Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.51, 2018

Effect of Earplugs and Eye Mask on Sleep Quality Among Patients with Acute Coronary Syndrome at Assiut University Hospital

Asmaa Tolba[1]* Warda Youssef Mohammed[2] Mona Aly Mohammed[3] Mogedda Mohamed Mehany[3] Ahmed Abdel-Galeel Ahmed[4]
1.Assistant lecturer of Critical Care and Emergency Nursing, Faculty of Nursing, Assiut University, Egypt
2.Professor of Critical care &Emergency Nursing, Faculty of Nursing, Cairo University, Egypt
3.Assist. Professor of Critical Care and Emergency Nursing, Faculty of Nursing, Assiut University, Egypt
4.Lecturer of Cardiology, Faculty of Medicine, Assiut University, Egypt

Abstract
Background: Sleep disturbance can cause multiple negative cardiovascular effects among patients with Acute Coronary Syndrome (ACS). **Aim:** this study carried out to investigate effect of earplugs and eye mask on sleep quality among patients with ACS. **Design**: a quasi-experimental design. **Setting**: Coronary Care Unit at Assiut University Hospital. **Subjects**: Convenience sampling of 60 male and female adult patients were assigned randomly to two equal groups (30 each). **Tools**: Four tools were utilized to collect data of study, which were: **Tool I** Acute Coronary Syndrome patient assessment sheet **Tool II:** Factors affecting sleep quality among patients with ACS during night **Tool III:** 0–10 Numeric Pain Rating Scale **Tool IV:** ST Mary's Hospital Sleep Questionnaire (SMHSQ). **Methods**: Researcher assessed factors affecting sleep quality during night as base line data and on daily basis for 3 consecutive days. Then, earplugs and eye mask were placed for study group between 7:10 PM. On morning, sleep quality was assessed for study and control groups by using (SMHSQ) between 7:8 AM. **Results**: Finding of this study supported stated research hypotheses with statistical significant difference between study and control groups regarding total mean of sleep quality score during 1st and 2nd nights of intervention (P=0.000**, P= 0.014*) respectively as well as some of environmental factors affecting sleep quality with P. value < 0.05. **Conclusion** Earplugs, eye mask significantly improve sleep quality of patients with ACS. Therefore, offering earplugs and eye mask as a part of routine nursing practice for all ACS patients is highly recommended.
Key words: earplugs and eye mask, sleep quality, acute coronary syndrome patients

1. Introduction

Sleep disturbance in acute coronary syndrome patients is characterized by lacking length or phases of sleep that effect on quality of life. Environmental stimuli have considerate main etiology of sleep disturbance for example noise, light, diagnostic tests and routine patient care. Furthermore, environmental causes may be combined with non-environmental factors, including the patient status at presentation (e.g., myocardial infarction and pulmonary edema), disease severity, pain, patient medications side effect as Beta blockers due to their capacity to cross the blood-brain barrier. **(Bihari etal, 2012& Costal and Ceolim, 2014).**

Patients with acute myocardial infarction complain from sleep disturbance as a result from physiologic inflammatory changes or from the nature of the myocardial infarction itself. Cardiovascular impacts of sleep disturbance exude from the stimulation of the sympathetic nervous system and the discharge of the adrenaline and noradrenaline. Subsequently, rise in blood pressure, pulse and level of myocardial oxygen demand. If Sleep disturbance lasts more than one night, it stimulates the discharge of inflammatory cytokines that cultivate endothelial disruptions related with atherosclerosis and acute coronary syndrome **(Sauvet et al, 2010& Daneshmandi etal, 2012& Mullington etal, 2012)**.

Critical care nurses should be modified some behaviors such as; stop unused suctioning and oxygen equipment, sort out care activities, avoid turn on TVs in the patients' rooms during night, constrain phone calls and silence unnecessary alarms so patients have lower evening sounds. Other effective method can be used to improve sleep quality for patients with acute coronary syndrome are earplugs. The soft and foam type of earplugs they were accepted as a highly protective method from noise and may be used for different nights and generally cheap **(Neyse etal, 2011)**.

One of the most environmental causes of sleep disturbance in coronary care unit (CCU) is light. So that, critical care nurses should organize patient care procedures to permit patients time for united nighttime sleep and a daytime nap. Draperies or blinds ought to be opened during the day to enable patients to get normal light and to assist conscious patients to time of day, with lights darkened at night. Eye mask is effective method to prevent patient from exposure to light. Eye mask is considered financially inexpensive and noninvasive as well as easy to use. **(Yazdannik etal, 2014).**

2. Patients and methods

2.1. Aim of the study

- To identify the different factors affecting sleep quality among patients with acute coronary syndrome at Assiut University Hospital.
- To investigate the effect of earplugs and eye mask on sleep quality among patients with acute coronary syndrome at Assiut University Hospital.

2.2. Hypotheses

- Factors affecting sleep quality among the study group (earplugs and eye mask group) will be lesser than that among control group.
- Patients with acute coronary syndrome will demonstrate improvement in sleep quality with the use of earplugs and eye mask when compared to control group subject.

2.3. Research design:

Quasi-experimental research design was used to conduct this study.

2.4. Setting:

This study was carried out in Coronary Care Unit at Assiut University Hospital.

2.5. Sampling:

A convenience sampling of 60 adult male and female patients with acute coronary syndrome were constituted the study sample. The subjects were randomly assigned into two equal groups (study group and control group, 30 patients each) considering the following matching criteria age group, sex, level of education, diagnosis and comorbidity. All groups received the routine hospital care.

