Correlation of Sleep Quality and Anxiety with Pain Intensity in Primary Headache Patients

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Abstract

Background: Headache is the most common diagnosis that is referred to a neurologist. Chronic headaches are one of the biggest challenges that are rarely handled and treated well. Therefore, the clinician should look for the cause of headache in order for the patient's complaints can be handled and not being chronic. One of the causes or risk factors for headache is sleep disturbance and anxiety.

Objective: To analyze the correlationbetween sleep quality and anxiety with the intensity of pain in primary headache patients.

Materials and Method: This is a case-control study. We obtained 52 subjects through consecutie admission sampling. The subjects were examined for their pain intensity using Numeric Pain Rating Scale (NPRS). Sleep quality examination were performed using Pittsburgh Sleep Quality Index (PSQI) and for anxiety we used Hamilton Anxiety Rating Scale (HARS). The data were analyzed using chi-square test and paired t-test.

Result: Subjects with mild NPRS (<4) and moderate-severe NPRS (≥4) had the same percentage (50.00%). There was a significant correlation between sleep quality ($p = 0.012$) and anxiety ($p = 0.020$) with pain intensity in primary headache. Sleep quality with anxiety also has a statistically significant relationship ($p = 0.001$).

Conclusion: There is a correlation between poor sleep quality and anxiety with pain intensity in primary headache patients.

Keywords: *Primary headache, pain intensity, sleep quality, anxiety.*

Introduction

Headache is the most common diagnosis that is referred to a neurologist. Primary headache types such as Tension type headache (TTH), migraine and cluster are always the main complaints from the patients. Tension-type headaches and migraines ranked second and third with the highest prevalence worldwide. Migraine is also the seventh highest cause of disability worldwide. Migraine suffered by 153 million sufferers in Europe affecting the socio-economics of about 43 billion euro per year[1,2].

One of the causes or risk factors for headache is sleep disturbance. Headache and sleep disturbances are common in the community and often occur together in one patient. The lack of thoroughness in clinicians leads to a lack of epidemiological data related to exact diagnosis according to headache classification[3]. Sleep disturbances need to be considered as one of the primary

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headache triggers. The pattern of headache emergence may be associated with waking and sleeping rhythms. Lack of sleep can cause daytime fatigue, cognitive dysfunction, mood disorders, increased susceptibility to infection, susceptibiliiness to depression, productivity disorder and work ethic, sensitivity to exogenous and endogenous stimuli, including headache.

The intensity of headache is closely related to psychological stress[4]. The most common thing is anxiety. Patients with migraine and TTH complain about 50.00% anxiety and 27.00% cause headache condition[5]. Anxiety can be interpreted as fear without any evident object. Although anxiety is a natural thing in human life as well as pleasure, love, anger, fear, hate, miss, etc., the anxiety that requires caution is an excessive anxiety that causes problems for both physical and social individuals, particularly its relationship with the incidence of primary headache[1,6]. Therefore, we are interested in examining the correlation between sleep quality and anxiety with the intensity of pain in primary headache patients.

Method and Materials

The subjects of the study were all primary headache patients who came to the neurology poly of inpatient unit Dr. Soetomo TeachingHospital Surabaya in June-August 2017. The inclusion criteria for the case group were pain intensity of <4 (mild pain), age of >18-70 years old, education level of at least senior high school or equivalent. The inclusion criteria for the control group were pain intensity of ≥4 (moderate and severe pain), age of 18-70 years old, and education level of at least senior high school or equivalent. Exclusion criteria were the subjects dropped-out during in the middle of the process of this study.

The study design was case-control. We obtained 52 samples through consecutive admission sampling. The subjects were divided into two groups, case group and control group, according to the inclusion criteria.

