

# THE EFFECTS OF EARPLUG ON PERCEPTION OF SLEEP IN PATIENTS OF CORONARY CARE UNIT (CCU) EDUCATORS

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## Introduction

Although the function of sleep is not clear, it is generally accepted that lack of sleep can affect the health of patients and may tend to delay recovery from illness (Dogan et al., 2005; Higgins et al., 2007; Jafarian Amiri et al., 2012; Venkateshiah et al., 2012). In general, hospitalization can affect patients' quality of sleep (Reid, 2001; Venkateshiah et al., 2012). It can be related to environmental, physiological and psychological factors (Dogan et al., 2005; Honkus, 2003; Pellatt, 2007). Sleep disturbances in critically ill patients are defined as of insufficient duration or stages of sleep that result in discomfort and interference with quality of life (Tastan et al., 2010; Urden et al., 2010). One group of hospitalized patients that encounter sleep problems and symptoms of sleep disturbances are patients with cardiovascular disease (Tastan et al., 2010). Environmental stimuli in the critical care unit could be disruptive for patients' sleep (Honkus, 2003; Richardson et al; 2007; Tastan et al., 2010). The environmental stimulus that is most often cited in the literature as disturbing sleep, is noise (Freedman et al., 1999; Meyer et al; 1994; Redding et al., 1977). Sustained noise impairs quality and quantity of sleep and increases adrenocorticotrophic hormone release, triggering the stress response which reduces motivation and cognition. (Intensive care nursing)

Although most sleep disorders in CCU patients could be treated by using pharmacological methods; (Daneshmandi et al., 2012; Moeini et al., 2010; Neyse et al., 2011) however, non-pharmacological methods still remain important and a less expensive way for increasing quality of sleep in hospitalized CCU patients (Moeini et al., 2010; Neyse et al., 2011). Van Rompaey et al., in 2012, studied the effects of reduction of sound during the night with use of earplugs in the prevention of

## Abstract

**Background and Aim:** Sleep deprivation can affect the health of patients and may tend to effect recovery from illness. This study aims to assess the effects of earplug on perception of sleep in patients who are admitted to CCU.

**Methods:** A single group crossover design was used. Thirty patients were recruited from a CCU in Iran during March to July 2012. Using Verran and Snyder-Halpern Sleep Scale (VSH Sleep Scale), perception of patients sleep with and without usage of ear plug were evaluated. This tool consists of 16 items that include three main sleep sub scales: disturbance, effectiveness, and supplementation.

**Finding:** Of the 30 patients, 17 were men. The mean age of patients was  $51 \pm 18.1$  years. Mean time of patients' nocturnal sleep was  $6.6 \pm 1.1$  hours. Using ear plug statistically significantly increased the quality of sleep in three subscales (disturbance, effectiveness, and supplementation) ( $P < 0.05$ ).

**Conclusion:** Patients in coronary care unit (CCU) are at risk of sleep deprivation. The use of ear plug is an easy and cheap method to improve the perception and quality of sleep in CCU patients.

**Key words:** Ear plug, sleep perception, CCU, patient

intensive care unit delirium (Van Rompaey et al., 2012). They reported that use of earplugs may be a useful instrument in the prevention of confusion or delirium, especially within 48 hours after admission (Van Rompaey et al., 2012). Scotto et al., evaluated the use of earplug on the subjective experience of sleep for critically ill patients. They reported that use of earplug improved the subjective experience of sleep in this group of patients (Scotto et al., 2009). In the study of Hu et al., the effects of earplugs and eye masks on nocturnal sleep, level of urine melatonin and cortisol in healthy subjects exposed to simulated intensive care unit environment were evaluated (Hu et al., 2010). They reported that the use of earplugs and eye masks may increase rapid eye movement (REM) time, decrease REM latency, cause less arousal and elevate levels of melatonin in urine (Hu et al., 2010).

The importance of sleep is not a new concept. However, sleep disruption continues to be a problem in hospitals and with the emphasis on the use of non-pharmacologic methods for improving patients' sleep quality in CCU, few studies have been performed in this area. The aim of this study was to examine the effects of earplug on perception of sleep in CCU patients.

