Effectiveness of Implementing Sleep Hygiene Guidelines on Daily Living Activities for Anterior Knee Cruciate Ligaments Reconstruction Patients

Amina Elsayed. Abd alazez [1] , Afaf Abdel Aziz. Basal [2] , Waleed Mohamed. Ewais [3] , Reda Abdel Salam Ibrahim [4]

[1] Demonstrator, Medical –Surgical Nursing, Faculty of Nursing, Tanta University, Egypt.,

[2] Professor of Medical- Surgical Nursing (Main Supervisor) Faculty of Nursing, Tanta University, Egypt.

[3]Professor of orthopedic surgery, Faculty of Medicine, Tanta University, Egypt.

[4] Assist Professor of Medical- Surgical Nursing, Faculty of Nursing, Tanta University, Egypt.

Abstract

Back ground: Sleep hygiene is the term that are used to describe good sleep habits. Sleep is defined as a set of behaviors that impact sleep quality and duration. **Aim**: This study was conducted to evaluate the effectiveness of implementing sleep hygiene guidelines on daily living activities for anterior cruciate ligaments reconstruction patients. **Subjects and methods**: A quasi-experimental study was conducted in at orthopedic departments of Tanta Universal Teaching Hospital and Orthopedic Outpatient Clinic for follow up.The convenience sampling of (60) adult post-operative anterior cruciate ligaments reconstruction patients was included in the study and randomly divided into two groups. **Group 1:** (control group) Consists of (30) patient who received the usual hospital routine of care. **Group 2:** (study group) Consists of (30) patient who received the application of sleep hygiene guidelines. Three tools were being used as follow. *Tool (I)* Structured Interview Schedule. *Tool (II))*: Sleep Hygiene Index **Tool (III)):** Knee Outcome Survey-Activities of Daily living scale. **Results**:The main results revealed that the majority of the studied patients in study group were developed their sleeping habits 80% while among control group was 10% at the 2nd week of the operation. **Conclusions and recommendations**: sleep hygiene guidelines program has a favorable effect on the activity of daily living among patients with anterior cruciate ligaments reconstruction, : In addition to the patients' ability to perform this activity improved. It's recommended to provide clear instruction to patients about behavior change to provide a foundation for improvement of sleep hygiene.

 Key words: Anterior Cruciate Ligaments Reconstruction, Sleep hygiene, daily living activitie

Introduction

 Anterior cruciate ligament (ACL) injuries are one of the most common injuries of the knee.[1]The most common mechanism that can cause tear of the anterior cruciate ligament (ACL) is sudden deceleration (slowing down or stopping motion), hyperextension or pivoting in place. This also includes sports-related injuries which is considered the most common cause, the types of sports that have been associated with ACL tears are numerous, which requiring the foot to be planted and the body to change direction rapidly such as basketball and football.[2] The activities of daily living

 (ADLs) is a term that are used to collectively describe fundamental skills required to independently care for self, such as eating, bathing and mobility. The inability to perform ADLs results in the dependence on other individuals or mechanical devices. The inability to accomplish essential activities of daily living may lead to poor quality of life. Measurement of ability or inability to perform ADLs is important in describing the functional status of a person and then in implementing an intervention.[3]

Sleep hygiene" refers to those behaviors that are believed to promote improved quantity and quality of sleep. According to the

National Slep Foundation sleep hygiene is defined as a group of behaviors that impact sleep quality and duration and can be classified into five different factors which are including, Behavioral factors as have regular exercise but avoid strenuous workouts close to bedtime and avoid eating food that can cause indigestion just before sleep as heavy meals, fatty meals, spicy dishes, citrus fruits, and carbonated drinks.[4]

Cognitive factors as avoid worrying and planning right before bedtime. Environmental factors as use comfortable mattress and pillows, be mindful of room temperature, sound, and light; and turn off electronic devices before bed. Sleeping pattern, have a regular sleep schedule and bedtime routine, limit daytime naps to thirty minutes. Substance use, avoid stimulants such as caffeine and nicotine close to bedtime. [5-6]

Maintain a regular sleep schedule, will help regulate body's clock and promote quality of sleep and wake time. Avoid naps if possible. If the persons have to take a nap, they must try to keep it to less than one hour and avoid taking a nap after three p.m.[7-8]

Have evening and bedtime routine, practicing this routine half an hour to two hours before bed is one of the most important guideline for sleep hygiene, and it is recommended to include, Personal care, Take a warm shower or bath about ninety minutes before bed.[9] Avoid caffeine, smoking and eating fatty meals before bed, heavy meals can make you uncomfortable while sleeping, caffeine and nicotine give a stimulant effect that takes up to two hours to start to disappear.[10]

Preparing the body for sleep, avoid caffeine after lunch, the effects of caffeine may last for several hours after ingestion. Caffeine is a stimulant and reaches its peak effect in the first hour but with a half-life elimination of three to seven hours. Caffeine is a potent sleep inhibitor and it increases sleep latency. Avoid going to bed hungry or full, if the

stomach is too empty it can interfere with sleep. However, eating a heavy meal before bedtime can interfere as well. Dairy products and tuna contain tryptophan which acts as a natural sleep inducer. Exercise regularly but avoid strenuous exercise within six hours of your bedtime. [11-13] Prepare sleeping area, remove all TVs, computers and other electronic devices from the bedroom. Use bedroom only for sleeping. Avoid bright light by using an eye mask while sleeping. Stay away as much as possible from noise and use earplugs while sleeping, teach patient how to wear eye mask and ear plug and how to preform relaxation technique that help to sleep easly.[14]

Significance of the study: Sleep is an important part of recovery; however, patients who are recovering from a knee reconstruction find it difficult to sleep at night, the patients suffering from severe pain and immobility of knee as it heals can affect the ability to get a good night's rest. So maintaining good sleep hygiene will improve daily living activity of patients undergoing Anterior Cruciate Ligaments Reconstruction (ACL), to evaluate the effectiveness of implementing sleep hygiene guidelines on daily living activities for anterior knee cruciate ligaments reconstruction patients.