2.6. Inclusion criteria:

This study included patients had the following criteria age over 18 to 60 years, fully conscious patient and have had one previous night in the unit during this hospital stay.

2.7.Exclusion criteria:

This study excluded those who had the following criteria history of brain damage (traumatic or pathologic) or chronic sleep problems, hearing and vision disorders and mentally ill patient.

2.8. Tools:-

Four tools were used by the researcher in this study after reviewing of the related literatures **(Ellis etal, 1981&Leigh etal, 1988 & McCaffery etal, 1999& Moeini etal. 2010, Shahid etal, 2012& Oshvandi etal, 2014& Bagheri-Nesami etal, 2015& Delaney etal, 2015,)** to investigate the effect of earplugs and eye mask on sleep quality among patients with acute coronary syndrome.

2.8.1. Tool one: - Acute coronary syndrome patient assessment sheet:

This tool was developed by the researcher after reviewing of the related literatures **(Oshvandi etal, 2014&Bagheri-Nesami etal, 2015& Delaney etal, 2015)**. This tool consisted of eleven items. It was used to assess the studied patients regarding socio-demographic, clinical data, habits and homodynamic state to form base line data to be compared with. This tool comprised two main parts:

Part I: Socio demographic and clinical data sheet:

Socio-demographic data included patient's age, sex, level of education. **Clinical data** as patient's diagnosis, past medical history and history of previous hospitalization in ICU. **In additional to,** habits such as drinking tea and coffee.

Part II: Homodynamic state:

This part included pulse, blood pressure, respiration and temperature**.**

2.8.2 Tool two: Factors affecting sleep quality among patients with acute coronary syndrome during the night:

This tool was used to assess environmental and non- environmental factors affecting sleep quality among patients with acute coronary syndrome. Researcher recorded patient's responses to these factors as yes or no and then calculated the numbers of patient's responses with yes or no. Environmental factors included seven items were constant cardiac monitoring, lighting, noise, patient-care activities as taking vital signs, medication administration, diagnostic testing, and others nursing care activities as bed making and feeding. Non-environmental factors included two items were pain and medications as sedating and inotrope drugs, beta-blocker and angiotensin-converting enzyme inhibitors.

2.8.3. Tool three: 0–10 Numeric Pain Rating Scale

This tool was adopted from **(McCaffery etal, 1999)** and used to assess the intensity of pain levels on a scale of 0 (no pain) to 10 (worst pain). This scale consists of 4 items includes (0→No pain, 1, 2, 3→mild pain, 4, 5, 6→moderate pain and 7, 8, 9, 10→sever pain).

2.8.4. Tool four: ST Mary's Hospital Sleep Questionnaire (SMHSQ):

This tool was developed by **Ellis etal, (1981) & Leigh etal, (1988)** then modified by the researcher in this study. ST Mary's Hospital Sleep Questionnaire is a sleep systematic questionnaire is designed for evaluating sleep status of the hospitalized patients. It included fourteen items for assessing the duration and subjective quality of an individual's previous night's sleep and it can be repeated again. The SMHSQ includes both likert type and open-ended type questions. The questions were about the amount of a day and night sleep, depth of sleep, waking numbers during sleep, sleep quality, the amount of waking consciousness, the amount of satisfaction with sleep, troubling by waking early and difficulty in getting off to sleep. This questionnaire had been evaluated in many studies. For example **Moeini etal. (2010)** used this questionnaire and achieved its reliability 0.91 and **Oshvandi etal, (2014**) used this questionnaire and achieved its reliability 0.87 and in this study, reliability was 0.781 by using Cronbach's alpha. **(Moeini etal. 2010, Shahid etal, 2012& Oshvandi etal, 2014)**

The researcher modified first four questions from open ended questions to closed questions. An answer of the first and second questions arranged in four chooses while an answer of third and fourth questions arranged in three chooses.

The scale's scoring process has not been standardized grading for this questionnaire. The SMHSQ questionnaire was scored in the present study, based on the opinion of experts and specialists. In this study the SMHSQ questionnaire divided to two parts; part one reflected duration of sleep and presented in questions (1,2,3,4,7,8and14) while part two reflected sleep quality and presented in questions (5,6,9,10,11,12,and13). Scores are between 6 and 38 which reflected part two of the SMHSQ questionnaire. A score of 6-16, a severe sleep disorder; a score of 17-27, a moderate sleep disorder; and a score of 28-38 a slight sleep disorder**.**

2.9. Method

- **The study was conducted throughout three main phases**, which were preparatory phase, implementation phase and evaluation phase:-

2.9.1. Preparatory phase

- Permission to conduct this study obtained from the responsible hospital authorities in cardiology department after explaining the aim and nature of the study.
- Ethical considerations: Research proposal approved from Ethical Committee in the Faculty of Nursing. Written consent was obtained from patients or guidance that were willing to participate in the study, after explaining the nature and purpose of the study. Patients' anonymity and confidentiality were assured. Study patient privacy was considered during collection of data.
- Tool one and two in this study was be developed by the researcher based on reviewing the relevant literature.
- Tool four in this study was translated into Arabic by the researcher after modification for testing validity and reliability.
- Content validity: Tools were tested for content validity by a jury of (5) specialists in the field of critical care nursing and cardiology from Assiut University, and necessary modifications was done.
- The Reliability was done on tool two, tool three and tool four by Cronbach`s Alpha (r = 0.834 & 0.831& 0.781 respectively) to assess the consistency and stability of the tools.
- A pilot study was conducted on 6 patients in order to assess the feasibility and applicability of the tools and the necessary modifications was done.

