Effect of Eye Movement Exercise on Pain and Sleep Quality among Patients with Burn

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Abstract

Background: Burn injuries are a traumatic experience that can cause significant pain and sleep disturbances that impact patients' healing and recovery. **Aim:** Was to evaluate the effect of eye movement exercise on pain and sleep quality among patients with burn. **Design:** A quasi-experimental (pretest - post test non equivalent control group) design was used to achieve the current study aim. **Setting:** The current study was carried out at a burn unit affiliated to an educational University Hospital, Cairo, Egypt. **Sample:** A purposive sample of 60 adult patients with burn was recruited for the study, the sample was divided equally into two groups; study group who received conventional treatment and eye movement exercise and control group who received conventional treatment only. **Tools:** Three tools were used for data collection; Tool (I): Participants' Demographic Characteristics and Medical Related Data Form; Tool (II) The Visual Analogue Scale (VAS) and Tool (III) Pittsburgh Sleep Quality Index (PSQI). **Results:** Mean age of the current study participants were 36.43 ± 13.45 years for the study group and 33.43 ± 9.09 for the control group. There were statistically significant differences in pain mean scores between the two groups after one and two weeks (P value =0.000& 0.05 respectively). Also, there was statistical significant difference between the two groups in relation to total PSQI after one week only (P value =0.000). **Conclusion:** Based on the findings of the current study, the implementation of eye movement exercise has a significant effect on improving patient's pain severity and sleep quality among patients with burn. **Recommendations:** Eye movement exercise should be promoted in nursing management of burn as it can alleviate pain sensation and improve sleep quality.

Keywords: Eye movement exercise, Pain, Sleep quality & Burn

Introduction

Burns are a kind of tissue damage that can happen locally or systemically and are caused by biological, chemical, electrical, and physical sources. Any age group and social class might get burns. The high rates of death, morbidity, and social and economic costs in society are caused by the high prevalence of burns and serious injuries. It is seen as a traumatic event linked to changes in the body, mind, and social structure, including symptoms of post-traumatic stress disorder, sadness, pain, sleeplessness, and exhaustion (**Beal, Lerman, & Leppla, 2022; Burgess et al., 2022**).

Furthermore, burn injuries are generally regarded as some of the most excruciating ailments a patient may have. The appropriate management of a burn injury necessitates unpleasant procedures such as debridement of the wound, daily wound care, and surgery, in addition to the inherent pain caused by the burn itself. Following this, vigorous physical and occupational therapy is recommended (**Opriessnig et al., 2023**).

Additionally, patients with burn must undergo repeated procedures and therapies that include manipulation of their severe burn sites, burn pain is particularly complex, multilayered, and frequently changes over time. Additionally, burn injuries can cause damage to nerve endings, which results in neuropathic pain, which can be excruciating, shooting, or even have a pins-and-needles sensation. Burn-related psychological and emotional trauma might intensify pain perception even further (**Stanton, et al., 2024; Klifto et al., 2021**).

A bidirectional relationship between sleep and pain was evidenced in many researches. Insufficient sleep intensifies the sense of pain, exacerbating its experience. On the other hand, unmanaged pain interferes with sleep, which makes one tired and less tolerant of pain. This vicious loop may impede recovery and healing (**Woelk, Goerlitz, & Wachholtz, 2020**).

The most prevalent kind of sleep disturbance is insomnia. It can manifest in a variety of ways, such as having trouble getting asleep, having trouble remaining asleep, having poor-quality sleep, waking up too early, and/or having nightmares. As a result, sleeplessness can be incredibly upsetting, crippling, and negatively impact recovery from burn injuries. Additionally, insomnia can worsen feelings of restlessness, impair one's capacity to handle stress, and slow down the healing process (**Oh, & Choi, 2022; Nosanov et al., 2020**). In addition, It decreases glucose tolerance, increased blood pressure and the risk for cardiovascular diseases (**Mokhtari, Ajorpaz, & Golitaleb, 2023; Rafii et al., 2020**).