## Materials and Methods

The study was conducted during the period of March to July 2012 in Kerman in Iran. Ethical approval was obtained from the research ethical centre of the Kerman University of Medical Science and head of Kerman hospital. A single group crossover design was used. The sample was composed of 30 patients who were admitted in CCU. This unit has 8 beds in 8 separated rooms. According to hospital protocol, at 22:30 every night, all lights were turned off for helping patients to have a better sleep. A "night's sleep" is considered as the period from when the person tried to sleep until waking up in the morning (Bergamasco et al., 2007). Written consent was obtained from each participant. Before obtaining the

patients' consent, the research was comprehensively described to each patient, and they were assured that their information will be used only for research purposes. Inclusion criteria of the study were: aged more than 18 years, being alert enough to respond to the questionnaire, having a stable hemodynamic situation, no history of hearing disorders, and who had not previously used an ear plug at sleep time. Patients with previous sleep disorders (acute or chronic), patients with history of mental disorder and patients who used narcotics, sedative, psychiatric and analgesic drugs, were excluded. The participants were randomly divided into two groups: with ear plug (group 1) or without ear plug (group 2) in sleeping time in the first night after admission to CCU. In the second night, patients in the two groups were changed and group 2 used ear plugs and patients in group 1 did not use ear plugs. Patients' room and beds were similar in both nights for every patient. Correct use of ear plug by patients was controlled by researchers working in CCU.

Data collection tools in this study were Verran and Snyder-Halpern Sleep Scale (VSH Sleep Scale). Using this questionnaire, patients provided an assessment of the quality of their previous night's sleep. This tool consists of 16 items which include three main sleep subscales: "disturbance" (interruptions and delays in sleep), "effectiveness" (how well sleep refreshed the individual), and "supplementation" (napping). Disturbance comprises items measuring subscales of fragmentation (interruption of sleep) and "latency" (delay in getting to sleep). Effectiveness comprises the subscales of "quality" (restfulness and depth of sleep), and "length" (hours of sleep while in bed). Supplementation contains four items about naps and falling back asleep after morning awakenings. Each characteristic is measured using a 100 mm visual analogue scale and the total score for the primary outcome of sleep disturbance is a sum of the scores from each scale (total score maximum 700). A lower total score on this scale indicates a

lower degree of sleep disturbance. For effectiveness, higher scores indicate better sleep (Bergamasco et al., 2007; Call-Schmidt et al., 2003; Frighetto et al., 2004; Snyder-Halpern et al., 1987). In order to translate the English version of VAS into Farsi, the standard forward-backward procedure was applied. Translation of the items and the response categories was independently performed by six professional translators and then temporary versions were provided. Later, they were back translated into English and after a careful cultural adaptation, the final versions were provided. The validity of questionnaire has been assessed through a content validity discussion. Scholars of statistics, physicians and nurses have reviewed the content of the questionnaire. To reassess the reliability of the translated questionnaire alpha coefficients of internal consistency were used. The alpha coefficient for questionnaire was 0.91. Data were analyzed with use of descriptive statistics (mean and standard deviation (SD)), Chi squared test and paired t-test. All statistical analyses were performed using SPSS software (v15.0; PASW Statistics). A P value of less than 0.05 was considered as statistically significant.

## Results

Of the 30 patients, 17 were men. The mean age of patients was  $51 \pm 18.1$  years. Table 1 shows patient's demographic characteristics. Mean time of patients' nocturnal sleep was  $6.8 \pm 1.15$  hour. Mean score of sub scale "disturbance" before and after intervention was  $140.90 \pm 55.6$  and  $89.83 \pm 52.1$  respectively. In this sub scale, most change before and after use of ear plug was related to item "wake after sleep onset". In sub scale "effectiveness", mean score of sleep quality was  $255.33 \pm 41.1$  before intervention and  $291.50 \pm 38.9$  after intervention. In this sub scale, most change before and after use of ear plug was related to item "sleep sufficiency evaluation". Results of paired t-test showed significant difference in mean score of sub scales "effectiveness" and "disturbance" before and after use

Variable	Mean (SD)	N	%
Age	51± 18.1	30	-
Night sleep	6.88 ± 1.150	30	-
Gender	Male	17	56.7
	Female	13	43.3
Marital status	Married	25	83.3
	Single	5	16.7
Education	Illiterate	10	33.1
	School	5	16.9
	University	15	50
Job	Self-employment	6	30
	Government Job	9	20
	Unemployed	11	36.7
	Retired	4	13.3
Diagnosis	MI	17	56.7
	Angina	2	6.7
	Angina complain	11	36.7
Hospitalization	First	20	66.7
	Second	10	33.3
Bed time habits	Watching TV	2	33.4
	Praying	2	33.4
	Study	2	33.4

