

COMPARATIVE EVALUATION OF THE STOP-BANG QUESTIONNAIRE AND  
EPWORTH SLEEPINESS SCALE IN THE SCREENING OF OBSTRUCTIVE SLEEP  
APNEA

Djumaniyazova Guzal Alimbaevna

[guzadd55coral2000@gmail.com](mailto:guzadd55coral2000@gmail.com)

Khushvakova Nilyufar Jurakulovna

DSc, Associate Professor Samarkand Medical University

<https://doi.org/10.5281/zenodo.22911337>

**Annotation:** This study evaluates the clinical usefulness of commonly used screening instruments for the early identification of obstructive sleep apnea. The study compared the STOP-BANG questionnaire and the Epworth Sleepiness Scale in patients with suspected obstructive sleep apnea. The assessment focused on clinical symptoms, daytime sleepiness, and objective sleep-related parameters. The findings showed that higher screening scores were associated with a greater frequency of sleep-related breathing disturbances. The STOP-BANG questionnaire provided information about the overall risk of obstructive sleep apnea, while the Epworth Sleepiness Scale mainly reflected the level of daytime sleepiness. The results indicate that these screening instruments can be useful for identifying patients who require further objective sleep assessment. However, screening questionnaires should be considered preliminary assessment tools and should be interpreted together with clinical examination and objective diagnostic methods.

**Keywords:** Obstructive sleep apnea, STOP-BANG questionnaire, Epworth Sleepiness Scale, screening, daytime sleepiness, apnea–hypopnea index, sleep disorders, respiratory disturbances, clinical assessment.

### Introduction

Obstructive sleep apnea is a common sleep-related breathing disorder characterized by repeated episodes of partial or complete obstruction of the upper airway during sleep. These episodes may cause intermittent reduction in blood oxygen levels, repeated awakening during sleep, disruption of normal sleep patterns, and impaired daytime functioning. Patients may experience habitual snoring, morning fatigue, difficulty maintaining attention, and excessive daytime sleepiness. However, clinical manifestations vary between individuals, and the severity of symptoms does not always correspond to the actual severity of the disease. Early identification of patients who are at increased risk of obstructive sleep apnea is an important part of clinical practice. Objective sleep examination provides reliable information about respiratory disturbances during sleep; however, such examinations may require specialized equipment, trained medical personnel, considerable time, and appropriate clinical facilities. For this reason, screening questionnaires are widely used as an initial method for identifying patients who may require further diagnostic examination. The STOP-BANG questionnaire is one of the commonly used screening instruments for assessing the probability of obstructive sleep apnea. It evaluates several clinical and demographic characteristics, including habitual snoring, daytime tiredness, witnessed episodes of breathing interruption during sleep, high blood pressure, body mass index, age, neck circumference, and sex. The combined assessment of these factors allows patients to be classified according to their potential risk of obstructive sleep apnea.

The Epworth Sleepiness Scale evaluates another important clinical manifestation of the disorder, namely daytime sleepiness. The questionnaire determines the likelihood of falling asleep in different everyday situations and provides an estimate of the patient's subjective level of daytime sleepiness. Although excessive daytime sleepiness is an important symptom of obstructive sleep apnea, it is not present in every patient. Therefore, a low level of daytime sleepiness cannot independently exclude the possibility of clinically significant obstructive sleep apnea. Other screening instruments, such as the Berlin Questionnaire and the NoSAS score, use different combinations of symptoms, anthropometric characteristics, and clinical risk factors. Differences in their structure and scoring systems may influence their ability to identify patients with a high probability of obstructive sleep apnea. Comparative assessment of these instruments is therefore important for determining their clinical applicability in different patient populations. An important component of such comparison is the assessment of the relationship between screening results and objective sleep parameters. The apnea–hypopnea index is commonly used to determine the frequency of episodes of reduced or completely interrupted breathing during sleep. Comparing screening scores with the apnea–hypopnea index can provide information about the ability of different questionnaires to identify patients with a higher probability of objectively confirmed obstructive sleep apnea.

#### **Relevance**

Obstructive sleep apnea is an important clinical problem because repeated interruption of normal breathing during sleep can negatively affect sleep quality, daytime functioning, and overall health. The disease may remain undiagnosed because its clinical manifestations vary considerably between patients, and some individuals may not recognize the significance of their symptoms. Early identification of patients with an increased probability of obstructive sleep apnea is therefore important for timely diagnostic evaluation and appropriate clinical management.

#### **Aim**

The aim of this study is to comparatively evaluate the STOP-BANG questionnaire, Epworth Sleepiness Scale, Berlin Questionnaire, and NoSAS score in patients with suspected obstructive sleep apnea and to determine the relationship between their results and objective sleep-related parameters, particularly the frequency of abnormal breathing episodes during sleep.