Data collection:-

- Intervention for the studied patients was initiated on the second night of hospitalization. There was no intervention on the first night of hospitalization because of the patients' acute conditions. Data was completed for 4 days (the 1st day of hospitalization concerning first night of sleep in the hospital and 3 days of intervention).
- Data were collected over nine months approximately starting from February 2016 to October 2016.

2.9.2. Implementation phase for the study and control groups:-

- For control and study groups:
  - The researcher assessed patient from the first day of admission and record patient socio demographic, clinical data and habits before any data collection by taking this information from his/her sheet using tool 1 (Part 1).
  - The researcher assessed homodynamic state of the study and control groups (pulse, respiration, blood pressure and temperature) every four hours daily by using tool 1(part 2) for four days to assess

effects of sleep disturbance.
- The researcher assessed factors affecting sleep quality of the study and control groups during night as base line data and on daily basis for 3 consecutive days between 7: 8 am by using tool 2 and tool 3.

- For study (earplugs and eye mask) group:
  - Earplugs selection: The earplugs used in this study were selected by examining previous research, cost, and availability. Only foam earplugs had previously been found to be the easiest and most comfortable to use, they stay in place during positioning and were comfortable throughout the night.
  - These earplugs were made from polyurethane with a smooth, soil-resistant skin which prevented dirt buildup. They were bell-shaped for comfort and were designed to be easy to insert with reduced tendency to back out of the ear. They came in one size fits all of ear sizes.
  - The researcher examined earplugs prior to using for fitting, dirt, damage, deformation or extreme hardness and discard immediately if compromised. Then, washed earplugs with mild soap and warm water only. Then, dried earplugs with a towel and stored in a case when not in use.
  - The researcher examined eye mask that fit comfortably and not be too tight on participant face.
  - Patients slept with earplugs and eye mask from second night of hospitalization for three consecutive nights.
  - The earplugs and eye mask were placed between 7 PM and 10 PM.
  - Data were analyzed from participants who wore earplugs and eye mask for great than half of the sleep time as self-reported.

2.9.3. Evaluation phase:

This phase was done to evaluate sleep quality for both the study and control groups by using ST Mary's Hospital Sleep questionnaires which was completed every day in the morning between 7: 8 AM for 4 days (the 1st day of hospitalization concerning first night of sleep in the hospital and 3 days of intervention).

3. Statistical analysis:

- Data were computerized and analyzed by computer programme. Data was collected and analyzed by computer programmed SPSS (ver.16) .Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for qualitative variables. Quantitative continuous data were compared using Independent samples t- test for comparisons among two groups. Qualitative variables were compared using chi-square test to determine significance.
- The critical value of the tests "P" was considered statistically significant when P less than 0.05.
- Pearson correlation was used to compare between total mean of sleep quality score and main blood pressure.

4. Limitation of the study

- It was difficult for the researcher to assess sleep stages of patients with ACS which was positively beneficial to this study but it couldn't be reached because of the unavailability of polysomnography (PSG) in CCU.
- Lack of Egyptian statistical record about sleep quality of acute coronary syndrome patients.

5. Results

The current study was aimed to evaluate factors affecting sleep quality, effect of earplugs and eye mask on sleep quality among patients with acute coronary syndrome at Assiut university hospital.

To achieve the aim of this study the following research hypotheses were formulated:

I. Factors affecting sleep quality among the study group will be lesser than that among control group.
II. Acute coronary syndrome patients will demonstrate improvement in sleep quality with the use of earplugs and eye mask when compared to control group subject.

Results of the current study are presented in three sections:-

- **Section I:** Delineated the socio-demographic and clinical data: Tables (1-3) and figure (1) are related to this section.
- **Section II:** Delineated the testing of research hypotheses (I). Tables (4-8) are related to this section.
- **Section III:** Delineated the testing of research hypotheses (II) tables (9- 10) are related to this section.
- **Section I: Socio-demographic and medical data of patients**

Table 1: Comparison between the study and control groups in relation to socio- demographic data.

Items	Study group (n= 30)		Control group (n= 30)		P. value
	No	%	No	%	
Age: (years)					
<40 years	2	6.6	2	6.6	0.349
40 - < 50 years	10	33.4	8	26.6	
50 - 60 years	18	**60.0**	20	**66.6**	
Mean ± SD(year)	50.7±7.0		52.2±6.2		
Level of education					
Read and write	9	**30.0**	9	**30.0**	0.313
Primary education	9	30.0	9	30.0	
Secondary education	5	16.7	1	3.3	
Bachelor	7	23.3	11	36.7	

- Independent samples t-test - Chi-square test * Significant difference at p. value<0.05

5.1. Table (1) represents that more than half of both groups their age ranged between 50:60 years old with no statistical significant difference between them in relation to age (60% and 66.6 %) respectively .For level of education the highest percentage of both groups can read and write (30% and 30 %) respectively.

5.2. Figure (1) shows that more than half of both groups were males with no statistical significant difference between them (66.7% and 60%) respectively.