Pain and sleeplessness are often treated with one of two approaches: pharmaceutical or non-pharmacological. Benzodiazepines and opioids are the typical pharmacological drugs used to treat pain in burn patients. But given the negative consequences of prolonged usage and large dosages of these medications on burn patients, most academics now focus on complementary medicine and other non-pharmacological methods to treat burn patients' pain and suffering and enhance their overall health (**Whale et al., 2022; Harorani et al., 2020**).

Eye movement exercise (EME) is among the non-pharmacological methods that used to improve and decrease the presence and severity of pain and insomnia (**Hu et al., 2021; Sadeghi et al., 2020**). Exercises involving eye movements such as tracking visual stimuli in predetermined patterns have the ability to activate brain regions related to pain perception and sleep regulation. It can improve physical and sleep quality, lessen painful sensations, and lessen unpleasant emotions. Additionally and can also raise living standards generally and productivity **(Hu et al., 2022).**

This study has the potential to add significant evidence to the expanding body of knowledge regarding non-pharmacological therapies for burn patients' pain management and sleep enhancement. Eye movement exercise is an affordable and easily accessible tool that nurses can use to enhance patients' health status. As essential members of the healthcare team, nurses play a critical role in providing patients with the skills they need to overcome their concerns by putting evidence-based solutions into practice. Therefore the current study aimed to examine the effect of eye movement exercise on pain and sleep quality among patients with burn.

Significance of the Study

Burn injury is a significant threat to global public health that can have a wide range of effects, including psychological and cosmetic harm in addition to physical, functional, and vocational harm (**Rouzfarakh et al., 2021)**. The World Health Organization (WHO, 2023) estimates that 180,000 people die from burns a year, most of which occur in low- and middle-income nations. Moreover, over 96% of these deaths are due to fires in poor nations. In addition to the high fatality rate, millions of burn sufferers experience permanent disability and disfigurement (**Baimuratova & Abashidze, 2023)**. Statistics indicate that every year in Egypt, almost 100,000 individuals get burned. The statistics of those who have burned are horrifying; in Egypt, the death rate from burn injuries can reach 37%, while in other nations in the region, it averages 5% (**Shabana et al., 2021**).

After burn injuries, sleep disturbances are very common; over 50% of burn patients reported having trouble sleeping. Another significant issue related to burn injuries is extreme pain and exhaustion, which may persist until full wound healing and improvement **(Liang et al., 2021)**. A significant amount of research has demonstrated the intriguing connection between pain, sleep, and non-pharmacological interventions like yoga, breathing techniques, relaxation, and music listening **(Şara et al., 2022).**

The non-pharmacological intervention that is easy, safe, readily available, inexpensive, and suitable for autonomous use at any time or place is eye movement exercise. Furthermore, it has no negative effects and doesn't require any equipment to be used **(Hu et al., 2021; Hu et al., 2022**).

The core of burn care is provided by nurses, who offer all-encompassing care that attends to the medical, psychological, and social requirements of burn patients during their treatment and recuperation. When it comes to providing non-pharmacological techniques, medication administration and positioning, nurses are essential. However, there is still a deficiency of conclusive data regarding how EME affects pain and sleep quality among patients with burn. Therefore, it was crucial to assess how eye movement exercise affected burn patients' pain and quality of sleep.

Aim of the study

The current study aimed to evaluate the effect of eye movement exercise on pain and sleep quality among patients with burn.

The following four research hypotheses were formulated to achieve this study aim:

H^1: There will be a statistical significant difference in the mean score for pain intensity between the study and the control group after one week of receiving eye movement exercise.

H^2: There will be a statistical significant difference in the sleep quality mean score between the study group and the control after one week of receiving eye movement exercise.

H^3: There will be a statistical significant difference in the pain intensity mean score between the study group and the control group after two weeks of receiving eye movement exercise?

H^4: There will be a statistical significant difference in the sleep quality mean score between the study group and the control after two weeks of receiving eye movement exercise .

Operational definitions

Patients with burn: In the present study refers to patients with second and third degree burn according to depth and total body surface area (TBSA ≥ 10%).

Pain: In the present study, it means to self-reported moderate to severe pain ≥ 4 as measured by Visual Analogue Scale (VAS) (**Smeltez & Bare, 2017**).

