ORIGINAL ARTICLE

Correlation Between the Severity of Chronic Rhinosinusitis and Sleep Quality in Adult Patients

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ABSTRACT

Introduction: Chronic rhinosinusitis (CRS) usually accompanied by one of the symptoms (nasal obstruction, rhinorrhea) and one of associated symptoms (facial pain and/or hyposmia/anosmia). In addition, most of CRS sufferers have poor sleep quality. Thus, we aim to determine the relationship between the severity of CRS and sleep quality in adult patients.
Methods: This study was cross-sectional method study. Consecutive sampling technique with estimate a proportion in finite population formula was used. The variables studied were the CRS severity based on visual analogue scale (VAS), and subjects' sleep quality based on the Pittsburgh sleep quality index (PSQI). The data collection was carried out using a questionnaire and analyzed using chi-square test and continued with fisher's exact test.
Results: Of the 24 study subjects, 45.8% were male and 54.2% female. 83.3% had a nasal obstruction, 66.7% had rhinorrhea, 54.2% had hyposmia/anosmia, and 66.7% had facial pain. The severity of subject was mild, moderate and severe by 41,67%, 29,17%, and 41,67% respectively. 87.5% had poor sleep quality. There was no significant correlation between the severity of CRS and sleep quality (p=1,00).
Conclusion: Although there was no correlation between CRS severity and sleep quality in adult patients, but CRS patients in general had poor sleep.Further study using more subjects, apply objective assessments, and include other more specific will help describe the correlation in population.

Introduction

Chronic rhinosinusitis (CRS) is one of common chronic disease in the world, in which approximately 5-15% of the world's population suffers from CRS.[1] CRS can be defined as inflammation of the nose and paranasal sinuses and is characterized by two or more symptoms, one of which should be nasal obstruction or rhinorrhea, facial pain and/or hyposmia/anosmia, as well as having signs of nasal endoscopy namely nasal polyps, and/or mucopurulent discharge from the middle meatus, and/or nasal mucosal obstruction of the middle meatus, and occurs for 12 weeks or more.[2] Many studies revealed that generally, CRS sufferers have worse sleep quality than healthy people. The lower quality of sleep is due to symptoms that disturb the sleep. 50-90% of people with CRS report to have sleep problems,3 far more than the proportion of such problems in a healthy population by 8-18% of such complaints.[4] Pittsburgh Sleep Quality Index (PSQI) is one of the parameters most widely used to measure sleep quality.[5-7]

A study revealed that approximately 75% of CRS sufferers had poor sleep quality, and it was found that worse sleep quality was found in patients with more severe CRS.5 Other studies have also found that the prevalence of sleep problems increases in conjunction with the number of CRS symptoms suffered.[3] The book of European Position on Rhinosinusitis and nasal Polyps (EPOS) 2012 edition recommended Visual Analogue Scale (VAS) to measure the severity of CRS.[2]

Logically, the more severe the CRS, the more sleep problems occur. To date, only a few studies seek the correlation of CRS severity and sleep quality, hence we conducted this study.

Methods

This cross-sectional study had been approved by Dr. Soetomo General Hospital, Surabaya through ethical clearance (1359/KEPK/VII/2019).

This study was conducted in the outpatient unit of Otolaryngology-Head and Neck Surgery Department,

Dr. Soetomo General Hospital Surabaya, from September 2019 to March 2020. The population of this study was CRS sufferers with medical treatment from the outpatient unit of Otolaryngology-Head and Neck Surgery Department on Dr. Soetomo General Hospital, Surabaya. The inclusion criteria were 18-60 years old patient who was diagnosed with CRS, never undergone surgical intervention and had a minimum level of education equivalent to junior high school to prevent person whom did not get proper education (illiterate) could affect the results of this research. Subjects were excluded if underwent sinus surgery, has accompanying diseases that can interfere with sleep quality such as obesity, diabetes mellitus, a history of cardiovascular diseases, a history of pulmonary diseases, and a history of central nervous system diseases since they may interfere with the results of the calculation of sleep quality index. The subject were given questionnaires consisting of patient personal data, the severity of CRS using VAS, symptoms experienced, and sleep quality of CRS patients using PSQI.

