patients regarding modified Cincinnati knee rating scale pre, two weeks, one month and six months post tibial plateau fracture surgery (No = 30 for each group):

Cincinnati knee rating scale	Study (n= 30)	Control (n= 30)	P. value
1-Pain intensity			
Preoperative	0.93±1.72	1.47±3.4	0.926
Two weeks postoperative	8.53±2.92	1.73±3.74	<0.001**
One month postoperative	14.13±2.03	7.47±6.37	<0.001**
Six months postoperative	19.47±1.38	7.6±4.62	<0.001**
2-Swelling			
Preoperative	1.47±1.17	1.13±1.72	0.100
Two weeks postoperative	10±0	1.27±1.78	<0.001**
One month postoperative	9.8±0.61	3.27±1.86	<0.001**
Six months postoperative	9.73±0.69	3.8±2.25	<0.001**
3-Giving way			
Preoperative	3.33±3.17	2.67±3.54	0.291
Two weeks postoperative	19.6±1.22	3.47±3.6	<0.001**
One month postoperative	19.6±1.22	6.67±3.84	<0.001**
Six months postoperative	20±0	9.07±4.69	<0.001**

4-Overall activity level			
Preoperative	4.53±4.55	3.33±4.08	0.249
Two weeks postoperative	10±5.83	3.87±4	<0.001**
One month postoperative	18.8±3.66	7.6±4.25	<0.001**
Six months postoperative	19.2±2.44	9.2±4.83	<0.001**
5-Walking			
Preoperative	2.93±1.72	2.87±1.46	0.811
Two weeks postoperative	4.8±2.33	3.47±1.66	0.024*
One month postoperative	7.67±1.9	5.2±1.63	<0.001**
Six months postoperative	9.6±1.22	6±1.89	<0.001**
6-Stairs			
Preoperative	2.27±0.87	2.67±1.09	0.064
Two weeks postoperative	3.87±1.48	2.67±1.09	0.001**
One month postoperative	7.67±1.83	4.8±1.24	<0.001**
Six months postoperative	9.4±1.83	5.4±1.83	<0.001**
7-Running activity			
Preoperative	1.47±0.86	1.27±0.52	0.674
Two weeks postoperative	2.4±1.16	1.4±0.62	<0.001**
One month postoperative	3.93±1.08	2.3±0.6	<0.001**
Six months postoperative	4.7±0.92	2.8±0.96	<0.001**
8-Jumping or Twisting			
Preoperative	1.23±0.43	1.33±0.61	0.666
Two weeks postoperative	2.43±1.07	1.6±0.81	0.002**
One month postoperative	4.03±1.07	2.53±0.82	<0.001**
Six months postoperative	4.8±0.61	2.9±0.92	<0.001**