Sleep quality: It refers to self-reported sleep disruptions ≥ 10 on the Pittsburgh Sleep Quality Index in the present study (**Suleiman, Al-Hajjaj, & Ashraf, 2010**).

Eye movement exercises: In the current study, the ability of the patient to carry out basic eye exercises, like moving the eyes downward and internal (using the inferior rectus), upward and internal (using the medial rectus), downward and internal (using the superior rectus), upward and external (using the inferior oblique), downward and external, etc.

Objectives of the study:

- Enhance the quality of sleep for burn patients.
- Reduce the level of discomfort experienced by the burn patients
- Reduce the need for painkillers.
- Develop the eye muscles and improve eye mobility
- Promote relaxation and the sleep efficacy

Methods

Research Design

A quasi-experimental (pretest - post test non equivalent control group) design was used to achieve the current study aim. This design concerns manipulating the independent variable to detect the effect on the dependent variable. The pre- post-test results help establish the effectiveness intervention's measures proposed in the current study **(Polit, & Beck, 2017).**

Setting

The investigation was conducted in a burn unit of an Egyptian educational university hospital in Cairo. This unit, which is located on the sixth floor, has 21 beds as well as an intensive care unit. Patients with varying degrees of burns can receive medical, surgical, and nursing services, along with post-exposure care.

Sample

A purposive sample of 60 adult male and female patients with **the following inclusion criteria** was recruited in the current study: they were adults between 20 and 60 years old, had burn injuries of TBSA ≥ 10%, had pain severity ≥ 4 on VAS, had sleep disturbances with ≥ 10 points on PSQI scores, admitted at least two days before conducting the study, in order to be hemo-dynamically stable and were willing to take part in the study. The participants were divided into two groups by randomly assigned technique; study group who received conventional treatment and eye movement exercise and control group who received conventional treatment only.

Exclusion criteria: Participants who were suffering from mental health concerns or communication difficulty, had pre-existing eye conditions, uncontrolled medical conditions, inability to follow instructions, had a history of drug addiction and were taking sleep and/or anti-anxiety medications were excluded from the current study

Calculation of Sample Size: Epi info -7 program was used utilizing the further parameters. Population size=100, Acceptable error= 5%, Confidence coefficient=95 %, Expected frequency=50%, thus minimum sample size= 60 patients.

Data collection tools:

The following three tools were employed by the researchers to gather data:

Tool (I): Participants' Socio-Demographic Characteristics and Medical Related Data Form: such as age, gender, level of educational, occupation ….etc.

Tool (II): The Visual Analogue Scale (VAS) was used to assess pain intensity. In the current study, the segmented numerical version of the VAS called the Numeric Rating Scale (NRS) was employed.

Scoring system of tool (II)

The Numeric Rating Scale has 11 numbers to reflect the intensity of pain, ranging from (zero) means no pain, (1-3) mean mild pain, (4-6) mean moderate pain, (7-10) mean sever pain **(Hawker et al., 2011**).

Tool (III): Pittsburgh Sleep Quality Index (PSQI). It is an effective tool used to measure the quality and patterns of sleep; its Arabic reliable version was adopted by the researchers from **Sueliman et al, (2010)**. It consists of "19" self-assessed questions in addition to "5" questions assessed by the bed partner or roommate. However; only the self- assessed questions were included; the questions were then grouped to form seven "Sleep Domains" namely: subjective sleep quality (Q 9), sleep latency (Q2 & 5a), sleep duration (Q 4), sleep efficiency (Q 1, Q 3 & Q 4), sleep disturbances (Q5b - Q5j), use of sleep medication (Q 6), and daytime dysfunction (Q7 & Q 8).

Scoring system of tool (III)

Each question is scored through three points Likert Scale ranging from (zero) which means no difficulty to (three) that means severe difficulty. The seven component scores are then added together to give a global PSQI score ranging from zero to 21. Generally, score from 0-5; good sleep quality, score from 6-10; mild sleep problems, score 11-15; moderate sleep problems and 16-21; severe sleep problems.

Pilot study

Six participants, or ten percent of the entire sample under investigation, were subjected to it in order to evaluate the instruments' clarity and application, determine whether fieldwork is feasible, and identify any obstacles the researcher might face that would make data collection difficult. There were no changes made. The representative participants were included in the basic sample.

