Patients suffering from obstructive sleep apnea (OSA) are unaware of clinical symptoms, such as cessation of breathing during sleep, decrease in blood oxygen levels, severe sleep fragmentation, and excessive daytime sleepiness. Equally worrying is a low level of knowledge among physicians, psychiatrists, and psychologists of the intellectual and emotional impact of OSA. The illness may lead to anxiety, depression, psychosis, and other pathological symptoms. The aim of the present study was to evaluate relationships among OSA, quality of life, and psychological performance. STAI, UMACL, the Beck Depression Inventory, the Framingham Type A Scale, the Courtauld Emotional Control Scale (CECS), the Life Orientation Test - Revised (LOT-R), and the Satisfaction With Life Scale (SWLS) were applied. The tests were used to describe the well-being and pathological symptoms, such as depression or anxiety, in a clinical group (newly-diagnosed, untreated OSA patients) in comparison with a control group (healthy volunteers). The results of the tests failed to substantiate the presence of significant differences between the clinical and control groups. We put forward a hypothesis that the rather unexpected lack of psychological differences might stem from a rapid mood improvement in OSA patients on anticipation of being diagnosed and taken care of in the hospital setting. Followed-up studies in the same patients are required to confirm this hypothesis.

**Key words:** anxiety, quality of life, obstructive sleep apnea, psychology

**INTRODUCTION**

Obstructive sleep apnea (OSA) is a disease that affects the respiratory system. It is a sleep breathing disorder that is most common in obese men over the age of 40 (1) and obese women after menopause (2, 3). Apart from being significantly
overweight, other risk factors include anomalies of the facial skeleton (4) and certain laryngological problems (5). The prevalence of OSA in Poland is 16% in men and 5% in women (6).

Breathing in OSA is characterized by recurrent episodes of upper airway collapse and air inflow interruption. OSA is recognized when the number of apneic and hypopneic episodes, longer than 10 s, per hour of sleep (referred to as the apnea-hypopnea index - AHI) is ≥ 5 and the patient shows excessive daytime sleepiness (7). The incidence of ailments, especially daytime sleepiness and susceptibility to dangerous complications, is proportional to the AHI. If the intervals between apneic episodes are less than 2 min (AHI>30/h), OSA is considered to be severe. Hypopnea, in which the amplitude of breathing is reduced by 50% or more, produces symptoms similar to those caused by apnea.

The most common sign of OSA is loud, irregular snoring; apnea or gasping/choking during sleep is reported less frequently by patients or their families. A consequence of apnea and hypopnea is hypoxia, which, in turn, leads to light sleep and frequent, usually unnoticed, arousals that resume breathing (8, 9). Sleep is very fitful and its structure is disturbed due also to lack of deep sleep and REM periods. OSA-related symptoms such as a feeling of fatigue, daytime sleepiness, and impaired memory and concentration, affect efficiency of work and may result in job loss (10, 11). Emotional disturbance in OSA also gives rise to family and social conflicts (12). Symptoms of cognitive and emotional disorders are accompanied by cardiovascular impairment that eventually leads to more serious conditions such as hypertension, arrhythmia, myocardial infarction or stroke (13, 14).

Owing to psychopathological effects of the disease, OSA patients have been a subject of interest of not only medical science representatives, but also psychologists. Psychological studies have indicated severe intellectual disorders related mainly to verbal activity, attention, short memory, learning skills and logical reasoning, including planning and object categorisation (7). These symptoms, which are typical for organic damage to central nervous system, also affect the emotional sphere. As patients are usually aware of their impaired intellectual function, they feel lost and helpless. They become restless, anxious or depressed (15, 16). Comparative studies of OSA patients and healthy persons indicate a significantly higher rate of anxiety and depressive disorders in the former, as measured using different diagnostic scales, ranging from MMPI and the Beck Depression Inventory to discursive analyses (7, 17). In a study conducted in 2005 in a group of 4060 Americans, 21.8% of those suffering from OSA were diagnosed with depression, 16.7% with high anxiety, 11.9% with posttraumatic stress disorder, 5.1% with psychosis, and 3.3% with bipolar affective disorders (18).

Apart from general methods used in psychological studies, there are some scales developed specifically to measure the quality of life of OSA patients. These include: Functional Outcomes of Sleep Questionnaire by Weaver et al,
Calgary Sleep Apnea Quality of Life Questionnaire, and Obstructive Sleep Apnea Patient-Oriented Severity Index (19).