The severity assessment was carried out by asking the patient to mark the VAS scale, which is a horizontal 10-cm line representing "no pain" at the left to "worst possible pain" at the right end. Sleep quality was assessed by asking patients to fill out a PSQI questionnaire that contains 18 items of questions and is divided into 7 components namely subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleeping pills, and daytime dysfunction. Each component has a specific question ranges from 0 to 3 which was then added up. A final score ranging from 0 to 21 was obtained. A final score of 0-5 indicates good sleep quality, while a score of 6-21 means poor sleep quality.

The obtained data were analyzed using the IBM SPSS Statistics version 26. The correlation between the CRS severity and sleep quality of patients was calculated using the chi-square test and continued with fisher's exact test. Fisher's exact test is used because of a small sample size. P value of <0,05 considered as significant.

Results

The population of this study was 33 people, with 24 (72.7%) patients met the sampling criteria. The other nine subjects were excluded because they did not fulfil the criteria such as obesity, have had surgical intervention, did not meet the minimum criteria for latest education and age. The characteristics of the subjects can be seen in Table 1. Table 2 depicts nasal obstruction became the most common symptom (83.3%), followed by rhinorrhea (66.7%) and facial pain (66.7%), and hyposmia/anosmia (54.2%).

From seven components in the PSQI questionnaire, sleep disturbance, Sleep Latency, and daytime dysfunction were the most disturbing to CRS patients. Table 3 presents the mean scores of the components of the PSQI questionnaire.

Table 1. Characteristics of the subjects

Characteristics	Frequency (n=24)	Percentage
Gender		
Male	11	45.8%
Female	13	54.2%
Age		
18-20	3	12.5%
21-30	3	12.5%
31-40	9	37.5%
41-50	6	25%
51-60	3	12.5%
Education		
Junior High School	4	16.67%
Senior/ Vocational high school	12	50%
Diploma	3	12.5%
Bachelor's Degree	4	16.67%
Master's Degree	1	4.17%

Table 2. Research subjects' distribution of cardinal symptoms of chronic rhinosinusitis

Symptoms	Frequency (n=24)	
	Yes (%)	No (%)
Nasal Obstruction	20 (83.3%)	4 (16.7%)
Rhinorrhea	16 (66.7%)	8 (33.3%)
Hyposmia/anosmia	13 (54.2%)	11 (45.8%)
Facial Pain	16 (66.7%)	8 (33.3%)

Table 3. Distribution of PSQI questionnaire component scores

Components	Min	Max	Mean (SD)
Subjective Sleep Quality	0	2	1.33 (0.702)
Sleep Latency	0	3	1.58 (0.974)
Sleep Duration	0	3	1.17 (1.090)
Sleep Efficiency	0	3	0.33 (0.761)
Sleep Disturbance	1	2	1.58 (0.504)
Use of Sleeping Pills	0	3	1.33 (1.373)
Daytime Dysfunction	0	3	1.54 (1.021)
PSQI Total Score	1	14	8.92 (3.562)

The distribution of the variables of this study can be seen in Table 4. The number of patients included in the severe category is more than those in mild and moderate categories. In term of sleep quality, subjects with poor sleep quality are much more dominant. This suggests that almost all CRS sufferers have poor sleep quality regardless of the severity degree.

Table 4. Distribution of the severity of chronic rhinosinusitis and sleep quality of study subjects

Variables	Percentage (%)
Degree of Severity	
Mild	7 (29.17%)
Moderate	7 (29.17%)
Severe	10 (41.67%)
Sleep Quality	
Good	3 (12.5%)
Poor	21 (87.5%)

The relationship of the CRS severity and sleep quality was analyzed using the chi-square test, followed by fisher's exact test. No relationship between CRS severity and sleep quality in adult patients. Poor sleep quality was also found in all degrees of severity, with only three patients who had good sleep quality. The results can be seen in Table 5.