Validity of the tools

The adopted tools content validity was tested by panel of five experts in the field of medical surgical nursing for testing content validity, clarity of sentences, and appropriateness of content. Modifications were carried out according to the experts' judgment.

Reliability of the tools

The Cronbach's alpha coefficient was used to evaluate the scale's internal consistency. A reliability coefficient of 0.70 is considered satisfactory, a Cronbach's alpha score of 1.00 denotes perfect reliability, and a value of 0.00 denotes no dependability. In the current study, the Arabic version of the Pittsburgh Sleep Quality Index scale had a Cronbach's alpha value of 0.856. Subjective sleep quality (0.794), sleep latency (0.863), duration (0.979), sleep efficiency (0.959), sleep disruptions (0.892), use of sleep medication (0.709), and daytime dysfunction (0.960) were the sleep domains alpha scores.

Ethical Considerations

Official approval was obtained from the Research Ethics Committee at Faculty of Nursing, Cairo University (IORG0005857). Before the study began, participants received detailed information about the research goals, its importance, and how it would be conducted. They had the chance to ask questions and were given a guarantee that they might leave at any time without incurring any penalties. A written informed consent was obtained before data collection started. To protect participant privacy, all data was anonymized using codes. Additionally, the documents were stored securely in a locked location.

Data Collection Procedure

After receiving formal approval to conduct the study, the researchers located possible participants who fit the requirements for inclusion in the study. Data were collected over a period of one year, starting from September 2022 to September 2023. Three phases were used to gather the following data: a) **During the first phase** (preparatory and assessment phase), the researchers discussed the nature and aim of the study, then got the written informed consent from participants and collected demographic and medical data through in-person interviews utilizing tool number (I). Additionally, each participant, whether in the control or study group, received the second and third tools, which they were to to be answered by participants and to be filled by the researchers in thirty minutes. Data was collected firstly from control group then study group to avoid contamination.

In the second phase (implementation phase), the control group was given conventional treatment and the study group was given conventional treatment and eye movement exercise using video and written flyer following these steps. (1) The researchers explained to the participants the function of eye movement training. (2) kept the participants in a quiet and relaxed condition, with both eyes into

the distance horizontally during which the eyeballs were moved internal (with medial rectus), upwards/internal (with superior rectus), downwards/internal(with inferior rectus), upwards/external (with inferior oblique), and downwards/ external (with superior oblique) for 36 times each and moved annular from left to right to the maximum extent, this session took about 15-30 minutes. After that, the researchers asked the participants to demonstrate the exercise to check the accuracy for application of eye movement exercise that was performed once a day for two weeks before bed time.

The third phase was the evaluation phase, every participants in the two groups were re-evaluated after one and two weeks using tools(II & III) that filled in by the researchers.

Statistical Analysis

Version 25 of the Statistical Package for the Social Sciences (SPSS-v25) was used to analyse the data. In order to provide percentages, means, and standard deviations for the patients' medical and demographic data, descriptive statistics were performed. The independent t test and chi-square test were used to examine the homogeneity of the two groups at baseline.The study employed the independent t-test to assess any variations in pain and sleep quality between the control and intervention groups. At p-value <0.05, the statistical significance criterion was reached.

Results:

Statistical results of the current study are displayed in three sections as follows: **Section1:** Describes personal demographic characteristics and medical related data of the study participants (Table 1 & Figure 1). **Section 2:** Represented hypotheses testing (Tables 2 & 3), and **section 3**: Clarifying other additional findings as differences among Pittsburgh Sleep Quality Index domains (Table 4) and relationship of total pain intensity mean scores and total PSQI mean scores among study participants along the two weeks of the study (table 5&6).

Table (1) reveals that the age group of 18 to less than 40 years old represented 63.3% of the study group and 70% of the control group, with the study group's mean age being 36.43 ± 13.45 years and 33.43 ± 9.09 for control group. Additionally, it shows that married women made up 70% & 56.7%, 53.3% & 56.7% of the study group and control group, respectively. Concerning occupation 53.3 % of study group and 70% of control group were housewives. Regarding educational level (46.7 % & 56.7%) of the study and control groups had a secondary education and 80% & 50 % of them living in urban areas respectively. Moreover, there were no a statistical significant differences between both groups in relation to demographic characteristics except occupation.

