Sleep Apnea prevalence among IBS Patients in Qena University Hospital

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Abstract

Background: Sleep disruptions impact health, correlating with cardiovascular disease, metabolic syndrome, and higher mortality. Irritable bowel syndrome (IBS) involves abdominal pain, altered stool habits, and gut microbiota dysbiosis.

Objectives: To screen for obstructive sleep apnea among patients with irritable bowel syndrome.

Patients and methods: This cross-sectional study at Qena University Hospital involved adults diagnosed with irritable bowel syndrome (IBS) per Rome IV criteria. Evaluations included personal data, general examinations for vital signs and BMI, and screening for obstructive sleep apnea (OSA) using the Epworth Sleepiness Scale and STOP-BANG Questionnaire.

Results: The mean age of the study population was 46.77±12.24 years, with 45% male (135). Epworth Sleepiness Scale averaged 3.78 ± 6.72, with 14% (42) having excessive sleepiness (score>10). STOP-BANG score averaged [2.49 ± 1.89], classifying 72.33% (217) as low risk, 13% (39) as intermediate risk, and 14.67% (44) as high risk for obstructive sleep apnea (OSA). High-risk patients were older (mean age 56.75 years) and had higher BMI (38.77kg/m²) compared to low and intermediate risk groups (P<0.0001).

Conclusion: There is a high prevalence of obstructive sleep apnea among patients with IBS, emphasizing OSA screening importance in older, higher BMI patients. Routine screenings could enhance patient care, integrating lifestyle changes and medical interventions.

Keywords: Sleep apnea; Irritable bowel syndrome (IBS); Qena University Hospitals

DOI: 10.21608/SVUIJM.2024.302218.1917

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Received: 1 July,2024.

Revised: 4 August,2024.

Accepted: 5 August,2024.

Published: 17 August, 2024

Cite this article as: Basma Mohamed, Haggagy Mansour Mohammed, Shamardan Ezz Eldin Sayed Bazeed, Eptehal Mohammed Dongol.(2024). Sleep Apnea prevalence among IBS Patients in Qena University Hospital. *SVU-International Journal of Medical Sciences*. Vol.7, Issue 2, pp: 419-428.

Introduction

Sleep has a crucial biological function and is increasingly recognized for its impact on overall health. Disrupted sleep is associated with adverse health outcomes, such as cardiovascular disease, metabolic syndrome, and elevated all-cause mortality. Additionally, it imposes significant economic costs through reduced productivity and increased healthcare utilization **(Daghlas, 2020; Deng et al., 2017; Hillman et al., 2018).**

Irritable bowel syndrome (IBS) is characterized by abdominal pain occurring at least once weekly, accompanied by defecation-related discomfort, altered stool frequency, and/or consistency. The etiology of IBS is unknown, but it is suspected to be multifactorial. Factors implicated in its pathophysiology include the dietary intake of unabsorbed carbohydrates, gut microbiota dysbiosis, and low-grade inflammation **(Ohlsson, 2022).**

Studies indicate that IBS impacts a considerable portion of the global population, and Egypt.

Concurrently, sleep apnea, a condition characterized by disruptions in breathing during sleep, is underdiagnosed despite its high prevalence and the serious health issues it poses. Notably, research shows a compelling link between sleep apnea and the exacerbation of IBS symptoms, suggesting that the physiological stress and sleep disturbances caused by sleep apnea could aggravate IBS. Despite this association, routine screenings for sleep apnea among IBS patients remain insufficient, highlighting a gap in holistic patient care and underscoring the need for integrated approaches in the diagnosis and management of these conditions **(Ghiasi et al., 2017; Saeed & Galal, 2017).**

The main objective of this study was to screen for the existence of obstructive sleep apnea among patients with irritable bowel syndrome.

Patients and Methods

This cross-sectional study was conducted under ethical code (SVU/MED/CHT019/1/23/4/630) in the Chest Diseases and Tuberculosis Department and the Gastroenterology Department of Qena University Hospital. The study included subjects aged 18 years and older who diagnosed with irritable bowel syndrome (IBS) according to Rome IV criteria **(Palsson et al., 2016),** and require recurrent abdominal pain at least one day per week over the past three months, associated with defecation, changes in stool frequency, or changes in stool form, and symptoms persisting for at least six months.