Aim of the study

To evaluate the effectiveness of implementing sleep hygiene guidelines on daily living activities for anterior knee cruciate ligaments reconstruction patients.

Research Hypothesis

Patients undergoing anterior knee cruciate ligaments reconstruction will exhibit improvement in their activities of daily living post follow good sleep hygiene guidelines.

Subjects and methods

 a quasi- experimental research design was utilized to conduct the study.

Setting

The study will be conducted at orthopedic departments of Tanta Universal Teaching Hospital and orthopedic outpatient clinic to follow up of sleep hygiene guidelines.

Subjects

A convenience sampling of (60) adult post-operative anterior knee cruciate ligaments reconstruction patients in the above previously mentioned settings. The sample size was calculated based on Epidemiological Information Program, based on the total patients per year according to review of Tanta Universal Teaching Hospital Statistical Records. They were divided into two equal groups; each group were consisted of (30) patients as following:

Group (1): - Consists of (30) patients who were received the usual hospital routine of care (vital sings measures, receiving medication, wound dressing, wound care and hygienic care).

Group (2):- Consists of (30) patients who were received the sleep hygiene guidelines plus the previous usual hospital routine of care mentioned.

Inclusion criteria

- Conscious patient

- Age ranges between 21-60years.

- Patients of both sex.

 - Patients have anterior cruciate ligaments tear and undergone arthroscopic anterior cruciate ligaments reconstruction

Exclusion criteria of patient's

- Knee fractures

- Knee multiple ligamentous injuries.

- Patient who refuse to participate in study.

Tools of data collection

 Three tools were used in the study, which includes the following:

Tool (I):- Structured Interview Schedule :- It was comprised of three parts:-

Part 1) Patients' Socio- demographic characteristics

 Which included; patient name, age, sex, educational level, marital status, occupation, pattern of sleep, number of days with sleep disturbances, number of cigarettes per day and drinking caffeine.

Part 2) Medical data

Which included present and past medical history, medication history, date of admission, date of operation, mechanism of injury, affected knee (right or left knee).

Part 3) knowledge assessment (pre-posttest): - It was developed by the researcher based on literature review [3,4,9,10] to assess patient's knowledge regarding anterior cruciate ligament surgeries and sleep hygiene guidelines. It was consisted of 6 open end question .**Scoring system :-** it was scored as the following: Correct answer was scored as (1) and incorrect answer was scored as (0). Total scoring system of knowledge assessment questioner was calculated and classified as the following: 70% and more will be considered as satisfactory, Less than 70% will be considered as unsatisfactory.

Tool (II):- Sleep Hygiene Index (SHI)

Sleep Hygiene Index (SHI), originally developed by **Mastin et al. (2006).[15]** It was consisted of 13 items of self-reported instrument that was implemented to assess habits, practices and behaviors related to sleep hygiene. It was consisted of four factors, Factor 1: "Arousal at bedtime" Factor 2: "Regular routines" Factor 3: "Sleep environment" Factor 4: "Sleep-disrupted behaviors" Particularly, the first factor, that composed of five items 7, 8, 9, 12, 13; the second factor composed of three items 2, 3 and 5; the third factor was composed of two items 10 and 11; and finally fourth factor was composed of three items 1, 4, 6. Participants was asked to rate the frequency to which they have engaged in specific behaviours on a 5-point Likert scale ("always" = 5, "frequently" = 4, "sometimes" = 3, "rarely" = 2, "never" = 1). Higher scores were indicative of poorer

sleep hygiene status and less sleep hygiene behaviors.[16] **The scoring system :** <26 was considered as good sleep hygiene, 27-34 was considered as average and >35 was considered as poor sleep hygiene.

Tool (III) :- Knee Outcome Survey- Activities of Daily living scale(ADL)

The knee outcome Survey was a patient self-report survey developed by **Irrgang et al.[17]** To assess activities of daily living of patient's undergoing anterior cruciate ligament reconstruction postoperatively, This self-administered scale was consisted of two parts:- **Part (1):** symptoms of knee that affect level of daily activity it was included (6 factors) such as pain, stiffness, swelling, giving way buckling, or shifting of the knee , weakness, limping. The response to the symptoms questions was scored from 0 (the symptom prevents all daily activities) to 5 (do not have the symptom). **Part (2):** functional limitation of ADL (8 factors) such as walk, go upstairs, go down stairs, stand, kneel on front of your knee, squat, sit with your knee bent, rise from a chair. The response to questions in the functional limitation of ADL was scored from 0 (unable to do the activity) to 5 (activity is not difficult).