#### **Main part**

Obstructive sleep apnea is a sleep-related breathing disorder characterized by repeated narrowing or complete obstruction of the upper airway during sleep. This condition can cause recurrent disturbances of normal breathing, intermittent reductions in blood oxygen levels, and fragmentation of normal sleep. Common clinical manifestations include habitual snoring, witnessed episodes of breathing interruption, nocturnal choking or gasping, morning fatigue, and excessive daytime sleepiness. Repeated disruption of sleep may negatively affect concentration, daytime performance, and overall quality of life. However, the clinical presentation can vary considerably among patients. Some individuals may have pronounced symptoms, whereas others may experience relatively mild subjective complaints despite having significant respiratory disturbances during sleep. Several factors may increase the probability of obstructive sleep apnea, including increased body weight, enlarged neck circumference, advancing age, elevated blood pressure, and anatomical characteristics of the upper airway. Increased body weight may contribute to the accumulation of soft tissue around the upper airway and increase the tendency of

the airway to narrow during sleep. A larger neck circumference may also be associated with increased upper airway collapsibility. Age-related structural and functional changes may further contribute to impaired airway stability during sleep. Nevertheless, the presence of individual risk factors does not independently establish the diagnosis of obstructive sleep apnea. Therefore, symptoms, demographic characteristics, anthropometric measurements, and medical history should be assessed together. A comprehensive clinical assessment can help identify individuals who have an increased probability of the disorder and may require further diagnostic evaluation. Early recognition of these risk characteristics is particularly important because untreated sleep-related breathing disturbances may remain undetected for a prolonged period. For this reason, systematic evaluation of clinical manifestations and risk factors represents an important initial stage in the screening of obstructive sleep apnea.

The STOP-BANG questionnaire is a standardized clinical screening instrument designed to assess the probability of obstructive sleep apnea. It incorporates several symptoms, clinical characteristics, and demographic factors that are associated with an increased risk of sleep-related breathing disturbances. The questionnaire evaluates habitual snoring, daytime tiredness, witnessed episodes of breathing interruption during sleep, and elevated blood pressure. It also considers body mass index, age, neck circumference, and sex. The combination of these characteristics allows a broader assessment than the evaluation of a single clinical symptom. A higher screening result may indicate an increased probability of obstructive sleep apnea and may support the decision to perform further objective sleep assessment. The questionnaire is particularly useful because it can be completed relatively quickly and does not require specialized equipment. This characteristic makes it potentially valuable in primary healthcare and outpatient clinical settings. However, the STOP-BANG questionnaire should be considered a screening instrument rather than a definitive diagnostic method. A high score indicates an increased probability of the disorder but does not independently confirm its presence. Similarly, a lower score cannot always exclude clinically significant sleep-related breathing abnormalities. The performance of the questionnaire may also vary according to the characteristics of the population being examined. Age distribution, body composition, prevalence of obesity, and other clinical characteristics may influence the interpretation of the results. Therefore, questionnaire findings should be considered together with the patient's symptoms, medical history, and clinical examination. Comparison of STOP-BANG results with objective sleep parameters can provide additional information about its clinical usefulness. In this context, the questionnaire can serve as a practical initial tool for identifying patients who may benefit from further diagnostic investigation.

The Epworth Sleepiness Scale is a standardized instrument used to assess the level of subjective daytime sleepiness. It evaluates the likelihood of falling asleep during several common daytime situations and provides an estimate of the patient's perceived tendency toward sleepiness. Excessive daytime sleepiness may develop as a consequence of repeated sleep disruption and abnormal breathing during the night. However, the degree of daytime sleepiness varies among patients with obstructive sleep apnea, and some individuals with objectively confirmed disease may report relatively little sleepiness. Therefore, the Epworth Sleepiness Scale provides important clinical information but should not be interpreted independently from other risk factors. The Berlin Questionnaire represents another screening approach that evaluates symptoms and clinical characteristics associated with sleep-related breathing disorders. It includes information regarding

snoring, daytime sleepiness, and certain clinical risk factors. The NoSAS score uses a combination of anthropometric and clinical characteristics, including neck circumference, body mass index, age, snoring, and sex. These instruments differ in their structure and therefore provide information from different clinical perspectives. Comparing their results may help determine how consistently they identify individuals with an increased probability of obstructive sleep apnea. The differences between screening instruments are particularly relevant because some tools emphasize subjective symptoms, whereas others incorporate a broader range of demographic and anthropometric characteristics. A patient may have substantial anatomical or demographic risk factors without experiencing pronounced daytime sleepiness. Conversely, daytime sleepiness may occur because of other conditions unrelated to obstructive sleep apnea. For this reason, screening instruments should be viewed as complementary clinical tools rather than interchangeable diagnostic methods. Comparative evaluation can provide useful information about their applicability in different patient populations. Combining questionnaire results with clinical assessment and objective sleep testing may provide a more comprehensive evaluation of suspected obstructive sleep apnea.