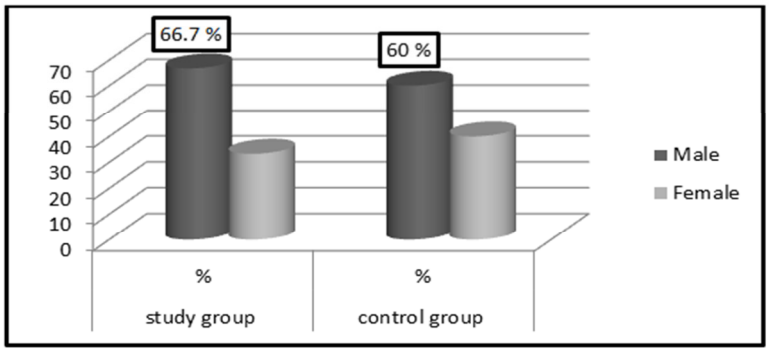

Figure (1): Percentage distribution of the study and control groups in relation to gender.

Table2:- Comparison between the study and control groups in relation to clinical data and habits.

Items	Study group (n= 30)		Control group (n= 30)		P. value
	No	%	No	%	
Diagnosis					
Unstable angina	9	30.0	6	20.0	0.556
- NSTEMI	4	13.3	3	10.0	
- STEMI	17	**56.7**	21	**70.0**	
Past medical history					
No history	7	23.3	14	46.7	0.210
Hypertension	13	43.3	8	26.7	
Diabetes mellitus	3	10.0	1	3.3	
Hypertension + Diabetes mellitus	7	**23.3**	7	**23.3**	
History of previous hospitalization in ICU					
No	25	83.3	22	73.3	0.532
Yes	5	16.7	8	26.7	
Habits: drinking tea and coffee					
No	8	26.7	9	30.0	1.000
Yes	22	73.3	21	70	

Chi-square test * Significant difference at p. value<0.05

NSTEMI: non ST-segment elevation myocardial infarction STEMI: ST-segment elevation myocardial infarction

5.3. Table (2) shows that the highest percentage of both groups were diagnosed as ST-segment elevation myocardial infarction (56.7 % and 70.0 %) as well as near to quarter of the them had past history of hypertension and diabetes (23.3% and 23.3%) respectively. No statistical significant difference between the study and control groups in relation to all items mentioned in this table (P value > 0.05).

Table3:- Comparison between the study and control groups in relation to mean scores of hemodynamic parameters.

Items	Study group (n= 30)	Control group (n= 30)	P. value
Pulse			
1st day of hospitalization	82.7±14.2	88.6±15.4	0.129
1st day of intervention	78.2±12.2	82.4±12.8	0.192
2nd day of intervention	80.1±11.1	81.5±11.7	0.621
3rd day of intervention	78.9±11.4	78.8±9.6	0.990
SBP			
1st day of hospitalization	131.7±13.7	126.3±19.2	0.220
1st day of intervention	121.7±15.6	120±18.4	0.458
2nd day of intervention	120.7±10.1	118±14.2	0.339
3rd day of intervention	115.7±10.1	120.3±11.9	0.111
DBP			
1st day of hospitalization	82.3±9.4	80.3±11.3	0.239
1st day of intervention	75.7±10.7	79.7±15	0.239
2nd day of intervention	78.7±7.3	78±11.9	0.407
3rd day of intervention	75±8.2	79.3±8.3	0.794
MBP			
1st day of hospitalization	98.8±10	95.7±13.2	0.321
1st day of intervention	91±11.9	93.1±15.8	0.106
2nd day of intervention	92.7±7.9	91.3±12.1	0.046
3rd day of intervention	88.6±8.6	93±9.2	0.060
RR			
1st day of hospitalization	21.6±0.62	22.3±2.1	0.085
1st day of intervention	17.4±2.4	21.1±1.7	<0.001**
2nd day of intervention	16.4±1.3	19.9±2.7	<0.001**
3rd day of intervention	15.7±1.2	19.2±2.1	<0.001**
Temperature			
1st day of hospitalization	37±0.2	36.9±0.5	0.313
1st day of intervention	37.1±0.2	37±0.4	0.100
2nd day of intervention	37±0.1	37±0.4	0.325
3rd day of intervention	37±0.3	36.9±0.3	0.800

- Independent samples t-test * significant difference at p. value<0.05

SBP: Systolic Blood Pressure DBP: Diastolic Blood Pressure MBP: Mean Blood Pressure RR: Respiratory rate

5.4.Table3: reveals that the mean scores of pulse, systolic blood pressure, diastolic blood pressure, mean blood pressure and temperature was within normal for both groups all over the four assessments with no significant difference except in respiration (P=0.001) during three nights of intervention.

Section II: The testing of research hypotheses (I) states factors affecting sleep quality among the study group will be lesser than that among control group.

Table 4: Comparison between the study and control groups in relation to constant cardiac monitoring and lighting as environmental factors affecting sleep quality.

Items	Study group (n= 30)		Control group (n= 30)		P. value
	No	%	No	%	
Constant cardiac monitoring					
1st night of hospitalization	25	83.3	26	86.7	0.994
1st night of intervention	14	46.7	24	80.0	0.015
2nd night of intervention	6	20.0	23	76.7	**<0.001****
3rd night of intervention	3	10.0	23	76.7	**<0.001****
Lighting					
1st night of hospitalization	30	100	28	93.4	0.468
1st night of intervention	8	26.7	26	86.7	**0.002****
2nd night of intervention	4	13.3	24	80.0	**<0.001****
3rd night of intervention	2	6.7	24	80.0	**<0.001****

- Chi-square test * Significant difference at p. value<0.05 - These results revealed to patient's answers with yes.