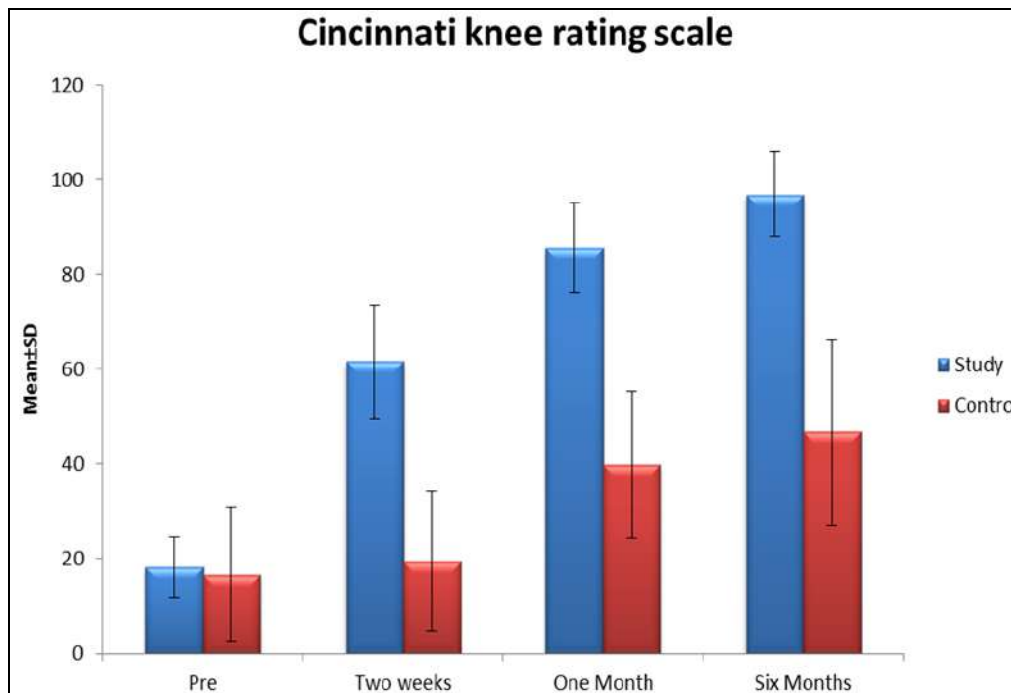


Fig 3: Percentage distribution of the studied patients (both study and control group) regarding the Cincinnati total mean score (No = 30 for each group):

Table 4: Comparison between study and control group of the studied patients regarding total mean score of quadriceps muscle strength pre, two weeks, one month and six months post tibial plateau fracture surgery (No = 30 for each group):

Total mean score of quadriceps muscle strength	Study (n= 30)	Control (n= 30)	P. value
Affected limb			
Preoperative	1.52±0.8	1.18±0.55	0.066
Two weeks postoperative	2.15±0.81	1.2±0.58	<0.001**
One month postoperative	4.67±2	1.65±0.74	<0.001**
Six months postoperative	6.35±2.18	2.1±1.14	<0.001**
Un affected limb			
Preoperative	4.78±1.85	3.57±1.1	0.003**
Two weeks postoperative	5.05±1.84	3.57±1.1	<0.001**
One month postoperative	5.83±1.85	3.57±1.1	<0.001**
Six months postoperative	6.47±1.96	3.57±1.1	<0.001**

Table 5: Comparison between study and control group regarding complications preoperative, two weeks, one month and six months post tibial plateau fracture surgery (No = 30 for each group):

Postoperative complications	Study (n= 30)		Control (n= 30)		P. value
	No.	%	No.	%	
Swelling and wound-healing problems					
Preoperative	0	0.0	0	0.0	-
Two weeks postoperative	0	0.0	3	10.0	0.076
One month postoperative	0	0.0	0	0.0	-
Six months postoperative	0	0.0	0	0.0	-
Infections					
Preoperative	0	0.0	1	3.3	0.313
Two weeks postoperative	1	3.3	2	6.7	0.554
One month postoperative	0	0.0	0	0.0	-
Six months postoperative	0	0.0	0	0.0	-
Deep vein thrombosis					
Preoperative	0	0.0	0	0.0	-
Two weeks postoperative	0	0.0	0	0.0	-
One month postoperative	0	0.0	1	3.3	0.313
Six months postoperative	0	0.0	1	3.3	0.313
Knee stiffness					
Preoperative	0	0.0	0	0.0	-
Two weeks postoperative	0	0.0	0	0.0	-
One month postoperative	3	10.0	0	0.0	0.076
Six months postoperative	1	3.3	13	43.3	0.001**
Knee instability					
Preoperative	0	0.0	0	0.0	-
Two weeks postoperative	0	0.0	0	0.0	-
One month postoperative	0	0.0	0	0.0	-
Six months postoperative	0	0.0	2	6.7	0.150
Post-traumatic arthritis					
Preoperative	0	0.0	0	0.0	-
Two weeks postoperative	0	0.0	0	0.0	-
One month postoperative	0	0.0	0	0.0	-
Six months postoperative	0	0.0	5	16.7	0.020*
Malunion					
Preoperative	0	0.0	0	0.0	-
Two weeks postoperative	0	0.0	0	0.0	-
One month postoperative	0	0.0	0	0.0	-
Six months postoperative	0	0.0	1	3.3	0.313