The scoring system was calculated by summing the scores of all 14 factors. [18] The highest possible score was 70. The scores of all items are summed, divided by 70, then multiplied by 100 to give an overall ADLS percent rating. Higher percentages reflect higher levels of functional ability. Less than 40 of total score considered as low of (Daily Living activity), From 40 to less than 60 considered as moderate and from 60 to 70 considered as high.

Ethical and legal consideration

- Nature of the study did not cause any harm or pain to the entire subjects.
- An informed consent was taken from every patient after explanation the aim of the study.

- Confidentiality and privacy was taken into consideration a regarding data collection .
- The patient was informed the right to withdraw from the study at any time with no reason.

Mehods of data collection

- An official permission was obtained from the orthopedic departments of Tanta Universal Teaching Hospital and orthopedic outpatient clinic
- All tools were tested for content validity and clarity of questionnaire by five experts in the Medical Surgical Nursing at the faculty of nursing and orthopedic field professors.
- All tools of the study were tested for reliability by using alpha Cronbach's test and found to be 0.823, 0.775, and 0.810 respectively for the tool I, II, III which represent highly reliable tools, when alpha Cronbach was >0.5 .
- The **pilot study** was conducted before the actual study on (10%)of the patients, to test the clarity, feasibility; relevance and applicability of the different items of the tools to determine any obstacles that may encountered during the period of data collection, accordingly needed modifications were done before the main study.
- Data were collected over a period of 6 months, started from March 2022to August 2022
- The present study was conducted through four phases (assessment, planning, implementation, evaluation).

A. Assessment phases

Tool (I); part (1,2) was used at the time of patients' admission for collection of the baseline data and assessed the patients who met the inclusion criteria and was included in the study.

B. Planning Phase

The guideline and power point was prepared by the researcher based on patient's level of

education, objectives of the study were determined based on the needs of the study subjects. The guideline booklet was distributed to the studied patients at the end of sessions and power point was presented.

Objectives: - To improve knowledge and practice of patients undergoing anterior cruciate ligament reconstruction regarding sleep hygiene practice.

Educational methods and aids

 Educational aids include :- booklets, lab top and power point was prepared by the researcher based on literature review.

Educational methods include individualized discussion as the patient can't move from the bed, demonstration and re-demonstration where used as teaching method.

C. Implementation phase

Giving guidelines to the patient regarding sleep hygiene were adopted and implemented by researcher based on patients' level of education. **These sleep hygiene guidelines will include the following;** Maintain a regular sleep schedule, Maintain evening and bedtime routine, Preparing the body for sleep, Maintain comfortable environment and Practice relaxation techniques before bedtime which include(Deep breathing, Progressive muscle relaxation, Guided imagery).

Educational session:- Were given to all patients included in the study, educational sessions were implemented over five sessions ranged from 30-45 minutes for each one including 30 minutes for explanation of instruction and re-demonstration of theoretical and practical part and 15 minutes for discussion and feedback. Sessions will be individualized.

Content of each session was divided as following

Theoretical part:-

this sessions were given patient information about**:-**

First session

Contents: Simple note of the anterior cruciate ligament of the knee. Definition of the anterior cruciate ligament reconstruction surgery of the knee. Mechanism of performing the cruciate ligament surgery. Complications of the anterior cruciate ligament reconstruction surgery of the knee.

Second session

 Contents: Definition of sleep. Importance of sleep. Definition of sleep hygiene.

Third session

Contents: Preforming sleep hygiene guidelines. Discharge instructions about (activities of daily living (ADL), reporting unusual signs and symptoms)

Practical part:- was presented through demonstration and re-demonstration

Fourth session

Contents: Practical part of sleep hygiene guidelines include (sleep eye mask and earplugs, inform patient how to perform relaxation technique)

Fifth session

Contents: Practical part of sleep hygiene guidelines include (teach patient how to perform progressive muscle relaxation and guided imagery).

D. Evaluation Phase

Post-operative anterior cruciate ligaments reconstruction patients who was received sleep hygiene guidelines was evaluated by tool I part (3) to assess patient's knowledge before and after implementation of sleep hygiene guidelines, and by tool II and tool III to assess daily living activities of knee on the second day of operation in hospital and after one week and after two weeks in orthopedic outpatient clinic for follow up.

Methods of data analysis

 Statistical presentation and analysis of the present study was conducted, using the mean, standard Deviation, **chi-square test** was used to compare between groups in qualitative, **linear correlation coefficient** was used for

detection of correlation between two quantitative variables in one group. By (*IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.*)**.**

Significant level: >0.05 Non significant <0.05* significant <0.001* High significant

Results

Table (1) Shows distribution of the studied patients according to their socio–demographic characteristics among the studied groups. The results revealed that nearly half of the patients in both control and study groups (50.0%and 36.7% respectively) were between (30- <40) years old with mean age of 31.8±5.82 in control group and31.57±8.27 in study group. **In relation to sex**, more than half of the patients in the control and study groups were male (93.3%and 90.0% respectively), **Concerning marital status**, more than half of the patients in the control and study groups were married (80.0% and 66.7% respectively). **Regarding educational level**, more than half of studied patient in the control and study groups were had university education (53.3% and 43.3% respectively). **As regard to occupation**, it was observed that less than half of the patients in control and study groups were office worker (46.7% and 36.7% respectively).