Figure (1) showed that, the second degree of burn (60% & 63.3%) were the most frequent degree of burn among the study and control group, (56.7 % & 70 %) were not smoker among the groups respectively, regarding the past medical history 53.3% from the study group had teeth problem while 56.7% of the control hadn't past medical history.

Table (2) illustrates that the mean scores of pain intensity in the study group pre eye exercise, after week & after 2 weeks was (9.26 ± 0.94, 6.03 ± 1.42, 2.60 ±2.59 respectively). On the other hand, in the control group it was (8.33 ± 1.06, 7.60 ± 1.35, 3.76 ± 1.88 respectively). It appeared from table 2 that there was a statistically significant difference in pain mean score after one and two weeks among both groups (P value =0.000).

According to **table (3)**, a noticeable decrease was identified in global PSQI mean scores after one and two weeks among participants in both group. The same table clarifies also that, there was a statistical significant difference in the mean score of PSQI among the groups after one week at (P=< 0.000*).

It is clear from **table (4)** there were reduction in PSQI mean scores all over the seven domains in the two groups, whereas a notable decline was observed among the study group. Additionally there are statistical significant difference in sleep efficiency, day time dysfunction & sleep disturbance before eye exercise at (P value < 0.05). While after one week there were statistical significant differences in all PSQI domains at (P value < 0.05) between both group except the domain of sleep efficiency. While after 2 weeks there are statistical significant difference in sleep efficiency, use of sleep medication, & sleep disturbance at (P value < 0.05).

Table (5) elaborates a statistical significant differences of total pain intensity mean scores among participants in each study and control group along the two weeks of the current study at (P value ≤ 0.000*). In addition, **Table (6)** elaborates also a statistical significant differences in the total PSQI mean scores among participants of both group along

the two weeks of the current study at (P value ≤ 0.000*).

Section (1)

Table (1): Frequency and percentage distribution and statistical differences of

Demographic Characteristics	Study group (30)		Control group (30)		χ 2	P- value
	No	%	No	%		
Age					0.663	0.718
18- < 40	19	**63.3**	21	**70.0**		
40- < 60	9	30.0	9	30.0		
≥ 61	2	6.7	0	0		
Mean SD	36.43 ± 13.45		33.43 ± 9.09			
Gender					0.621	0.431
Male	14	46.7	13	43.3		
Female	16	**53.3**	17	**56.7**		
Marital status					0.006	0.936
Single	9	30.0	13	43.3		
Married	21	**70.0**	17	**56.7**		
Occupation					6.667	0.036*
House wife	16	**53.3**	21	**70.0**		
Employee	14	46.7	9	30.0		
Level of education					0.444	0.801
Cannot read and write	6	20.0	0	0.0		
Primary	9	30.0	8	26.6		
Secondary	14	**46.7**	17	**56.7**		
University	1	3.3	5	16.7		
Place of residence					9.613	0.383
Rural	6	20.0	15	50.0		
Urban	24	**80.0**	15	**50.0**		

demographic characteristics among study and control groups (n=60).