Table 6: Relationship between Cincinnati total mean score of the studied patients and their sociodemographic data during program phases (No = 30 for each group):

Sociodemographic data	Cincinnati total mean score							
	pre		Two weeks		One month		Six month	
	Mean± SD	Range	Mean± SD	Range	Mean± SD	Range	Mean± SD	Range
Age group								
18-30years	17.31±6.06	10-30	57.69±13.28	44-78	84.92±8.38	59-94	97.31±8.08	71-100
30-40 years	19.9±6.79	12-30	63.1±10.54	44-78	86.1±9.99	59-94	97.1±9.17	71-100
40-50 years	16.2±7.01	10-28	66.2±10.59	52-76	84.6±14.64	59-94	94.2±12.97	71-100
more than 50 years	20±8.49	14-26	68.5±13.44	59-78	90.5±4.95	87-94	100±0	100-100
P. value	0.681		0.419		0.893		0.876	
Sex								
Male	18.19±6.46	10-30	60.59±11.86	44-78	85.11±9.97	59-94	96.56±9.28	71-100
Female	18±7.21	12-26	71±10.44	59-78	90.33±3.51	87-94	100±0	100-100
P. value	0.963		0.157		0.382		0.532	
Residence								
Urban	18.33±6.89	10-28	55.88±10.71	44-78	81.33±11.75	59-90	94.19±11.6	71-100
Rural	18.57±5.92	12-30	68.21±10.04	44-78	90.36±3.52	84-94	100±0	100-100
P. value	09.22		0.003**		0.010*		0.072	
Educational level								
High education	16.2±7.43	10-28	55±9	44-68	76±15.65	59-89	88.4±15.88	71-100
Secondary school	17.44±6.01	10-30	62.31±13.54	44-78	86.81±8.31	59-94	98.19±7.25	71-100
Read and write	20.6±7.2	12-28	61.2±11.95	44-76	88.2±3.7	84-94	100±0	100-100
Illiterate	20.5±6.86	15-30	67.75±6.95	59-76	89.75±2.99	87-94	98.5±3	94-100
P. value	0.610		0.472		0.088		0.122	
Occupation								
Working	18.33±7.12	10-30	59.94±11.67	44-78	84.94±9.99	59-94	96.78±9.38	71-100
Not working	17.92±5.45	12-28	64.17±12.51	44-78	86.67±9.38	59-94	97.08±8.39	71-100
P. value	0.865		0.354		0.639		0.928	

Table (1): Shows that the majority of the studied patients were males (83.3%), their age ranged from 18 to <30 years and living in rural areas in both study and control group, as regard level of education; the highest percentages in both study and control group were secondary educated (53.3%) and workers (60.0%,46.7) respectively.

Figure (1): Shows that regarding to hospital stay, the highest percentages in the studied patients stayed in hospital for more than 5 days.

Table (2): Shows that there was a high statistically significant difference between the study and the control group regarding Cincinnati scale level two weeks, one month and six months post tibial plateau fracture surgery.

Table (3): Illustrates that there was no a statistical significant difference between the study and the control group preoperative but there was a statistical significant difference between the study and the control group regarding pain intensity, swelling, giving way, overall activity level, walking, stairs, running activity, jumping or twisting two weeks, one month and six months post tibial plateau fracture surgery.

Figure (2): shows that there was a high statistically significant difference between the study and the control group regarding total score of the modified Cincinnati knee rating scale two weeks, one month and six months post tibial plateau fracture surgery.

Table (4): Illustrates that there was a high statistically significant difference between the study and the control group regarding total mean score of quadriceps muscle strength two weeks, one month and six months post tibial plateau fracture surgery.

Table (5): Illustrates that there was a statistically significant difference between the study and control group regarding incidence of knee stiffness (p-value 0,001) and post traumatic arthritis (p-value 0,020) as a complications after tibial plateau fracture surgery in the follow up period 6 months.

Table (6): Shows that no relation between age, sex, educational level, occupation and Cincinnati total mean score and there is relation between residence and Cincinnati total mean score.