5.5. Table4: represents that study group showed highly significantly decreases in number of patients who reported constant cardiac monitoring as factor affecting sleep quality during 2nd, and 3rd nights of intervention as compared to control group (P=0.001**, P= 0.001**) as well as who reported lighting during 1st& 2nd, and 3rd nights of intervention (P=0.002**, P= 0.001**& P= 0.001**) respectively .

Table 5: Comparison between study and control groups in relation to noise and taking vital signs as environmental factors affecting sleep quality.

Items	Study group (n= 30)		Control group (n= 30)		P. value
	No	%	No	%	
Noise					
1st night of hospitalization	27	90.0	28	93.3	0.996
1st night of intervention	14	46.7	26	86.7	**0.002****
2nd night of intervention	6	20.0	22	73.3	**<0.001****
3rd night of intervention	5	16.7	22	73.3	**<0.001****
Taking Vital signs					
1st night of hospitalization	22	73.3	15	50.0	0.111
1st night of intervention	17	56.7	12	40.0	0.300
2nd night of intervention	3	10.0	8	26.7	0.181
3rd night of intervention	3	10.0	7	23.3	0.300

- Chi-square test * Significant difference at p. value<0.05 – These results revealed to patient's answers with yes

5.6. Table 5: shows that study group showed highly significantly decreases in number of patients who reported noise as factor affecting sleep quality during three nights of intervention as compared to control group (P=<0.002**, P= 0.001**& P= 0.001**) respectively.

Table 6: Comparison between study and control groups in relation to medication administration, diagnostic testing and other nursing care procedures as bed making and feeding as environmental factors affecting sleep quality.

Items	Study group (n= 30)		Control group (n= 30)		P. value
	No	%	No	%	
Medication administration					
1st night of hospitalization	25	83.3	25	83.3	0.729
1st night of intervention	21	70.0	23	76.7	0.768
2nd night of intervention	12	40.0	19	63.3	0.121
3rd night of intervention	12	40.0	19	63.3	0.121
Diagnostic testing					
1st night of hospitalization	20	66.7	17	56.7	0.595
1st night of intervention	8	26.7	5	16.7	0.531
2nd night of intervention	2	6.7	5	16.7	0.421
3rd night of intervention	0	0.0	5	16.7	0.061
Other nursing care procedures					
1st night of hospitalization	11	36.7	14	46.6	0.605
1st night of intervention	4	13.3	13	43.3	**0.021***
2nd night of intervention	2	6.7	13	43.3	**0.002****
3rd night of intervention	2	6.7	11	36.7	**0.012***

- Chi-square test * Significant difference at p. value<0.05 - These results revealed to patient's answers with yes

5.7. Table 6: illustrates that the highest percentage of patients was in control group who reported other nursing care procedures as factor affecting sleep quality during three nights of intervention as compared to the study group who showed a statistically significant difference (P=0.0021*, P= 0.002**& P= 0.012*) respectively

Table 7: Comparison between the study and control groups in relation to pain as non- environmental factors affecting sleep quality

Items		Study group (n= 30)		Control group (n= 30)		P. value
		No	%	No	%	
1st night of hospitalization	No pain	0	0.0	0	0.0	0.935
	Mild pain	0	0.0	0	0.0	
	Moderate pain	3	10	2	6.7	
	Sever pain	27	90	26	86.7	
1st night of intervention	No pain	8	26.7	7	23.3	0.566
	Mild pain	7	23.3	4	13.3	
	Moderate pain	5	16.7	9	30	
	Sever pain	10	33.3	10	33.3	
2nd night of intervention	No pain	13	43.3	13	43.3	0.506
	Mild pain	10	33.3	10	33.3	
	Moderate pain	7	23.3	5	16.7	
	Sever pain	0	0.0	2	6.7	
3rd night of intervention	No pain	25	83.3	22	73.3	0.640
	Mild pain	3	10	5	16.7	
	Moderate pain	2	6.7	3	10	
	Sever pain	0	0.0	0	0.0	

- Chi-square test * Significant difference at p. value <0.05

5.8. Table7 shows that pain severity approximately similar in both groups and the difference between the both groups were not statistically significant.

Table 8: Comparison between study and control groups in relation to sedating and inotrope drugs, Beta blocker and Angiotensin-Converting Enzyme Inhibitors as non-environmental factors affecting sleep quality

Items	Study group (n= 30)		Control group (n= 30)		P. value
	No	%	No	%	
Sedating and inotrope drugs					
1st night of hospitalization	6	20.0	4	13.3	0.726
1st night of intervention	2	6.7	3	10.0	0.966
2nd night of intervention	2	6.7	2	6.7	0.605
3rd night of intervention	2	6.7	2	6.7	0.605
Beta blocker					
1st night of hospitalization	19	**63.3**	20	**66.7**	0.955
1st night of intervention	19	**63.3**	20	**66.7**	0.955
2nd night of intervention	19	**63.3**	20	**66.7**	0.955
3rd night of intervention	19	**63.3**	20	**66.7**	0.955
ACE inhibitors					
1st night of hospitalization	15	**50.0**	15	**50.0**	0.796
1st night of intervention	15	**50.0**	15	**50.0**	0.796
2nd night of intervention	15	**50.0**	15	**50.0**	0.796
3rd night of intervention	15	**50.0**	15	**50.0**	0.796

- Chi-square test * Significant difference at p. value<0.05
- ACE inhibitors: Angiotensin-Converting Enzyme Inhibitors.