The clinical value of screening instruments can be more accurately assessed when questionnaire results are compared with objective sleep-related parameters. Objective sleep examination provides information about respiratory events and physiological changes occurring during sleep. The apnea–hypopnea index is an important parameter that reflects the frequency of episodes of reduced or completely interrupted breathing during sleep. Comparison of screening scores with this index can help determine whether higher questionnaire scores are associated with a greater frequency of abnormal respiratory events. Nocturnal blood oxygen saturation is another important parameter because repeated airway obstruction may result in intermittent reductions in oxygen levels. Changes in oxygen saturation can therefore provide additional information about the physiological consequences of sleep-related breathing disturbances. However, subjective symptoms and objective findings do not always demonstrate a direct relationship. Some patients may have frequent respiratory events but relatively mild daytime symptoms, while others may report substantial fatigue or sleepiness due to several possible causes. This discrepancy emphasizes the importance of combining subjective and objective information. Statistical analysis can be used to determine the strength of the relationship between screening scores and objective sleep parameters. Correlation analysis may demonstrate whether increases in questionnaire scores are associated with changes in the frequency of respiratory events. Sensitivity and specificity can also be evaluated to determine the ability of individual screening instruments to identify patients at increased risk. Positive and negative predictive values may provide additional information regarding the practical interpretation of screening results. Such comparisons are important because screening questionnaires are designed to estimate disease probability rather than establish a definitive diagnosis. Objective sleep assessment remains necessary when confirmation of obstructive sleep apnea is clinically indicated. Therefore, comparison with objective sleep parameters represents an essential component of evaluating the diagnostic usefulness of different screening instruments.

Screening instruments have an important practical role in the early identification of individuals who may have an increased probability of obstructive sleep apnea. Their use can facilitate the initial assessment of patients in primary healthcare, outpatient clinics, and other medical settings where specialized sleep diagnostic facilities may not be immediately available.

Standardized questionnaires allow clinicians to collect information about symptoms and risk factors in a structured manner. Patients with higher screening results can subsequently be considered for further objective diagnostic evaluation when clinically appropriate. The STOP-BANG questionnaire provides information about several established clinical and demographic risk factors, while the Epworth Sleepiness Scale focuses mainly on subjective daytime sleepiness. The Berlin Questionnaire and NoSAS score provide additional approaches based on different combinations of symptoms and patient characteristics. Because these instruments evaluate different aspects of the disorder, their results may provide complementary information. The choice of screening instrument should take into account the characteristics of the patient population, the purpose of assessment, and the resources available within the clinical setting. Screening results should always be interpreted together with the patient's medical history and clinical findings. A screening questionnaire cannot replace objective sleep examination when confirmation of the disorder is required. Its principal purpose is to identify patients who may benefit from further investigation. Appropriate use of screening instruments may facilitate earlier recognition of patients with possible obstructive sleep apnea and improve the organization of diagnostic services. It may also help clinicians prioritize patients for further assessment when healthcare resources are limited. Nevertheless, screening should remain part of a broader diagnostic pathway rather than being considered an independent diagnostic procedure. A combination of standardized screening, clinical evaluation, and objective sleep assessment provides a structured approach to the identification of suspected obstructive sleep apnea. Thus, appropriate application of screening instruments can contribute to more systematic and timely clinical evaluation of patients with possible sleep-related breathing disorders.

### **Results**

The study included 80 patients with suspected obstructive sleep apnea. The patients were divided into two groups according to the results of objective sleep examination. The first group included 52 patients with confirmed obstructive sleep apnea, while the second group included 28 patients without confirmed obstructive sleep apnea. The STOP-BANG questionnaire was completed by all 80 patients. A high risk of obstructive sleep apnea was identified in 39 patients (48.8%), an intermediate risk in 25 patients (31.2%), and a low risk in 16 patients (20.0%). The Epworth Sleepiness Scale showed increased daytime sleepiness in 43 patients (53.8%), while 37 patients (46.2%) had lower levels of daytime sleepiness. Among patients with confirmed obstructive sleep apnea, the mean apnea-hypopnea index was  $27.8 \pm 8.2$  events per hour, compared with  $8.6 \pm 3.7$  events per hour in patients without confirmed disease. Mean nocturnal oxygen saturation was  $90.1 \pm 3.4\%$  in the first group and  $94.2 \pm 2.1\%$  in the second group. Higher STOP-BANG scores were more frequently observed among patients with confirmed obstructive sleep apnea. Increased daytime sleepiness was also more common in this group. These findings indicate that the screening questionnaires provided useful information for identifying patients who required further objective sleep assessment.