Discussion

Regarding socio-demographic characteristics of the patients; the result of the present study revealed that, most of the studied patients their age ranged from more than eighteen to less than thirty years. This result disagree with (Biju *et al.*, 2014) [3] who carried out A prospective study was conducted at Department of Orthopedics, Narayana Medical College Hospital, Nellore, Andhra Pradesh, India for the period of 20 months from August 2010 to April 2012 which revealed that the mean age of the studied patients was 41 years.

The current study revealed that, the majority of the studied patients were males. This study finding was in line with (Suélem *et al.*, 2008) [6] which conducted at surgical department, between 2002 and 2005 at the Hospital das

Clínicas, Campinas State University (HC-UNICAMP). Entitled as assesment of the functional capacity of individuals submitted to surgical treatment after tibial plateau fracture which revealed that; the majority of the study group were males.

In the current study; it was founded that the majority of the studied patients were secondary educated, workers and live in rural area. Regarding to hospital stay, it was founded that the highest percentages in the studied patients stayed in hospital for more than 5 days which was in line with (Berkson & Virkus, 2006) [1] which conducted at Department of Orthopaedic Surgery, Rush University Medical Center, Chicago, USA. Entitled as High-energy tibial plateau fractures which revealed that; the majority of the studied patients stayed in hospital for 7 days.

Regarding assessment of patient's physical status; the results of the present study illustrated that, there was a statistically significant difference between the study and control group regarding total mean scores of the Cincinnati knee rating scale collectively in the follow up periods. This result was supported by (Michael *et al.*, 2015) [15] who carried out a study in Toronto-Canada entitled as Distal femoral varus osteotomy combined with tibial plateau fresh osteochondral allograft for post-traumatic osteoarthritis of the knee which revealed that a significant difference in the knee function scores.

Regarding measurement of quadriceps muscle strength; the results of the present study illustrated that, there was a statistically significant difference between the study and control group regarding measurement of quadriceps muscle strength in the follow up periods. This study finding was supported by (Gaston *et al.*, 2005) [4] who carried out a prospective study for patients admitted to trauma center Between May 1996 and December 2001, who were diagnosed with an isolated fracture of the tibial plateau entitled as Recovery of knee function following fracture of the tibial plateau which revealed that a significant difference in measurement of quadriceps muscle strength.

Regarding patients complications after tibial plateau fracture surgery; the present study revealed that, nearly fifth of the studied patients suffering from knee stiffness. This result disagreed with (Ralf *et al.*, 2017) [7] who carried out a study in department of orthopaedic, trauma and plastic surgery, University of Leipzig, Germany entitled as Infection following fractures of the proximal tibia-a systematic review of incidence and outcome which revealed that 1.6% of patients suffering from knee stiffness.

The present study revealed that, the minority of the studied patients suffering from infection. This result disagreed with (Syed and Subbukannu, 2016) [10] who carried out a study in department of orthopedics, Al Ameen Medical College, Bijapur, Karnataka entitled as Study on complications of tibial plateau fractures which revealed that 0.0% of patients suffering from infection.

The present study revealed that, the minority of studied patients suffering from malunion. This result disagreed with (Siddesh *et al.*, 2018) [9] who carried out A prospective study in department of orthopaedics, Ssims-Rc, Davanagere, Karnataka, India entitled as A prospective study of surgical management of tibial plateau fractures by locking compression plate which revealed that 10% of patients

suffering from malunion.

The present study revealed that, the minority of studied patients suffering from Deep vein thrombosis. This result disagreed with (Ronald and John, 2017) [8] who carried out a study in trauma centers across the United States entitled as The incidence of deep vein thrombosis and pulmonary embolism after fracture of the tibia: An analysis of the National Trauma Databank which revealed that 0.53% of patients suffering from Deep vein thrombosis.

Regarding relations; the present study revealed that, no relation between age, sex, educational level, occupation and Modified Cincinnati Rating System scale and there was relation between residence and Modified Cincinnati Rating System scale. This could be due to that the urban patients have a good access to new technology from which they could gain a lot of information regarding the rehabilitation after surgery and what should be done to reduce incidence of complications after tibial plateau fracture surgery.