Table 1: Patients' demographic characteristics

of ear plug ( $p < 0.05$ ). Mean score of sub scale "supplementation" before and after intervention was  $25.50 \pm 27$  and  $40.80 \pm 23.4$  respectively. In this sub scale, most change before and after use of ear plug was related to item "wake after final arousal". Results of paired t-test showed significant difference in sub scale of "supplementation" before and after use of ear plug ( $p < 0.05$ ). Mean scores of three sub scales have been shown in detail in Table 2 and Figure 1 (next page).

### Conclusion

In order to evaluate the effects of ear plug on perception of sleep in CCU patients, this study has been conducted. Our results showed that in general, patient's perception of sleep significantly improved after use of ear plug in this group of patients. Quality of sleep in hospitalized patients should be a routine part of patients' assessment such as vital signs, because the patients sleep quality may reveal more information about the patients' overall well-being (Young et al., 2008). One important group of patients who may have higher risk of sleep disturbance is patients with heart diseases

(Norra et al., 2012). Zeighami et al., in 2013 reported that patients who suffer from heart disease, may have many problems in sleeping (Zeighami et al., 2013). The two most common sleep problems reported by Zeighami et al., were insomnia and sleep apnea (Zeighami et al., 2013). They also reported that factors such as weight loss, smoking cessation, control and treatment of chronic diseases and control of drug side effects could decrease sleep problems in this group of patients (Zeighami et al., 2013).

High level of sound may considerably affect the quality of patients' sleep (Tastan et al., 2010). Zolfaghari et al., in 2013 investigated the effects of environmental modification on quality of sleep among CCU patients (Zolfaghari et al., 2013). They reported that interventions of decreasing excessive environmental light and noise; such as turning off extra lights, use of bulbs with low light, decreasing the alarm sounds levels throughout the night, decreasing level of telephone ringtone during night and educating staff regarding the control of environmental excessive light and noise have improved the patient's nocturnal sleep in CCU (Zolfaghari et al., 2013). In 2010, Neyse et al., surveyed the effects of earplug and eye mask on quality of patients' sleep in critical care unit (Neyse et al., 2010). Similar to our finding, Neyse et al., reported that the use of earplug and eye mask could improve patients' sleep in critical care unit. (Neyse et al., 2010). Hu et al., in 2010 studied the effects of earplug and eye mask on sleep of healthy subjects exposed to simulated intensive care unit (ICU) noise and light (Hu et al., 2010). They reported that use of earplugs and eye masks may increase REM sleep and decrease REM latency and cause fewer arousals (Hu et al., 2010). In agreement with our finding, Richardson et al., reported that use of non-pharmacological methods could improve patients' sleep quality in CCU (Richardson et al., 2003). They reported that the use of relaxation and imagery is effective