Anamnesis were performed on the subjects regarding demographic data (age, sex, education level) and clinical data (type of headache and drug use). Subjects were examined for the intensity of pain, sleep quality and anxiety. Pain intensity was measured using Numeric Pain Rating Scale (NPRS). The pain scale starts from the number 0 (no pain) to 10 (the most severe pain perceived). The division of categories from Numeric Pain Rating Scale is 0: no pain, 1-3: mild pain, 4-7: moderate pain, 8-10: severe pain. Sleep quality was examined using the scores of the pittsburgh sleep quality index (PSQI). A subject was considered having a sleep disorder when the PSQI score was >5. Anxiety was measured using hamilton anxiety rating scale (HARS). A subject was considered having an anxiety disorder when the HARS value was >14. The data were analyzed using chi-square test for categorical data and paired t-test for normal distributed numerical data with SPSS program version 22.0 (SPSS, Inc., Chicago, IL).Prior to the identification of the subject, we conducted a test of ethics (453/Panke.KKE/VII/2017) at Dr. Soetomo Teaching Hospital Surabaya, Indonesia.

Result

Samples Characteristic:

Table 1. Correlation between Demographic Data and Pain Intensities

Demographic Variable	Group		p-value
	Case (%)	Control (%)	
Sex			
Female	73.10	50.00	0.087
Male	26.90	50.00	
Age (mean in year)	37.57	32.92	0.485
Education Level			
Senior High School	84.60	69.20	0.188
Diploma/Bachelor/Master	15.40	30.80	

The number of female subjects in the case group (73.10%) were larger than in the control group (50.00%). There were no differences in sex between the case group and control group (p = 0.087). The mean of the subjects' age in the case group was 37.57 years old, while in the control group was 32.92 years old. However, the difference was not statistically significant (p = 0.485). The subjects with high school education level in case group was 84.60%, while in control group was 69.20%. This difference was not statistically significant (p = 0.188) (Table 1).

The majority of subjects had pain in type of Tension-type headache(TTH) and cluster (69.23%). The number of subjects with migraine and cluster headaceh type in case group (42.30%) were higher than in control group (19.20%). However, this difference was not statistically significant (p = 0.071). Subjects using medication in the case group were 76.90%, while in the case group there were 73.10%. In similar proportions, there was no statistical difference between controls and drug-related cases (p = 0.49) (Table 2).

Sleep Quality, Anxiety and Pain Itensity: Both the case group (NPRS <4) and control (NPRS ≥4) had the same percentage (50.00%). Subjects with poor sleep quality in case group (69.20%) were more than in control group (34.60%). This difference in proportion was statistically significant (p = 0.012) with odd ratio of 4.25 (1.332-13.562), indicating that subjects with poor sleep quality had a risk of moderate and severe pain of 4.25 times greater compared with subjects with good sleep quality. This suggests that this study is clinically and statistically significant (Table 2).

Table 2. Correlation of Clinical Data, Sleep Quality and Anxiety with Pain Intensity

Variable	Group		p-value	OR (95% Cl)
	Case (%)	Case (%)		
Headache Type				
Migrain &Cluster	42.30	19.20	0.071	-
TTH	57.70	80.80		
Drug consumption				
Yes	76.90	73.10	0.749	-
No.	23.10	26.90		
Sleep Quality				
Poor	69.20	34.60	0.012	4.25 (1.332-13.562)
Good	30.80	65.40		
Anxiety				
Anxious	50.00	19.20	0.020	4.2 (1.213-14.541)
No	50.00	80.80		

The number of subjects with anxiety in case group (50.00%) was more than in control group (19.20%). This difference was statistically significant (p = 0.020) and the value of odd ratio was 4.2 (1.213-14.541; 95% Cl), indicating that subjects with anxiety had a risk of suffering from moderate and severe pain of 4.2 times greater compared to subjects without anxiety. This suggests that this study is clinically and statistically significant (Table 2).

Table 3. Correlation of Sleep Quality and Anxiety

Variable	Group		p-value	OR (95% Cl)
	Poor (%)	Well (%)		
Anxiety				
Yes	59.30	8.00	0.001	16.727 (3.257-85. 903)
No	40.70	92.00		

The number of subjects with anxiety in poor sleep quality group (59.30%) was more than in good sleep quality group (8.00%). This difference was statistically significant (p <0.001) with an odds ratio of 16.727 (3.257-85.903), indicating that subjects with anxiety had a risk of suffering from poor sleep quality of 16.7 times greater compared with non-anxious subjects. This suggests that this study is clinically and statistically significant (Table 3).