Conclusion

Based on the results of the present study, it can be concluded that; providing written and illustrated nursing rehabilitation protocol for patients was much more effective on postoperative complications after tibial plateau fracture surgery than those patients in the control group who received resident's oral instructions.

Recommendations

The study recommended that Simple nursing rehabilitation protocol booklet should be available for patients about preventive measures of complications following tibial plateau fracture surgery.

References

1. Berkson EM, Virkus WW. High-energy tibial plateau fractures. *Journal of American Academy of Orthopedic Surgeons*. 2006; 14(1):20-31.
2. Beurer GmbH. Adopted from [https:// www.virtualmarket.ifa-berlin](https://www.virtualmarket.ifa-berlin). Accessed at 12/6/2019 at 6 p.m.
3. Biju Ravindran, BLS Kumar Babu, Ramprasad Rallapalli, Mahabob Vali Shaik. An outcome of surgical management of the tibial plateau fractures. 2014; 3(2):110-114.
4. Gaston EM, Will, Keating JF. Recovery of knee functions following fracture of the tibial plateau. *The Bone & Joint Journal*. 2005; 87(9):27.
5. Michael Drexler, Allan Gross, Tim Dwyer, Oleg Safir, David Backstein, Hasaan Chaudhry, Anna Goulding and Yona Kosashvili. Distal femoral varus osteotomy combined with tibial plateau fresh osteochondral allograft for post-traumatic osteoarthritis of the knee Surgery. *Sports Traumatology, Arthroscopy Journal*. 2015; 23(5):1317-1323).
6. Suélem Pereira Camacho, Rafaela Campoi Lopes, Marília Rached Carvalho, Ana Cristina Ferreira De Carvalho, Rodrigo De Campos Bueno, Pedro Henrique Regazzo. Assesment of the functional capacity of individuals submitted to surgical treatment after tibial plateau fracture. *Acta Ortopédica Brasileira Journal*. 2008; 16(3):168-172.
7. Ralf Henkelmann, Karl-Heinz Frosch, Richard Glaab, Helmut Lill, Christian Schoepp, Dominik Seybold,

Christoph Josten and Pierre Hepp Infection following fractures of the proximal tibia-a systematic review of incidence and outcome. *The Journal of Headache and Pain*. 2017; 18(1):481.

8. Ronald Auer, John Riehl. The incidence of deep vein thrombosis and pulmonary embolism after fracture of the tibia: An analysis of the National Trauma Databank. *Journal of Clinical Orthopaedics and Trauma*. 2017; 8(1):38-44.
9. Siddesh Patil, Akshay MK, Ashwin Gobbur. A prospective study of surgical management of tibial plateau fractures by locking compression plate. *International Journal of Orthopaedics Sciences*. 2018; 4(1):148-156.
10. Syed Natiq Hussain, Subbukannu B. Study on complications of tibial plateau fractures. *International Journal of Orthopaedics Sciences*. 2016; 2(2):64-66.
11. Chen XZ, Liu CG, Chen Y. Arthroscopy-assisted surgery for tibial plateau fractures. *Arthroscopy journal*. 2015; 31(6):53-143.
12. Lowe JA, Tejwani N, Yoo B, Wolinsky P. Surgical techniques for complex proximal tibial fractures. *Journal of Bone Joint Surgery*. 2011; 93(7):59-1548.
13. Mthethwa J, Chikate A. A review of the management of tibial plateau fractures. *Musculoskeletal Surgery Journal*. 2017; 102(2):119-127.
14. Mehin R, O'Brien P, Broekhuysen H, Blachut P, Guy P. End stage arthritis following tibia plateau fractures: average 10-year follow up. *Canadian Journal of Surgery*. 2012; 55(1):003111-3111.
15. Yoon RS, Liporace FA, Egol KA. Definitive fixation of tibial plateau fractures. *Journal of Orthopedic Clinics of North*. 2015; 46(3):75-363.