*A Statistically significant at p ≤ 0.05

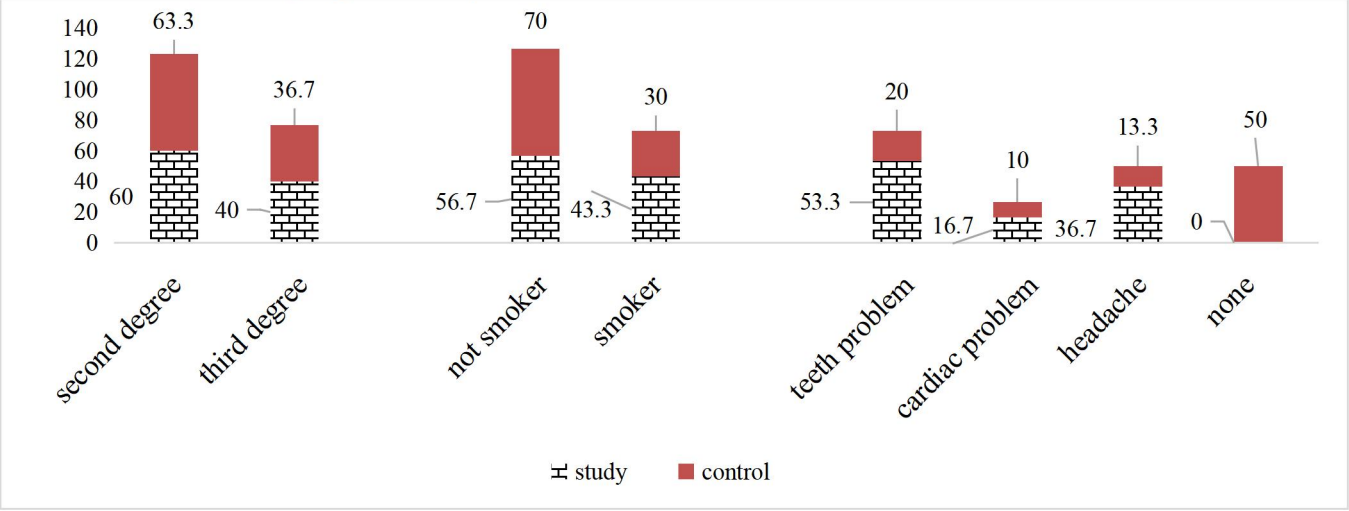

Figure 1. Percentage distribution of medical related data among study and control groups (n= 60)

*NB: the total number different because some patients had more than health problem.

Section (2)

Table (2) Frequency, percentage distribution and comparison of pain mean scores among study and control group pre and post eye exercise (n=60)

pain category	Before eye exercise				After one week				After two weeks			
	Study group n=30		Control group n=30		Study group n=30		Control group n=30		Study group n=30		Control group n=30	
	N	%	N	%	N	%	N	%	N	%	N	%
No pain (0)	--	--	--	--	--	--	--	--	3	10.0	--	--
Mild (1-3)	--	--	---	--	--	--	--	--	15	50.0	17	56.7
Moderate (4-6)	6	20	11	36.6	22	73.3	16	53.3	10	33.3	9	30.0
Severe (7-10)	24	80	19	63.3	8	26.7	14	46.7	2	6.7	4	13.3
Mean ± SD	9.26 ± 0.94		8.93± 1.06		6.03±1.42		8.60 ± 1.35		2.60 ±2.59		3.76 ± 1.88	
T test	3.598				4.363				1.992			
P-value	.061				.000**				.05*			

*A Statistically significant at $p \leq 0.05$ **A Statistically significant at $p \leq 0.01$

Table (3) Frequency, percentage distribution and comparison of total Pittsburgh Sleep Quality Index mean scores among study and control groups pre and post eye exercises (n=60).

Total Pittsburgh Sleep Quality Index scores	Pre eye Exercise				After one week				After two weeks			
	Study group n=30		Control group n=30		Study group n=30		Control group n=30		Study group n=30		Control group n=30	
	N	%	N	%	N	%	N	%	N	%	N	%
Good sleep quality (0-5)	--	--	--	--	--	--	--	--	--	--	-	-
Mild sleep problem (6-10)	--	--	--	--	3	10.0	--	--	12	40.0	10	33.3
Moderate sleep problem (11-15)	8	26.7	10	33.3	15	83.3	9	36.7	16	53.3	14	46.7
Severe Sleep problems (16 to 21)	22	73.3	20	66.7	12	6.7	19	63.3	2	6.7	6	20
Mean ± SD	17.16 ± 1.72		16.66 ±3.36		12.33 ± 2.08		15.80 ± 2.99		10.80±2.60		11.20±5.23	
T	.724				5.195				.375			
P-value	.472				.000*				.709			

* Statistically significant at $p \leq 0.01$

Section 3

Table (4) Comparison of mean scores of Pittsburgh Sleep Quality Index domains among study and control groups pre and post eye exercises (n=60).