Table (2) Shows distribution of the studied patients according to their medical data among the studied groups. The results revealed that about one third of the patients in the control and study groups their mechanism of injury was due to playing sports (20 % and 36.7% respectively). Concerning with the affected knee, it was observed that more than half of the patients in control and study groups were lift knee affected (40.0% and 63.3% respectively).

Table (3) Shows distribution of the studied patients according to their sleeping pattern among the studied groups. The results revealed that more than half of the patients in the control and study groups were not sleeping well (63.3% and 76.7% respectively). **Regarding taking day time nap,** more than half of the patients in the control and study groups were taking day time nap (60.0% and 83.3% respectively). **In relation to smoking**, half of the patients in the control and study groups were smoker (50%) and 33.3% of control group and 53.3% of study group were smoking 5:8 pack/ day respectively. **As regard to drinking caffeine,** it was observed that more than half of the patients in control and study groups were drinking caffeine (53.3% and 60.0% respectively). **Concerning Number of days with sleep disturbances,** the results revealed that more than one third of the patients in both control and study groups were having sleep disturbances for 4 days (45.8% and 30.8 % respectively). **As regard to action that patients do to get sleep,** it was observed that nearly half of the patients in both control and study groups were getting out of the bed (50.0% and 40.0% respectively).

Table (4): shows the **distribution of the studied patients according to their total knowledge regarding anterior cruciate ligament surgeries and sleep hygiene guidelines among the studied groups**.

The study found that 30% of patient in control groups were considered as satisfactory while 70% considered as unsatisfactory pre-test, compared with 26.7% of patients in study groups considered as satisfactory and 73.3% considered as unsatisfactory pre-test. On the other hand, the study shows that 33.3% of patient in control groups were considered as satisfactory while 66.7% considered as unsatisfactory post-test, compared with 83.3% of patients in study groups considered as satisfactory and 16.7% considered as unsatisfactory post-test.

Figure (1) Show distribution of the studied patients according to their total of habits,

practices and behaviors. The results revealed that less than one quarter of the patients in the control and study groups were having good sleep hygiene at the second day of the operation (20.0% and 13.3% respectively), which developed after 1st week of operation in the control and study groups to (16.7% and 73.3% respectively), then become (10% and 80% respectively) in the control and study groups at the 2nd week of the operation.

Figure 2 :- Show distribution of the studied patients according to their total symptoms of knee that affect level of daily activity. The result found that more than half of studied patients in control and study groups were suffering from high symptoms of knee that affect level of daily activity (66.7% and 60.0% respectively) at 2nd day of operation, which developed after 1st week of operation

in the control and study groups to (53.3% and 23.3% respectively), then become much better in the control and study groups at the 2nd week of the operation(60% and 16.7% respectively).

Figure 3: - Illustrate distribution of the studied patients according to their total of functional limitation of activity of daily living by Knee Outcome Survey-Activities of Daily living scale(ADL). The result show that more than half of studied patients in control and study groups were suffering from high functional limitation of activity of daily living (66.7% and 63.3% respectively) at 2nd day of operation, which developed after 1st week of operation in the control and study groups to (56.7% and 23.3% respectively), then become much better in the control and study groups at the 2nd week of the operation (50% and 10% respectively).

Table (1): Distribution of the Patients According to their Socio–Demographic Characteristics among the Studied Groups.

	Control		Study		Total		Chi-square	
	N 30	%	N 30	%	N 60	%	X^2	P-value
Age								
21 -< 30	11	36.7	13	43.3	24	40.0		
30- <40	15	50.0	11	36.7	26	43.3	1.182	0.554
40 -<50	4	13.3	6	20.0	10	16.7		
Mean±SD	31.8±5.82		31.57±8.27		31.68±0.709			
Sex								
Male	28	93.3	27	90.0	55	91.7	0.218	0.640
Female	2	6.7	3	10.0	5	8.3		
Marital status								
Married	24	80.0	20	66.7	44	73.3		
Single	5	16.7	10	33.3	15	25.0	3.030	0.220
Widow	1	3.3	0	0.0	1	1.7		
Occupation								
Not work	4	13.3	5	16.7	9	15.0		
office work	14	46.7	11	36.7	25	41.7	0.625	0.732
manual work	12	40.0	14	46.7	26	43.3		
Level of education								
Read and write	1	3.3	0	0.0	1	1.7		
Primary education	1	3.3	1	3.3	2	3.3	1.882	0.597
secondary education	12	40.0	16	53.3	29	48.3		
University education	16	53.3	13	43.3	28	46.7		

Table (2) Distribution of the studied patients according to their medical data among the studied groups.

|	Control		Study		Total		Chi-square	
	N 30	%	N 30	%	N 60	%	X^2	P-value
Previous hospitalization								
Yes	2	6.7	2	6.7	4	6.7	0.000	1.000
No	28	93.3	28	93.3	56	93.3		
Past and present history								
Hypertension	5	16.7	1	3.3	6	10.0	2.963	0.085
DM	1	3.3	1	3.3	2	3.3	0.000	1.000
Arthiritis	4	13.3	2	6.7	6	10.0	0.741	0.389
Renal disease	2	6.7	1	3.3	3	5.0	0.351	0.554
Medication history								
Antibiotics	23	76.7	22	73.3	45	75.0	0.089	0.766
Anti-inflammatory drugs	18	60.0	12	40.0	30	50.0	2.400	0.121
Narcotics\analgesic	18	60.0	11	36.7	29	48.3	3.270	0.071
Anesthetics	12	40.0	5	16.7	17	28.3	4.022	0.045*
Antidepressant drugs	0	0.0	1	3.3	1	1.7	1.017	0.313
Mechanism of injury								
Playing sports	6	20.0	11	36.7	17	28.3	2.052	0.152
Sudden change of direction	11	36.7	6	20.0	17	28.3	2.052	0.152
Direct contact with object	4	13.3	3	10.0	7	11.7	0.162	0.688
Motor vehicle collisions	4	13.3	8	26.7	12	20.0	1.667	0.197
Landing from a jump	3	10.0	2	6.7	5	8.3	0.577	0.448
Unknown	2	6.7	0	0.0	2	3.3	0.218	0.640
Affected knee								
Right	18	60.0	11	36.7	29	48.3	3.270	0.071
Left	12	40.0	19	63.3	31	51.7		