5.9.Table 8 shows that more than half of study and control groups received beta blocker (63.3% and 66.7 %) as well as half of them received Angiotensin-Converting Enzyme Inhibitors (50.0% and 50.0%) all over four days of assessments respectively. There was no statistical significant difference between both groups in relation to using of sedated and inotropic drugs, beta blocker and Angiotensin-Converting Enzyme as non- environmental factor affecting sleep quality (P value > 0.05). Thus hypothesis (1) was supported**.**

Table 9: Comparison between the study and control groups in relation to duration of night sleep (average hours and minutes).

Items	Study group (n= 30)	Control group (n= 30)	P. value
Duration of night sleep			
1st night of hospitalization	0.92±0.77	1.1±0.92	0.414
1st night of intervention	3.65±1.48	2.17±1.85	**0.001****
2nd night of intervention	4.24±1.52	3.13±1.32	**0.003****
3rd night of intervention	4.87±1.46	3.32±1.37	**0.001****

- Independent samples t-test * Significant difference at p. value<0.05

5.10. Table9: illustrates that there was gradual increase in mean duration of night sleep for both groups with a statistical significant difference between them in 1st, 2nd and 3rd nights of intervention (P=0.001**& P= 0.003**& P= 0.001**) respectively.

Table 10: Comparison between the study and control groups in relation to total main of sleep quality score.

Items	Study group (n= 30)	Control group (n= 30)	P. value
1st night of hospitalization	17.73±2.56	17.03±0.76	0.156
1st night of intervention	21.53±2.9	18.37±2.33	**0.000****
2nd night of intervention	22.33±2.83	20.47±2.86	**0.014***
3rd night of intervention	21.6±3.64	20.46±2.67	0.174

- Independent samples t-test * Significant difference at p. value<0.05
- A score of 6-16, a severe sleep disorder
- A score of 17-27, a moderate sleep disorder
- A score of 28-38 a slight sleep disorder

5.11.Table10: illustrates that the study and control groups had moderate sleep disorder because the average

score 17-27 while study group had a significantly increase in total mean of sleep quality score as compared to control group in 1st and 2nd nights of intervention (P=0.000**, P= 0.014**) respectively. Thus research hypotheses (II) was supported

6. Discussion

Sleep is difficult especially for patients in CCU because of their medications, monitoring, lighting, noise, disease severity and patients' waking early in the morning make it hard for them to sleep comfortably while this patients need more sleep at this time. Sleep disturbance have several side effects on cardiovascular function, immune function, catecholamines, hormones, metabolism, pulmonary function, psychological or neurological function, and quality of life **(Neyse etal, 2011& Norra etal, 2012 & Zamanibabgohar etal, 2016)**.

Critical care nurses in CCU perform an essential function in recognizing and eliminating factors, which cause sleep disturbance. Nowadays, one of effective non- pharmacological methods used to improve the sleep quality of patients with ACS is using earplugs and eye mask by eliminating patients from external environmental noise and light **(Moeini etal, 2010& Jafarian etal, 2011)**. This study aimed to evaluate the different factors affecting sleep quality and the effect of earplugs and eye mask on sleep quality among patients with acute coronary syndrome at Assiut University Hospital.

The present study presented that more than half of the study and control groups were in **age group** 50 to 60 years old and were males. This might be related to the decrease in elasticity that increase the work needed to drive the blood to the various organs of the body. Also, this can be attributed to males are the higher exposure to life stress, and female hormones protect female from ACS. This was in line with **Daneshmandi etal (2012)** who studied effect of eye mask on sleep quality in patients with acute coronary syndrome found that the age mean and standard deviation of participated patients in the study 55.9 ± 7.55. This result was in accordance with a study conducted by **Demoule etal, (2017)** who studied impact of earplugs and eye mask on sleep in critically ill patients: a prospective randomized study reported that more than half of the study sample was males.

The current study, documented that more than fifty percentage of the both groups patients **were diagnosed with ST-segment elevation myocardial infarction**. This was in according with **Mashayekhi etal, (2013)** who studied the effect of eye mask on sleep quality in patients of coronary care unit found that more than half of the study sample, were diagnosed with STEMI.

The findings of the current study revealed that near to quarter of both groups had past **history of hypertension and diabetes**. This might be related to the fact that hypertension and diabetes mellitus are commonly complications of ACS. In this respect **Neyse etal, (2011**), who studied the effect of earplugs on sleep quality in patients with acute coronary syndrome reported that 21.6 % of the samples had a history of both hypertension diabetes.

The current study presented that **more than two third of both groups consuming coffee and tea**. These substances can affect sleep quality. Caffeine can damage rapid eye movement (REM) stage of sleep. Even so, these substances obligatory stopped during the hospital stay which may cause sleep disturbance. This was in line with **Viana and Filomena, (2014)** who studied factors that affect inpatients' quality of sleep reported that nicotine causes a delay in falling asleep but, sudden cessation may lead to sleep disorders for one nights or more.

The results of this study documented that there was gradual decrease in blood pressure and pulse for the both groups despite didn't reach a statically significant difference. This might be attributed that half of the study and control groups received beta blocker agents and ACE inhibitors approximately. In this respect, **Lewis etal, (2014**) reported that beta blocker agents decrease myocardial oxygen consumption by reducing myocardial contractility, heart rate and blood pressure. The ACE inhibitors reducing blood pressure by blocking the renin–angiotensin– aldosterone system.