In treatment of OSA, apart from continuous positive airway pressure (CPAP), which is the most effective intervention, behavioral therapy such as avoidance of alcohol or sedative-hypnotic drugs before sleep and sleeping on one's side or stomach (20), has its place as adjunctive measures. Tsuneto et al (21) have demonstrated that CPAP application during sleep also improves the quality of life of patients with OSA, although the effect is not as high as could be expected. It is possible that improvements in general health, vitality, social functioning referred to by Parish (22) are related to the very fact of treatment rather than its medical effects, as the procedures applied do not provide for the elimination of the placebo effect (19). This interpretation seems even more likely in the context of the results among OSA patients' bed partners, who also report improved quality of life in the same categories.

The purpose of our study was to verify the hypothesis that OSA negatively affects patient's emotional condition and thus the quality of life. We assumed that a diminished mood, sadness, pessimism, anxiety, lack of life satisfaction, annoyance or even anger would occur more frequently among patients with OSA than in healthy persons.

MATERIAL AND METHODS

The study was performed in accordance with the Declaration of Helsinki and was approved by a local Ethics Committee. In total, 63 subjects, divided into a clinical and control groups, were used for the study. All subjects gave informed consent to study procedures. The clinical group encompassed 29 patients of the mean age 57.0 ±9.3 yr (F/M - 4/25). They were new admissions to the National Institute of Tuberculosis and Lung Diseases in Warsaw, Poland, first time diagnosed as having OSA, and before the commencement of CPAP treatment. The patients' mean BMI was 35.3 ±6.6 kg/m² and mean AHI was 33.3 ±15.8/h. All patients had excessive daytime sleepiness, recorded on the Epworth Sleepiness Scale as >10. The control group consisted of randomly selected 34 age and weight-matched men (mean age - 54.0 ±6.4 yr) with no OSA record. In the clinical group, 76.9% of the patients were married, almost half (44.8%) were professionally active, and 75.9% had secondary or higher education. In the control group, 76.5% persons were married, 64.6% worked, and as much as 79.4% had secondary or higher education.

The subjects were asked to provide brief personal data: age, education, professional activity and marital status. In addition, the questionnaire included questions based on six standard research methods, namely:

- UWIST Mood Adjective Checklist (UMACL) - developed by G Matthews, AG Chamberlain, and DM Jones, Polish adaptation by E Goryńska. The checklist comprises 29 questions and is used to measure one's current mood. It is divided into three subscales: Hedonic Tone (HT), Tense Arousal (TA), and Energetic Arousal (EA);
- Satisfaction With Life Scale (SWLS) - developed by E Diener, RA Emmons, RJ Larson, and S Griffin, Polish adaptation by Z Jurczyński. The scale comprises five statements indicating one's satisfaction with life;
• Life Orientation Test - Revised (LOT-R) - developed by MF Scheier, CS Carver, and MW Bridges, Polish adaptation by R Poprawa and Z Jurczyński. The test comprises ten items, including only six diagnostic ones. The scale is used to measure dispositional optimism;
• Courtauld Emotional Control Scale (CECS) - developed by M Watson and Steven Greer, Polish adaptation by Z Jurczyński. CECS comprises three subscales: anger, depressed mood, and anxiety. It is used to measure the extent to which individuals control their anger, depression and anxiety in difficult situations;
• Framingham Type A Scale - developed by a research team in the Framingham Heart Study, Polish adaptation by Z Jurczyński. It is a ten-item scale comprising five questions related to individual traits, four questions about emotions at the end of an average day and one question that addresses time pressure. In the Polish version, the scale measures the sense of time urgency and competitive drive. It is used to assess certain behavioural correlates of cardiovascular diseases and other somatic disorders (usually gastric ulcer, digestive system diseases, and rheumatic diseases);
• Beck Depression Inventory (BDI) - the brief version, comprising eight scales. By answering questions patients describe their mood (sadness, interest in other persons), motivation states (willingness for work, suicidal thoughts) and somatic aspects (sleeplessness, appetite).

Differences between the clinical and control groups were assessed with multivariate one-factor analysis of variance (MANOVA).