Table (3) Distribution of the studied patients according to their sleeping pattern among the studied groups.

	Control		Study		Total		Chi-square	
	N 30	%	N 30	%	N 60	%	X^2	P-value
Sleeping well								
Yes	11	36.7	7	23.3	18	30.0	1.270	0.260
No	19	63.3	23	76.7	42	70.0		
taking day time naps								
Yes	18	60.0	25	83.3	43	71.7	4.022	0.045*
No	12	40.0	5	16.7	17	28.3		
Smoking								
Yes	15	50.0	15	50.0	30	50.0	0.000	1.000
No	15	50.0	15	50.0	30	50.0		

Numbers of packs per day								
1	4	26.7	0	0.0	4	13.3		
2	0	0.0	1	6.7	1	3.3		
5	4	26.7	2	13.3	6	20.0		
7	0	0.0	2	13.3	2	6.7	9.692	0.138
10	5	33.3	8	53.3	13	43.3		
15	1	6.7	2	13.3	3	10.0		
20	1	6.7	0	0.0	1	3.3		
Drinking caffeine								
Yes	16	53.3	18	60.0	34	56.7	0.271	0.602
No	14	46.7	12	40.0	26	43.3		
Numbers of cup								
2	0	0.0	2	11.1	2	5.9		
3	7	43.8	6	33.3	13	38.2		
4	4	25.0	2	11.1	6	17.6	3.471	0.628
5	3	18.8	5	27.8	8	23.5		
6	1	6.3	2	11.1	3	8.8		
7	1	6.3	1	5.6	2	5.9		
Number of sleeping hours/ day								
4	1	3.3	0	0.0	1	1.7		
5	15	50.0	13	43.3	28	46.7	3.779	0.286
6	8	26.7	14	46.7	22	36.7		
7	6	20.0	3	10.0	9	15.0		
Number of days with sleep disturbances								
2	4	16.7	1	3.8	5	10.0		
3	7	29.2	11	42.3	18	36.0	5.091	0.165
4	11	45.8	8	30.8	19	38.0		
5	2	8.3	6	23.1	8	16.0		
what do you do to get sleep								
Taking medication	2	6.7	3	10.0	5	8.3		
Get out of the bed	15	50.0	12	40.0	27	45.0		
Drinking milk	0	0.0	1	3.3	1	1.7	1.915	0.751
Taking bath	10	33.3	12	40.0	22	36.7		
Reading stories	3	10.0	2	6.7	5	8.3		

Table (4): Distribution of the studied patients according to their total knowledge regarding anterior cruciate ligament surgeries and sleep hygiene guidelines among the studied groups