The current study showed that the majority of the both groups reported that constant cardiac monitoring, light, noise and nursing care procedures (for example bed making and feeding) as environment factors affecting sleep quality in the first night of hospitalization but this percent highly significantly decreased from first night of intervention for study group. This might attributed that eye mask prohibit patients from environmental light and earplugs prevent patients from exposure to environmental noise. These findings were supported by **Zolfaghari etal, (2013)** who studied modification of environmental factors on quality of sleep among patients admitted to CCU reported that comfortable sleep is difficult for patients hospitalized in CCUs because of constant cardiac monitoring, lighting on the unit and noise. This result was in agreement with the findings of **Hultman etal, (2012)** who studied exploring the sleep experience of hospitalized adult patients documented that patients had attributed sleep disturbance to nursing interventions.

The present study summarized that more than half of the study and control groups received beta blocker agents. So, it considered as non- environmental factor affecting sleep quality among patients with ACS. This result was similar to the result revealed by **Beltrami etal, (2015)** who studied sleep in the intensive care unit documented that beta blockers can cause sleep disturbance because they pass the blood-brain barrier.

Beta-blocker agents have several effects on sleep such as difficulty falling asleep and insomnia. They

reduce the production of melatonin; it is a hormone excreted by the pineal gland in the brain, and maintains sleep quality. Hypertensive patients have a lower melatonin production **(Fares, 2011& Scheer etal, 2012 & Kimmi, 2014& Smith etal, 2015)**.

The current study documented that the majority of the study and control groups complain from severe pain as non-environmental factor affecting sleep quality in 1st night of hospitalization and the pain severity gradually decrease despite didn't reach a statically significant difference. This result was similar to the result revealed by **Daneshmandi etal, (2012)** who studied effect of eye mask on sleep quality in patients with acute coronary syndrome, found that hospitalized patients in coronary care units might have sleep disturbance due to several factors such as pain, discomfort, anxiety and stress.

The findings of this study revealed a significantly improvement of the total mean of sleep quality score for study group during first and second nights of intervention as well as mean duration of night sleep during three nights of interventions. This might be related to that combination of non-pharmacological interventions (earplugs and eye mask) is useful for promoting sleep through preventing patients from the environment lights and noise. These results were in line with **Locihová etal, (2017)**, who studied effect of the use of earplugs and eye mask on the quality of sleep in intensive care patients: a systematic review documented that earplugs and eye mask improve sleep quality. This result also was in accordance with, **Hu etal, (2015)** who studied non-pharmacological interventions for sleep promotion in the intensive care unit. cochrane database of systematic reviews figured out that significantly effect of earplugs or eye masks or both on total sleep time.

Finally, the major finding of this study was that using earplugs and eye mask significantly improve total mean of sleep quality score and mean duration of night sleep among patients with ACS.

7. Conclusion and recommendations

Based on the results of this study, it can be concluded that frequent sleep interruption for medications administration, taking vital signs, diagnostic testing, pain, and medications side effects as beta blockers was found to be prominent factors affecting sleep quality among the study and control groups. The positive effects of earplugs and eye mask on sleep quality of patients with ACS.

Based on the study findings, the following recommendations are suggested:-

- Emphasize have be directed toward offering earplugs and eye mask as a part of routine nursing practice to improve sleep quality.
- Establishing a standardized protocol for non-pharmacological measures such as using earplugs and eye mask to improve sleep quality of patients with ACS.
- More studies are necessary to evaluate the factors effecting on sleep quality of patients with ACS.
- Reapply this research on a larger probability sample acquired from different geographical areas in Egypt for generalization.

8. References

1. Bagheri -Nesami M, Ali M, Rezaie S, Pouresmail3 Z& Yazdani J. (2015): Effect of acupressure with valerian oil 2.5% on the quality and quantity of sleep in patients with acute coronary syndrome in a cardiac intensive care unit, Journal of Traditional and Complementary Medicine;3:1-7
2. Beltrami F, Nguyen X , Pichereau C, Maury E , Fleury B, Fagondes S. (2015): Sleep in the intensive care unit. Jornal Brasileiro de Pneumologia;41(6)
3. Bihari S, McEvoy D, Matheson E, Kims, Woodman R and Bersten A. (2012): Factors Affecting Sleep Quality of Patients in Intensive Care Unit. Journal of Clinical Sleep Medicine; 8(3): 301–307.
4. CostaI Sh& Ceolim M. (2014): Factors that affect in patients' quality of sleep, SciELO Analytics available at: http://www.scielo.br/scielo.php?pid=S008062342013000100006&script=sci_arttext&tlng=en
5. Daneshmandi M, Neiseh F, SadeghiShermeh M, and Ebadi A. (2012): Effect of Eye Mask on Sleep Quality in Patients with Acute Coronary Syndrome. Journal of Caring Sciences; 1(3): 135–143.
6. Delaney L, Van F and Lopez V. (2015): Sleeping on a problem: the impact of sleep disturbance on intensive care patients - a clinical review. Annals of Intensive Care; 5:3
7. Demoule A, Carreira S, Lavault S, Pallanca O, Morawiec E, Mayaux J, Arnulf I& Similowski T. (2017): Impact of earplugs and eye mask on sleep in critically ill patients: a prospective randomized study. Critical Care;21(1):284
8. Ellis B, Johns M, Lancaster R, Raptopoulos P,Angelopoulos N& Priest R. (1981): The St. Mary's Hospital Sleep Questionnaire: a study of reliability. Sleep;4:93-97
9. Fares A. (2011): Night-time exogenous melatonin administration may be a beneficial treatment for sleeping disorders in beta blockers patients. Journal of Cardiovascular Disease Research; 2(3):153-5.
10. Hu R, Jiang X, Chen J, Zeng Z, Chen X, Li Y, Huining X& Evans D. (2015): Non-drug treatments for promoting sleep in adults in the intensive care unit, Available at http://www.cochrane.org/CD008808/ANAESTH_non-drug treatments-promoting-sleep-adults-intensive-