RESULTS

First, we assessed positive emotions using the UMACL, SWLS, and LOT-R scales. There were no significant differences between the patient and control groups in one's current mood (Wilks' Lambda=0.84; F_{4,42}=1.96; P=0.11), hedonistic tone (mean score 29.4 ±3.8 vs. 28.9 ±3.8, respectively), and energetic arousal (mean score 29.7 ±4.6 vs. 31.9 ±4.9, respectively). Likewise, there were no significant differences between the patient and control groups in the measurements of dispositional optimism (mean score 15.6 ±2.8 vs. 15.0 ±3.6, respectively) and satisfaction with life (mean score 21.1 ±6.4 vs. 20.8 ±6.2, respectively). Correlation analyses of the aforementioned scales revealed a strong relationship between the SWLS scale and the UMACL subscales: hedonistic tone (r=0.56) and energetic arousal scales (r=0.44). The hedonistic tone and energetic arousal subscales correlated with each other the strongest (0.69), whereas the LOT-R scale showed a correlation with both hedonistic tone (r=0.41) and energetic arousal scales (r=0.40).

Next, we analyzed the BDI and CECS mood scales. There were no differences between the groups in this analysis either (Wilks' Lambda=0.98; F_{2,48}=0.59; P=0.55). The BDI score was 3.1 ±2.9 in the patient vs. 4.2 ±4.0 in the control group, which indicates that OSA patients were even slightly less depressed. The respective CECS scores were 16.5 ±4.8 and 16.9 ±3.7. Both scales assessing depressive symptoms were only slightly correlated to each other (r=0.19).

Finally, we analyzed the power of negative emotions: anger, anxiety, tension, time urgency, and competition drive. Again, the findings showed no differences between the patient and control groups (Wilks' Lambda=0.92; F_{5,40}=0.71;
P=0.61). In this case, as before, the mean data were within the norm for men in Poland. The CECS anger scale correlated with both CECS anxiety scale (r=0.54) and Framingham Type A competitive drive scale (r=0.37). Moreover, the time urgency scale correlated positively with the Framingham Type A competitive drive scale (r=0.47).

DISCUSSION

Our findings may be considered surprising and inconsistent with a range of previous reports on the quality of life of OSA patients. Contrary to the hypothesis formulated, patients did not differ from the control group in terms of either positive or negative emotions experienced. Lack of differences cannot be ascribed to the positive effect of treatment, for neither CPAP nor any other specific therapeutic process had yet been introduced before the study surveys. However, we ought to enlarge on these results.

Lack of differences in our measurements may have resulted from the methods applied; questionnaires could have been incomprehensible or too difficult for the subjects. This seems rather unlikely, considering the general level of education of the subjects, a great majority of whom had secondary or higher education. Usually, methods with a much higher cognitive load are applied in psychological practice and they are coped with even by persons with primary education. Thus, the supposition that the methods applied did not fit the intellectual capacity of the subjects should be rejected.

Another potential cause of lack of appreciable differences may have been the fact that the methods were inadequate for the subject of research. This argument seems hardly plausible either, considering the fact that we used questionnaires that certainly meet all reliability and diagnostic accuracy criteria and are commonly used in research of clinical groups, including somatic patients. It is worth noting that many studies that showed emotional disorders in OSA patients used exactly the same methods as we did, the Beck Depression Inventory being just one example.

Random sampling usually guarantees that a sample is representative of the population and results correspond to actual average scores. Occasionally, for not quite explicable reasons, results in a test group are either overstated or understated. But it was not the case in our study. The analysis of raw data gathered for the control group (and the clinical one, as well) indicates that these data, with respect to all the scales used, correspond to STEN scores of 5-6, which are typical scores for Poland's adult population. Thus, it should be stated that the patients with OSA did not differ from the control group and that their scores corresponded to average results in the population. In consideration of the above, one might assume that there is no empirical evidence of any negative impact of OSA on patients' psyche and emotions.
Having rejected the supposition of inadequacy of research methods, we can only try to offer an explanation for the results, taking for a fact that patients with OSA did not differ from the control group in terms of the emotional state. We put forward a hypothesis that the rather unexpected lack of psychological disturbances in OSA patients may stem from a rapid mood improvement after the very fact of admission to the hospital and anticipation of being diagnosed and taken care of by health professionals. Followed-up studies in the same patients monitoring their psychic health and the quality of life after the therapeutic process has started are required to verify this hypothesis. Assistance of psychologists in determining the emotional state of OSA patients is essential, as it may help them use the potential, inherent in a human being, to move toward health in Antonowski’s continuum.

REFERENCES


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