Total knowledge	Pre						Post					
	Control		Study		Chi-square		Control		Study		Chi-square	
	N	%	N	%	X^2	P-valu	N	%	N	%	X^2	P-value
Satisfactory	9	30.0	8	26.7			10	33.3	25	83.3		
Unsatisfactory	21	70.0	22	73.3	0.082	0.774	20	66.7	5	16.7	15.429	<0.001*
Mean±SD	1.93±0.58		2.20±0.76				2±0.53		5.93±0.25			
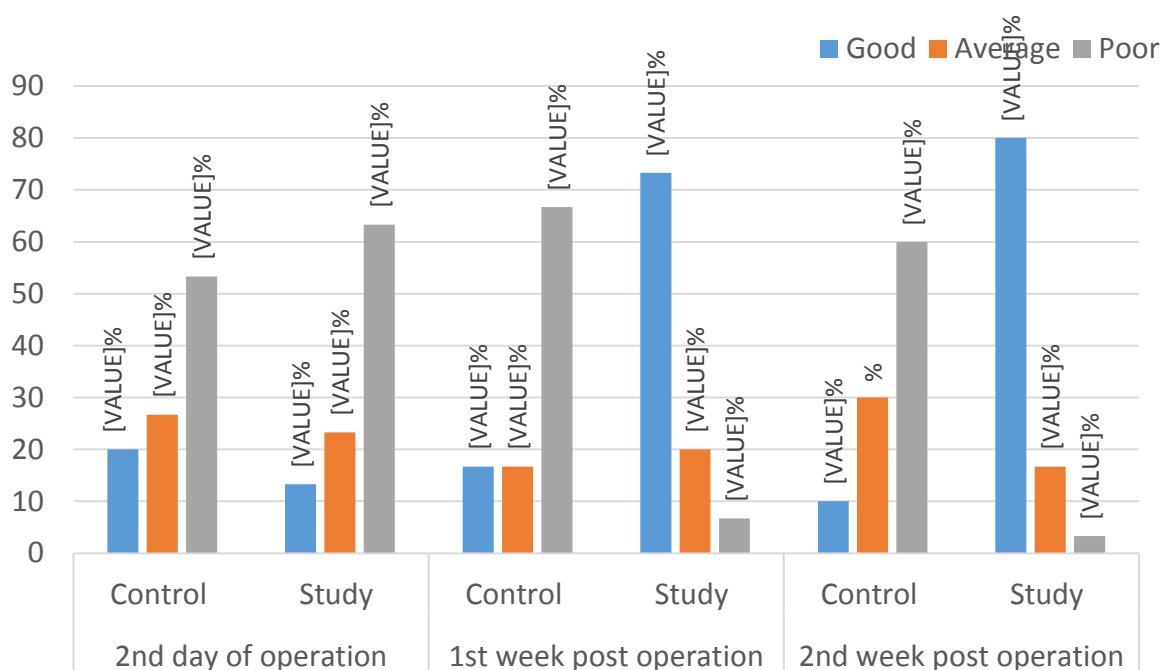
Figure (1) Distribution of the studied patients according to their total of habits, practices and behaviors related to sleep hygiene by Sleep Hygiene Index (SHI), 2nd day of operation, after 1 week and after 2 weeks of the operation.
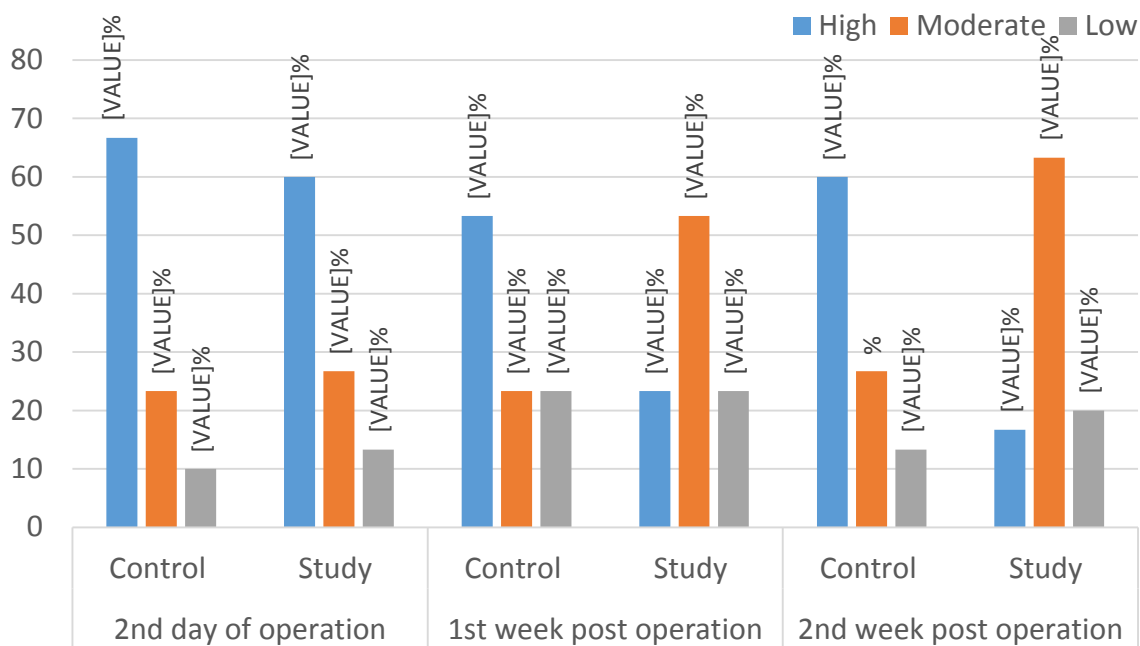
Figure 2 :- Distribution of studied patients by Knee Outcome Survey-Activities of Daily living scale(ADL), regarding their total symptoms of knee that affect level of daily activity .
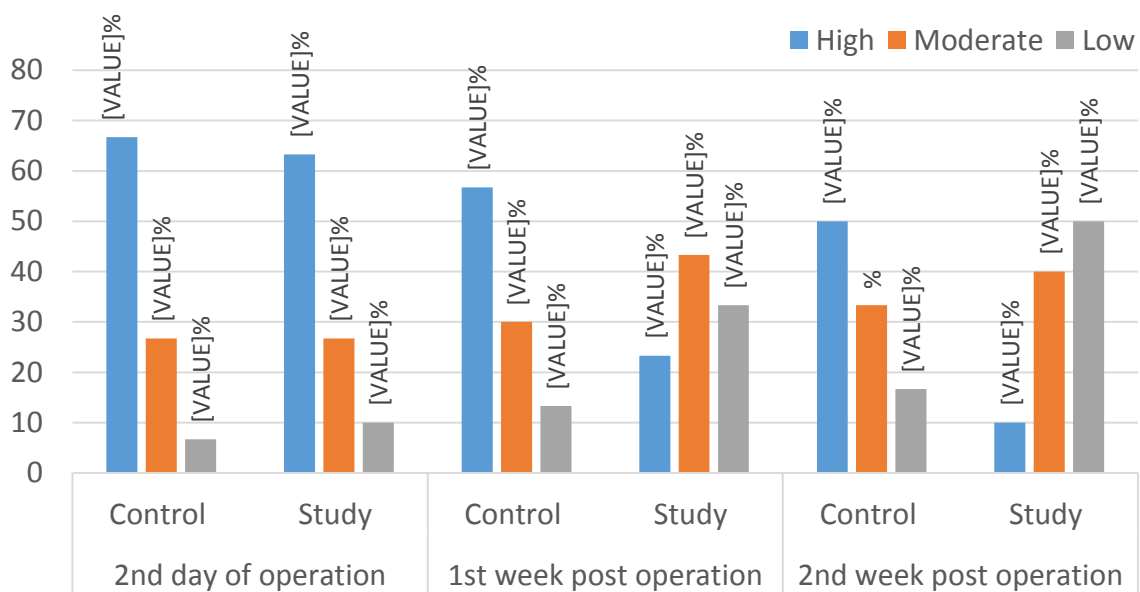