Pittsburgh Sleep Quality Index domains	Pre exercise		After one week		After two weeks	
	Study group n=30	Control group n=30	Study group n=30	Control group n=30	Study group n=30	Control group n=30
Sleep latency	2.73±0.44	2.7 ± 0.45	2.43± 0.56	2.63 ±0.46	2.30 ±0.70	2.20 ±0.80
T test	.857		3.053		.501	
P value	.395		.003*		.618	
Subjective sleep quality	2.56 ± 0.50	2.76 ± 0.43	1.03 ± 0.69	2.56 ±0.62	1.36 ±0.85	1.13 ±0.97
T test	1.653		3.719		.989	
P value	.104		.000**		.327	
Sleep duration	2.76 ± 0.43	2.10 ± 1.09	2.06 ± 0.94	2.43 ±0.77	1.73 ±1.14	2.26 ±0.90
T test	4.313		.729		1.736	
P value	.469		.000**		.088	
Sleep efficiency	2.96 ± 0.18	1.96 ± 1.37	2.33 ± 1.12	2.23±11.19	1.73 ±1.28	2. 23 ±1.19
T test	3.930		.664		2.076	
P value	.000*		.509		.042*	
Use of sleep medication	2.96 ±0.18	2.40± 1.00	2.13 ± 0.62	2.33 ±0.99	1.66 ±0.71	1.12 ± 1.22
T test	3.043		.931		2.063	
P value	.356		.004*		.044*	
Day time dysfunction	1.30 ± 0.83	2.23± 0.67	0.96 ±0.66	2.16 ±0.74	0.76 ±0.62	0.76 ± 0.77
T test	4.637		6.225		.508	
P value	.000*		.000*		.614	
Sleep disturbance	1.86 ±0.50	2.5 ± 0.50	1.46 ±0.50	2.43 ±0.62	1.23 ±0.43	1.46 ± 0.73
T test	4.832		7.184		1.896	
P value	.000**		.000**		.043*	

*: Statistically significant at $p \leq 0.05$ **Statistically significant at $p \leq 0.01$

Table (5) The difference of total pain intensity mean scores among participants in each study and control group along the two weeks of the study (n=60).

Total pain intensity	Study group n=30			Control group n=30		
	Before eye exercise	After one week	After two weeks	Before eye exercise	After one week	After two weeks
Mean ±SD	9.26 ± 0.94	6.03 ± 1.42	3.76 ± 1.88	8.33 ± 1.06	7.60 ± 1.35	2.60 ±2.59
F	105.95			90.39		
P value	.000*			.000*		

*: Statistically significant at $p \leq 0.01$

Table (6)The difference of total Pittsburgh Sleep Quality Index mean scores among participants in each study and control group along the two weeks of the study (n=60).

Total Pittsburgh Sleep Quality Index	Study group n=30				Control group n=30		
	Before eye exercise	After one week	After two weeks		Before eye exercise	After one week	After two weeks
Mean ± SD	17.16 ± 1.72	13.33 ± 2.08	10.80 ± 2.60		16.66 ± 3.36	16.80 ± 2.99	11.20 ± 5.23
F	65.46				19.25		
P value	.030*				.022*		

*: Statistically significant at $p \leq 0.05$

Discussion:

Regarding the personal demographic characteristics of the study participants, the findings revealed that about two thirds of the participants in both control and study groups were between 18 - < 40 years old. These findings are consistent with **Mahmoud, Mahmoud and Ammar, (2022)** Furthermore, these results are consistent with the research conducted by **Mahmoud, El Bilsha, and Bahaa (2023) ; Ragab, Abd Elkareem and Elsayed (2021)** which disclosed that, more than half of patients were ≤30 years old.

Concerning gender, more than half of both study and control group were females. This result is corresponded to **Mahmoud et al., (2022)** who stated that, more than half of their participants were females. This result could be accepted as most females aren't prone to such injury. While, this finding is not in agreement with **Mokhtari et al., (2023); Shabana et al., (2021)** who reported the majority of their participants were male.

Regarding marital status, more than two thirds of the study group and more than half of control group were married. This result in agreement with **Mahmoud et al., (2023); Mokhtari et al., (2023); Abo El Ata et al., (2021)** who found that more than half of their participants were married. This outcome could be attributed as marriage is common among the current study participants' age group.