### **Discussion**

The findings of this study demonstrate the clinical usefulness of screening instruments in the initial assessment of patients with suspected obstructive sleep apnea. Among the 80 patients included in the study, obstructive sleep apnea was confirmed in 52 patients, indicating the importance of identifying individuals at increased risk before objective sleep assessment. Patients

with higher STOP-BANG scores more frequently demonstrated respiratory disturbances during sleep. This finding suggests that the combined assessment of snoring, daytime tiredness, witnessed breathing interruptions, blood pressure, body mass index, age, neck circumference, and sex can provide clinically relevant information about the probability of obstructive sleep apnea. The Epworth Sleepiness Scale provided additional information regarding daytime sleepiness. Patients with higher levels of daytime sleepiness were more frequently observed among those with confirmed obstructive sleep apnea. However, daytime sleepiness was not equally pronounced in all patients, indicating that this symptom should not be evaluated independently. The higher apnea–hypopnea index observed in patients with confirmed obstructive sleep apnea further supports the relationship between screening findings and objective sleep-related respiratory disturbances. At the same time, screening questionnaires should not be considered substitutes for objective diagnostic testing. Their primary role is to identify patients who may require further investigation. The results suggest that the STOP-BANG questionnaire is useful for assessing the overall clinical risk of obstructive sleep apnea, whereas the Epworth Sleepiness Scale provides complementary information about daytime sleepiness. The combined interpretation of screening results, clinical findings, and objective sleep parameters may provide a more comprehensive assessment of the patient. Therefore, the use of standardized screening instruments may contribute to earlier recognition of patients at increased risk and facilitate appropriate referral for further diagnostic evaluation.

### Conclusion

The study demonstrated that the STOP-BANG questionnaire and Epworth Sleepiness Scale can provide useful information during the initial assessment of patients with suspected obstructive sleep apnea. Among the 80 examined patients, obstructive sleep apnea was confirmed in 52 patients. Higher STOP-BANG scores were associated with more frequent sleep-related breathing disturbances, while higher Epworth Sleepiness Scale scores reflected increased daytime sleepiness. Patients with confirmed obstructive sleep apnea also demonstrated higher apnea–hypopnea index values and lower nocturnal oxygen saturation. The findings indicate that screening questionnaires can help identify patients who require further objective sleep assessment. However, these instruments should be used as preliminary screening methods rather than as independent diagnostic tools. Combining screening results with clinical examination and objective sleep testing provides a more comprehensive approach to the evaluation of suspected obstructive sleep apnea.

### REFERENCES

1. Chen, L., Pivetta, B., Nagappa, M., Saripella, A., Islam, S., Englesakis, M., & Chung, F. (2021). Validation of the STOP-Bang questionnaire for screening of obstructive sleep apnea in the general population and commercial drivers: A systematic review and meta-analysis. *Sleep and Breathing*, 25(4), 1741–1751.
2. Arslan, B. O., Uçar Hoşgör, Z. Z., & Orman, M. N. (2020). Which screening questionnaire is best for predicting obstructive sleep apnea in the sleep clinic population considering age, gender, and comorbidities? *Turkish Thoracic Journal*, 21(6), 383–389.
3. Chung, F., Abdullah, H. R., & Liao, P. (2020). STOP-Bang questionnaire: A practical approach to screen for obstructive sleep apnea. *Chest*, 149(3), 631–638.

4. Duarte, R. L. M., Magalhães-da-Silveira, F. J., Oliveira-E-Sá, T. S., Silva, J. A., Mello, F. C. Q., & Gozal, D. (2020). Obstructive sleep apnea screening with a 4-item instrument, named GOAL questionnaire: Development, validation and comparative study with No-Apnea, STOP-Bang, and NoSAS. *Nature and Science of Sleep*, 12, 57–67.
5. Ulasli, S. S., Gunay, E., Koyuncu, T., et al. (2020). Validation of NoSAS score for screening sleep-disordered breathing: A sleep clinic-based study. *Sleep and Breathing*, 24, 1469–1476
6. Chen, L., Pivetta, B., Nagappa, M., Saripella, A., Islam, S., Englesakis, M., & Chung, F. (2021). Validation of the STOP-Bang questionnaire for screening of obstructive sleep apnea in the general population and commercial drivers: A systematic review and meta-analysis. *Sleep and Breathing*, 25(4), 1741–1751.