Figure 3: Distribution of the studied patients regarding their total daily living activities by Knee Outcome Survey-Activities of Daily living scale(ADL), through assessing functional limitation of ADL.

Table 5: - Correlation between Total knowledge pre-program implementation with Total sleep Hygiene Index score, Total knee Outcome Survey Activities and Total functional Limitations with Activities of Daily Living score at (2nd day of operation) in both groups.

	Total knowledge pre-program implementation			
	Control		Study	
	r	P-value	r	P-value
Total sleep Hygiene Index score (2nd day of operation)	-0.767	<0.001*	-0.777	<0.001*
Total knee Outcome Survey Activities of Daily Living sco (2nd day of operation)	-0.821	<0.001*	-0.638	<0.001*
Total functional Limitations with Activities of Daily Livir score (2nd day of operation)	0.735	<0.001*	0.680	<0.001*

Table 6: - Correlation between Total knowledge post program implementation with Total sleep Hygiene Index score, Total knee Outcome Survey Activities and Total functional Limitations with Activities of Daily Living score at (1st week and 2nd week after operation) in both groups.

	Total knowledge post program implementation			
	Control		Study	
	r	P-value	r	P-value
Total sleep Hygiene Index score (1st week post operation)	-0.404	0.027*	-0.662	<0.001*
Total sleep Hygiene Index score (2nd week post operation)	-0.329	0.076	-0.675	<0.001*
Total knee Outcome Survey Activities of Daily Living sco (1stweek post operation)	-0.154	0.416	-0.755	<0.001*
Total knee Outcome Survey Activities of Daily Living sco (2ndweek post operation)	-0.503	0.005*	-0.673	<0.001*
Total functional Limitations with Activities of Daily Livir score (1stweek post operation)	0.411	0.024*	0.685	<0.001*
Total functional Limitations with Activities of Daily Livir score (2ndweek post operation)	0.425	0.019*	0.745	<0.001*

Discussion

Reconstructive surgery has remained the gold standard of care for anterior cruciate ligament injuries, it's aimed to prevent erosion and osteoarthritis and regain ligament stability and normal knee function.[19]. Sleep disturbances are commonly reported following musculoskeletal injury and surgery. Pain at night and sleep disturbances are often associated with joint osteoarthritis. Substantial evidence suggests that sufficient quantity and quality of sleep are necessary for maintaining normal bodily function, including restoration of damaged tissues and flushing toxins from the brain, while inadequate sleep can have serious long-term health consequences.[20] .

Not having sufficient sleep has been reported as a public health risk contributing to obesity, cardiovascular disease and mental health disorders. These increased inflammatory markers may adversely

prolong recovery following orthopedic-related surgery or musculoskeletal injury. [26] so this study will evaluate the effect of implementing sleep hygiene guidelines on daily living activities for anterior cruciate ligaments reconstruction patients. **Concerning socio-demographic characteristics** of the studied patients. The present study showed that nearly half of the patients in both control and study groups were between (30- <40) years old. This study as the same line of, **Lionel et al, (2022)[21]** who studied anterior cruciate ligament injury epidemiology in team-ball sports, reported that the majority of the studied patients were in age between 30-40 years old. In the contrary, **Mardani et al, (2022)[22)]** who performed study about reconstruction of anterior cruciate ligament over 50 years old.

Regarding sex in the present study it was found that more than half of the patients in the control and study groups were male. This finding is agree with **Sik Ahn et al, (2021) [23]** , who studied physical activity in anterior cruciate ligament injury, showed that the majority of the studied patients were male. on the other hand, this study is in disagreement with **Howe et al, (2021)[24]** , they reported that female were at higher risk for ACL rupture than male. **Regarding marital status** in the present study more than half of the patients in the control and study groups were married These subjects' marital status was similar to **AbdElghany et al,(2019)[25]**, who reported that that most of their studied sample were married. **In relation to educational level**, the finding of this study represented that most of both groups were university educated. This agree with **Alqarni et al,(2020)[26]**, who reported that that most of their studied sample were university educated.

As regarding to mechanism of injury the results revealed that about one third of the patients in the control and study groups their mechanism of injury was due to playing sports. This study is in the line with **Godin et al,(2017)[28],** who reported in their studies that the majority of the mechanism of injury were playing football**. In contrast, it disagrees with Spörri et al,(2022)[29],** who reported that the most mechanism of injury among studied patient were an accidental case.