Discussion

There was a significant correlation between anxiety and sleep quality in which primary headache patients with anxiety had a 16-times greater risk of suffering from poor sleep quality than non-anxious patients. Anxiety and sleep disorders affect each other[7,8]. Poor sleep quality is associated with poor mental health. There are several possible causes. First, sleep disturbances and mental health status have related factors such as genetic predisposition, family factors, social or environmental factors. Second, sleep disturbances and mental health status are both included in the same category of disease, or can be said to appear simultaneously. Third, although sleep and mental health disorders are different categories of diseases, they still affect each other[9,10].

The majority of subjects were female. This is in line with other studies suggesting that women suffer more headaches than men. The ratio between women and men ranges from 1.16: 1 to 3: 1[11]. The number of female migraine patients was 2.5 times higher than the male ones[12]. Some of the factors that cause TTH prevalence to be more in women than men include gender differences (feminine is more susceptible to pain), perception of expression, tolerance of symptoms and pain sensation, behavioral differences, personality and psychological as well as hormonal influences.

The average of the subject is in the productive age. The majority of subjects had tension-type headache. This is consistent with the literature reporting that the peak age of tension type headache is 30-39 years old. Peak age of migraine sufferers around the fourth decade. The most common type of headache is tension headache followed by migraine and cluster. In this study there was no difference between the case groups and controls for the proportion of sex and drug use[11,12].

There was a significant association between poor sleep quality and pain intensity, where primary headache patients with poor sleep quality had a 4-times greater risk of moderate and severe headache than those with good sleep quality[13]. Patients with TTH and migraine have worse sleeping quality than normal people[14]. Headache causes increased autonomic psychological activity that ultimately induces the need for sleep. Locus ceruleus noradrenergic and serotonergic dorsal raphe are important structures in the control of the sleep-wake cycle. Both structures also play a role in modulating pain. Serotonin in particular plays an important role in sleep and pain relationships. Sleep regulation involves serotonin and some research data indicates its role in triggering some types of headache. Some possible interactions between sleep disturbances and headache involve structures such as the thalamus, hypothalamus, and brainstem.

There was a significant correlation between anxiety and pain intensity, in which primary headache patients with anxiety had a 4-fold greater risk of moderate and severe headache than those who were not anxious. TTH and migraine patients suffer from anxiety more often than normal people. Psychological stress may trigger exacerbations of TTH[14]. Anxiety is associated with recurring headache events, even with future headache events. Individuals with high anxiety (in this case anxiety related to personal relationships) have a greater perception of pain[15]. This may be due to a compromise of function regulation in the right orbitofrontal cortex. This area of the brain implies the onset of headache and pain sensitivity in migraine sufferers. In an experiment, suspected patients with anxiety and patients with migraine have a polymorphism in the serotonin transporter gene. Serotonin dysfunction is the underlying relationship of both.

There are several advantages offered by this study. Firstly, from the hypothesis in this study, it can be concluded that the process of pain intensity that occurs in primary headache is not different between some types of headache, i.e. tension migraine, and cluster headache. Second, this study also proved the involvement of two risk factors at once, namely the quality of sleep and anxiety to increase the intensity of pain. Third, this study even managed to prove the correlation between anxiety and sleep quality in primary headache patients. On the other hand, the limitations of this study are biases, especially recall bias, which is a major drawback of case-controll research.

Conclusion

The majority of subjects were female the average of them were in productive age. The majority of subjects also have senior high school education background.

The subjects also had the same percentage on mild and moderate-severe pain intensities. Poor sleep quality and anxiety increase the intensity of pain in primary headache sufferers. Sleep quality and anxiety also have a statistically significant correlation. A cohort study is needed to avoid recall bias and further distinguish the type of sleep disturbance, or more objective examination, e.g. with polysomnography.

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Ethical Clearance: This research involves participants in the process using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic regulation. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

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