Table 5. Analysis of the relationship between CRS severity and sleep quality in adult patients

CRS Severity	Sleep quality		p value
	Good	Poor	
Mild (%)	1 (14.3%)	6 (85.7%)	1.00
Moderate (%)	1 (14.3%)	6 (85.7%)	
Severe (%)	1 (10.0%)	9 (90.0%)	
Total (%)	3 (12.5%)	21 (87.5%)	

Discussion

Majority of subjects scores above the cut-off point of PSQI indicating poor sleep quality. Poor sleep quality is distributed all over the severity degree of CRS meant that sleep is impaired in CRS patients. The reason behind this are the direct effect of inflammatory response and symptoms of CRS that occurs while sleeping.

CRS symptoms negatively affect sleep quality in number of ways. The nasal obstruction as the most common symptom found in this study occurs due to the inflammation. Inflammation can cause inferior concha hypertrophy in the nasal mucosa, vascular dilatation, and/or autonomic dysfunction causing obstruction.[8] During sleep, nasal and oral airflow will be disrupted due to excessive nasal congestion causing the dry mouth to CRS sufferers contributing to sleep apnea that leads to decreasing sleep quality.[6, 9] The number of patients with nasal obstruction in this study is in accordance with almost all other studies making the symptoms of nasal obstruction as the gold standard in the diagnosis of CRS.[10] The same result are found in several other studies,[3, 10] then followed by rhinorrhea.[10] Facial pain which is a part of cardinal symptoms of CRS can also disrupt sleep quality through decreased activity of daily life, increased time in bed and increased amount of short nap causes insomnia as an adjustment mechanism that reduces the sleep quality,[11] while hyposmia/anosmia does not really effect the sleep quality. Hyposmia/anosmia can occur in number of ways such as disrupt transmission of odor to olfactory area because of mechanical obstruction,[12] temporary and reversible intervention with odor binding receptors because of inflammation around neuroepithelial,[13] and decreased volume of olfactory bulb.[14] Nasal congestion and postnasal drip which are minor symptoms can also disrupt sleep quality by disrupting the sleep-wake cycle by causing an increase in the frequency CRS patients' mid-sleep awakenings.[6] Apart from symptoms, the resulting inflammatory cytokine such as interleukin-1 beta (IL-1β) and tumor necrosis factor alpha (TNF-α) can also reduce the patient's sleep quality directly through neuroimmune signals which affects sleep regulation and maintaining proper sleep by promoting non-rapid eye movement sleep.[6] All of the above causes a decrease in sleep quality and can be seen in the component of sleep disturbance, sleep latency, and daytime dysfunction which gain the most proportions of such complaints (Table 3).

Previous study with similar result of no significant relationship between CRS severity and sleep quality used different method to assess the variables. Variables assessed using the Lund-Mackay bilateral scoring system which measures the severity of image opacity in the maxillary, ethmoidal, sphenoidal, ostiomeatal complex, and frontal sinus regions and the Lund-Kennedy endoscopy staging system which measures visual pathologic states within the nose and paranasal sinuses, as well as sleep PSQI.[5] Poor sleep quality was found in all degrees of severity. However, there are various variables that might influence the relationship since sleep quality was also aggravated by various factors such as gender, comorbid depression, and cigarette smoking.[5]

The quality of sleep is one of the elements from quality of life. CRS treatment is important since sleep disturbance or fatigue are important parameters in the diagnosis of CRS.[10] In controlled patients, sleep disturbance or fatigue will not be found thus making the quality of life improve.[10]

This study had limitation in collecting patients because Dr. Soetomo General Hospital is a third referral hospital that receive patients who have had surgical intervention before and frequently came for a follow-up appointment.

Conclusion

No relationship was found between CRS severity and sleep quality in adult patients. This occurs due to the small total subject. Further research should be conducted in a multi-center manner to cover a wider and more samples to help describe the population.

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Conflict of Interest

There is no conflict of interest.

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