Concerning with the sleeping pattern among the studied groups and number of days with sleep disturbances, the results revealed that more than one third of the patients in both control and study groups were having sleep disturbances for 4 days and the results revealed that more than half of the patients in the control and study groups were not sleeping well. This agree with **DePhillipo et al,(2021)[30],** who reported that there was high incidence of acute self-reported sleep disturbances following arthroscopic knee surgery..**In contrast, it disagrees with Wainwright et al,(2019)[31],** who stated that there was an improvement in sleep quality and duration can be expected after total knee arthroplasty.

Regarding taking day time nap, more than half of the studied patients in the both groups were taking day time nap. This is in the same line with **Gulam et al, (2020)[32],** they reported that the majority of studied patients taking day time nap which affect their sleeping at night. **In contrast, it disagrees with Jensen et al, (2021)[33],** who reported that only one quarter of studied patients in both groups were taking day time nap.

In relation to smoking, half of the patients in the control and study groups were smoker. **In the same line with Costa et al,(2018)[34],** they reported that more than of studied patients were smoker. **As regard to drinking caffeine,** it was observed that more than half of the patients in control and study groups were drinking caffeine. This agree with **Garrett et al,(2021)[35],** who reported

that more than half of studied patients need caffeine to perform their work.

Concerning the acquisition of knowledge, the result of the current study revealed that more than half of the studied patients hadn't good level of knowledge regarding anterior cruciate ligament surgeries and sleep hygiene guidelines among the studied groups, before program implementation. This results were agree with **Hussein et al,(2020)[36], Piussi et al,(2021)[37],** reported that the majority of the studied sample had a good knowledge level. Additionally, the result of the current study revealed that more than half of the studied patients had satisfactory level of knowledge regarding anterior cruciate ligament surgeries and sleep hygiene guidelines among the study groups, after program implementation. This results were supported by, **Øiestad et al,(2018)[38],** reported that more than two third of studied patients had improvement in knowledge about sleep hygiene .

Regarding habits, practices and behaviors related to sleep hygiene of the studied patients. The results revealed that less than one quarter of the patients in the control and study groups were having good sleep hygiene at the second day of the operation, which developed after 1st week of operation in the study groups, then become much better in the study groups at the 2nd week of the operation. **This results agree with Anwer et al, (2019)[39]**, reported that sleep hygiene index show an acceptable internal consistency as well as a high reproducibility among studied sample.

Concerning with knee outcome survey-activities of daily living, the results of the present study revealed that there were improvements and statistically significant difference regarding the degree of performing activities of daily living, The patients' ability to perform their activities were improved as result of reduction of knee symptoms and improved knee function at 2nd

week post operative. The activities of daily living scores also improved with time. **This finding agrees with Szczepanik et al,(2018)[40],** stated that there were an enhancement in knee function and reduction of knee symptoms in more than half of the studied patients.

Regarding Correlation between Total knowledge pre-program implementation with Total sleep Hygiene Index score, Total knee Outcome Survey Activities of Daily Living score and Total functional Limitations with Activities of Daily Living score at (2nd day of operation) in both groups. The present result revealed that there was highly statistically significant with positive correlation between total knowledge pre and total functional limitations with activities of daily living score (2nd day of operation) in two groups, highly statistically significant with negative correlation between total knowledge pre with total sleep hygiene index score and total knee outcome survey activities of daily living score (2nd day of operation) in two groups. This finding with the same line with, **Panagopoulos et al, (2020)[41],** who studied Cross-cultural adaptation of the greek versions of the lysholm knee scoring scale and tegner activity scale, reported that there was highly statistically significant with positive correlation between total knowledge and total functional limitations with activities of daily living score.

Regarding Correlation between Total knowledge post program implementation with Total Sleep Hygiene Index score, Total knee Outcome Survey Activities of Daily Living score and Total functional Limitations with Activities of Daily Living score at (1st week and 2nd week after operation) in both groups. The current result revealed that There was highly statistically significant with negative correlation between total knowledge with total sleep hygiene

index score (1st week post operation), total sleep hygiene index score (2nd week post operation), Total knee Outcome survey activities of daily living score (1stweek post operation) and total knee outcome survey activities of daily living score (2ndweek post operation) in study group. **In the same line with, Cui et al, (2020)**[42]**.** who studied, Global, regional prevalence, incidence and risk factors of knee osteoarthritis in population-based studies, reported that there was highly statistically significant with negative correlation between total knowledge with total sleep hygiene index score.

Conclusion

Based on the finding of the current study, it can be concluded that: sleep is a fundamental aspect of health and well-being, particularly when recovering from an illness or injury. It is clear that there are recognizable environmental factors that can be removed or adjusted with relatively simple changes to practice and the use of earplugs and eye-masks. According to the results of this study, sleep hygiene guidelines program has a favorable effect on the activity of daily living among patients with anterior cruciate ligaments reconstruction, the patients' ability to perform this activity improved as result of improvement of sleeping habits and reduction of knee symptoms.

Recommendations

Based on the findings of the present study, the following recommendations are suggested: Provide clear instruction to patients about behavior change interventions that consider both personal (family obligations, attitudes towards sleep) and environmental factors (irregular work schedules, location of workplace) to provide a foundation for improvement of sleep hygiene- Regularity of rise time- Exposure to morning light and exercise for easy transition to sleep and sleep maintenance. It's

recommended that future research in sleep hygiene focused on: Strategies that manage negative emotions at bedtime. Establishing high carbohydrates or tryptophan-rich foods.

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