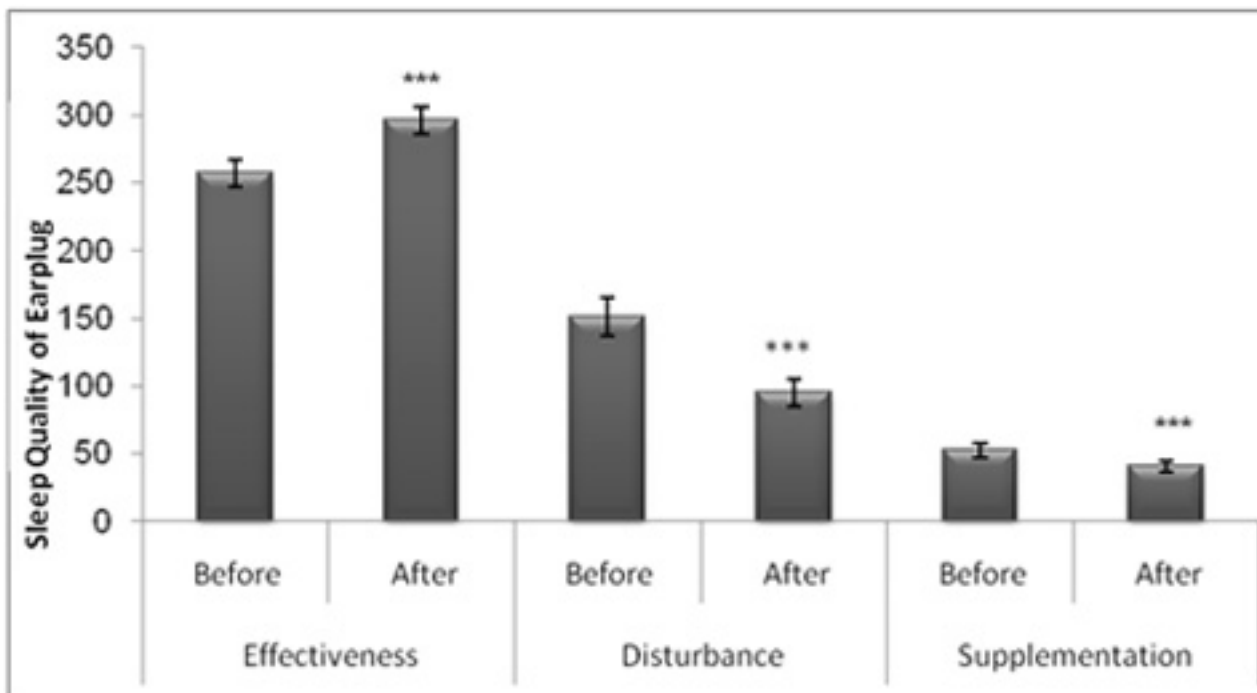


Figure 1: Mean of sleep perception score before and after the intervention

Domains	Item	Before Intervention Mean ± SD	After Intervention Mean ± SD	P
Disturbance	Mid sleep awaking	19.67 ± 7.30	13 ± 7.14	0.000
	Waking after sleep onset	25.17 ± 9.86	14 ± 10.56	0.000
	Movement during sleep	19.83 ± 10.46	13 ± 7.14	0.000
	Soundness of sleep	63.17 ± 15.79	41.33 ± 16.23	0.005
	Quality of disturbance	24.83 ± 13.48	16.83 ± 12.35	0.000
	Sleep latency	20.33 ± 8.89	14.33 ± 10.40	0.004
	Quality of latency	22 ± 10.87	14.50 ± 7.35	0.000
	Total	140.90 ± 55.66	89.83 ± 52.18	0.000
Effectiveness	Rest upon awaking	53.17 ± 12.35	66 ± 12.41	0.000
	Subjective quality of sleep	55.17 ± 11.48	65.67 ± 14.95	0.001
	Sleep sufficiency assessment	31.07 ± 18.32	18.23 ± 14.34	0.000
	Total sleep time	51.17 ± 13.87	64.33 ± 9.97	0.000
	Total sleep period	38.17 ± 11.86	39.33 ± 10.26	0.000
	Total	255.33 ± 41.10	291 ± 38.97	0.000
Supplementation	Day time sleep	7.83 ± 9.34	8.83 ± 11	0.884
	Morning sleep	5.17 ± 5.16	4.57 ± 5.99	0.339
	Afternoon sleep	12.50 ± 7.85	11.50 ± 7.32	0.265
	Wake after final arousal	64.33 ± 21.24	27 ± 18.69	0.000
	Total	25.50 ± 27.06	40.80 ± 23.64	0.000

Table 2: Sleep Quality Score before and after intervention

in improving the sleep of the critically ill adult patients. (Richardson et al., 2003) They also stated that men have a better response to this intervention. (Richardson et al., 2003)

Healing cannot occur without a good night's sleep (Dunn et al., 2010; Tastan et al., 2010). Sleep deficit and sleep without a refreshing and restorative function may increase the risk of recurrent events in patients with heart diseases (Leineweber et al., 2003). Members of the health care team, especially nurses, should pay more attention to satisfying the need of rest and sleep for critically ill patients (Neyse et al., 2010; Li et al., 2011). Nurses should assess patient sleep patterns routinely during hospitalization and then evaluate the need for sleep promotion strategies (Ünsal et al., 2012). Results of the present study confirmed that quality of nocturnal sleep in CCU patients was significantly improved after use of ear plug. Therefore, using ear plugs at night time is a cheap and comfortable method, which has been recommended for improving the quality of sleep in CCU patients.

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