care-unit
11. Hultman, T, Coakley A, Annese C& Bouvier S. (2012): Exploring the sleep experience of hospitalized adult patients. Creative Nursing journal; 18(3):135–139.
12. Jafarian A, Zabihi A, Babaie F, Sefidchian A& Bijanee A. (2011): Sleep quality and associated factors in hospitalized patients in Babol, Iran. Hormozgan University of Medical Sciences.;15(2):144–51.
13. Kimmi L (2014): Beta-Blockers cause lack of restful sleep available at http://www.lifeextension.com/magazine/2014/8/beta-blockers-cause-lack-of-restful-sleep/page-01
14. Leigh T, Bird H, Hindmarch I, Constable P& Wright V. (1988): Factor analysis of the St. Mary's Hospital Sleep Questionnaire. Sleep;11:448-453
15. Lewis S, Bucher L, Ruff SH, Heitkemper M& Harding M. (2014): Medical –surgical nursing: assessment and management of clinical problems. 9th ed. Mosby. An imprint of El Sevier Inc. printed in Canada; 730-750
16. Locihová H, Axmann K, Padyšáková H& Fejfar J. (2017): Effect of the use of earplugs and eye mask on the quality of sleep in intensive care patients: a systematic review. Journal of Sleep Research
17. Mashayekhi F, Arab M, Pilevarzadeh M, Amiri M& Rafiei H:(2013): The effect of eye mask on sleep quality in patients of coronary care unit; Sleep Science;6(3)108-111
18. McCaffery M& Pasero C. (1999): *Pain: Clinical Manual,* St. Louis,. by Mosby, Inc. P. 16
19. Moeini M, Khadibi M, Bekhradi R, Mahmoudian S& Nazari F. (2010): Effect of aromatherapy on the quality of sleep in ischemic heart disease patients hospitalized in intensive care units of heart hospitals of the Isfahan University of Medical Sciences. Iranian Journal of Nursing and Midwifery Research; 15(4): 234-239
20. Mullington J, Haack M, Toth M, Serrador J, and Meier-Ewert H. (2012): Cardiovascular, Inflammatory and Metabolic Consequences of Sleep Deprivation, available in PubMed Central at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3403737/#R11
21. Neyse F, Daneshmandi M, i Sadeghi M& Ebadi1 A. (2011): The effect of earplugs on sleep quality in patients with acute coronary syndrome. Iranian Journal of Critical Care Nursing; 4(3),127 – 134
22. Norra C, Kummer J, Boecker M, Skobel E, Schauerte P, Wirtz M, Gauggel S& Forkmann T. (2012): Poor sleep quality is associated with depressive symptoms in patients with heart disease. International Journal of Behavioral Medicine; 19(4):526–34.
23. Oshvandi Kh, Abdi1 S, Karampourian A, Moghimbaghi A& Homayonfar Sh. (2014): The effect of foot massage on quality of sleep in ischemic heart disease patients hospitalized in CCU, Iranian Journal of Critical Care Nursing; 7(2):66-73.
24. Sauvet F, Leftheriotis G, Gomez-Merino D, Langrume C, Drogou C, Van Beers P, Bourrilhon C, Florence G& Chennaoui M. (2010): Effect of acute sleep deprivation on vascular function in healthy subjects. Journal of Applied Physiology; 108(1):68–75.
25. Scheer FA1, Morris CJ, Garcia JI, Smales C, Kelly EE, Marks J, Malhotra A& Shea S.(2012): Repeated melatonin supplementation improves sleep in hypertensive patients treated with beta-blockers: a randomized controlled trial. Sleep; 35(10):1395-1402.
26. Shahid A, Wilkinson K, Marcu Sh& Shapiro C. (2012): STOP, THAT and One Hundred Other Sleep Scales, springer science + business media, chapter 89, P363
27. Smith J, Negrelli J, Manek M, Hawes E, and Viera A. (2015): Diagnosis and Management of Acute Coronary Syndrome: An Evidence-Based Update. The Journal of the American Board of Family Medicine; 28 (2): 283-293.
28. Viana SH& Filomena M. (2014): Factors that affect inpatients' quality of sleep, SciELO Analytics available at: http://www.scielo.br/scielo.php?pid=S008062342013000100006&script=sci_arttext&tlng=en
29. Yazdannik A, Zareie A, Hasanpour M, and Kashefi P. (2014): The effect of earplugs and eye mask on patients' perceived sleep quality in intensive care unit, Iranian Journal of Nursing and Midwifery Research; 19(6): 673–678.
30. Zamanibabgohar KH, Mokhtari J, Mohammad S, and Ebadi A. (2016): Implementation of Evidence-Based Nursing Guidelines and Sleep Quality in Patients With Acute Coronary Syndrome, Journal of Critical Care Nursing; 9(1):51-7.
31. Zolfaghari M, Afshar P, Noghabi A& Khameslou A. (2013): Modification of environmental factors on quality of sleep among patients admitted to CCU. Hayat Journal; 18(4):61-68