In relation to occupation, more than half of the study group and more than two thirds of control group were house wives. This result supported by **Mahmoud et al., (2022); Magbool, Ali and Hussein, (2021).** This result may be related to the fact that more than half of participants were females

Pertaining to educational level, about half of participants in both groups were received secondary education. This finding is in accordance with **Magbool et al., (2021); Harorani et al., (2020).** On the other hand, this finding is not matching with **Abo El Ata et al., (2021)** who revealed that less than one quarter of their participants received secondary education.

Concerning place of residence, two thirds of the control group and more than two thirds of the study group were from urban areas. This finding is matching with **Abo El Ata et al., (2021)** who reported that, the majority of the studied participants were from urban area. This could be explained in light of the fact that the burn unit in which this study was conducted is in urban area and receive patients from nearby areas. While, this finding isn't consistent with **Ragab, Abd Elkareem and Elsayed (2021).**

In relation to medical related data, the present study findings showed that, more than half of participants in both groups were suffering from second degree burn. This result is consistent with **Ragab et al., (2021)** who displayed that about three quarters of their participants were diagnosed as second degree burn. While, **Mahmoud et al., (2023)** reported that the majority of their participants were third degree burn. From researchers observation during data collection second and third degree of burn only are admitted to hospital to reduce the infection rate beside other degree not needed for monitoring or meticulous care.

Concerning smoking history, the majority in both groups were non smokers. This result is in agreement with **Mahmoud et al., (2023)** study which revealed that more than half of the participants were non-smokers. This result could be related to the fact that more than half of the participants were females and smoking is uncommon among Egyptian females.

Regarding past medical history, the findings revealed that more than half of control group didn't have any past medical history. This finding is in agreement with **Gallo et al., (2022); Fahmy, Abdelaziz, & Yahia, (2022)** who mentioned that the majority of their participants did not have past medical history. According to the researchers, this finding could be related to the fact that majority of participants were in the age group of 18 - < 40 and according to literature, chronic illness is uncommon in this age category

Regarding differences of pain intensity mean score between both groups, the findings of the current study revealed that there was decrease in pain mean scores in the two groups after one week and after two weeks, while the significant pain score reduction was in favor of study group. This result coincides with **Walsh, (2022); Rahimi et al., (2023)** who clarified EME was effective in pain alleviation. In addition, A statistically significant variation was seen in pain mean score between the two groups after one and two weeks (P value =0.000& 0.05). From the researchers' point of view, eye movement exercise is one of the relaxation techniques as yoga, which enhances relaxation and promotes sleep, especially with repetition. Burn patients complain of pain associated with burn injuries, and the application of such exercises can promote comfort and sleep.

Concerning statistical significant difference among PSQI domains, the present study findings showed a significant statistical differences in all PSQI domains at (P value < 0.05) except the domain of sleep efficiency between study group and control group after one week. This finding goes in the same line with **Hu et al., (2021); Jurado-Fasoli et al., (2020)** While after two weeks, there were statistical significant difference in sleep efficiency, use of sleep medication, and sleep disturbance at (P value < 0.05).This finding is correspondent to **Kizilgz, Yeildal, and Kabalak, (2019)**.

In relation to statistical significant differences of total PSQI mean scores between study and control group, there was significant difference between the two groups after one week only. This finding is matching with **Hu et al., (2021); Hu et al., (2021)** who reported that their participants obtained significantly better sleep quality after eye movement exercise.

Conclusion:

The current study was conducted to evaluate the effect of eye movement exercise on pain and sleep quality among patients with burn. There was a statistically significant difference in pain mean score after one week and after two weeks among study group and control group. Also, there was a statistical significant difference in the mean score of PSQI after one week among them. While, there wasn't a statistical significant difference in the mean score of PSQI after two weeks among them. Therefore, the current study proposed hypotheses (H^1, H^2 and H^3) were supported, but hypothesis (H^4) was rejected.

Recommendations:

Based on the current study findings, it is recommended to:

- conduct studies to assess factors related to pain intensity and sleep quality among patients with burn.
- replicate the study with large sample size across several regions in order to obtain more generalization of the findings and build up evidence - based practice.
- conduct session among health care providers regarding eye movement exercise procedure.

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