Exclusion criteria were pregnancy, use of sleep-affecting medications (such as sedatives, antidepressants, and antipsychotics), and treatment for any sleep disorder.

All participating patients underwent the following:

- Demographic data including name, age, sex, special habits, IBS data among the included subjects and history of comorbid diseases.
- General Examination: A thorough general examination was conducted, recording vital signs such as blood pressure and calculating body mass index (BMI) using the formula BMI = weight (kg) / height² (m²).
- Screening for OSA: Sleep data were obtained through validated Arabic versions of various questionnaires:

1. **Epworth Sleepiness Scale**: This scale evaluates sleepiness in eight daily situations, scored from 0 to 10 indicting no daytime sleepiness and a score of 10 or higher indicates excessive daytime sleepiness. **(Johns, 1991)**

2. **STOP-BANG Questionnaire**: This questionnaire comprises eight yes/no questions concerning snoring, tiredness, observed pauses in breathing during sleep, high blood pressure, BMI over 35 kg/m², neck circumference greater than 40 cm, age, and gender. Scores range from 0 to 8, with 5-8 indicating a high risk of obstructive sleep apnea (OSA), 3-4 indicating an intermediate risk, and 0-2 indicating a low risk. **(Chung et al., 2008)**

Statistical analysis

Data analysis was done using SPSS (Statistical Package for Social Science) software program version 23.0 (SPSS Inc., Chicago, IL). Qualitative variables were expressed as numbers and percentages, while quantitative variables were presented as mean ± standard deviation (SD). The arithmetic mean was used to describe central tendency, and SD measured the dispersion around the mean. A one-way ANOVA was employed to compare the means of three or more groups. P. Value is significant at P <0,05.

Results

The mean age was 46.77 ± 12.24 years. 56% were rural residents. 45% were male. The mean BMI was 25.08 ± 9.18 Kg/m^2. 6% were smkers, 28% were bird breader and 7.33% were ex-smokers. 12.33% had DM, 14% had HTN, 5.67% had cardiac disease and 10.67% had chest disease. The mean systolic BP was 118.35 ± 8.86 mmHg and the mean diastolic 78.28 ± 5.72 mmHg. 66.76% had snoring, 17.33% suffered from apnea, 17% had early morning headache, 13.67% had chocking during sleep and 16.33% had daytime sleepiness **(Table.1).**

Table 1. Basal characteristics of all the study populations

Variables	**N = 300**
Age (years)	46.77 ± 12.24
Residence	
• Urban	132 (44%)
• Rural	168 (56%)
Sex	
• Male	135 (45%)
• Female	165 (55%)
BMI (Kg/m^2)	25.08 ± 9.18
Special habits	
• Smoker	18 (6%)
• Bird breeder	84 (28%)
• Ex smoker	22 (7.33%)
Comorbid diseases	
• DM	37 (12.33%)
• HTN	42 (14%)
• Cardiac Diseases	17 (5.67%)
• Chest Diseases	32 (10.67%)
BP (mmHg)	
• Systolic	118.35 ± 8.86
• Diastolic	78.28 ± 5.72
Sleep symptoms	
• Snoring	200 (66.67%)

• Witnessed Apnea	52 (17.33%)
• Early morning headache	51 (17%)
• Chocking during sleep	41 (13.67%)
• Day Time Sleepiness	49 (16.33%)

(Table.2) illustrated that the distribution of irritable bowel syndrome (IBS) data among the included cases was as follows: IBS-D was observed in 93 individuals (31%), IBS-C in 85 individuals (28.33%), and IBS-M in 114 individuals (38%). The average duration of symptoms was 5.29 ± 3.1 years. The overall IBS-SSS score averaged 268.55 ± 65.46, with severity categorized as mild in 23 individuals (7.67%), moderate in 185 individuals (61.67%), and severe in 92 individuals (30.67%).

Table 2. IBS data among the included subjects

Variables	N = 300
IBS subtype	
• IBS-D	93 (31%)
• IBS-C	85 (28.33%)
• IBS-M	114 (38%)
Mean symptoms duration (year)	5.29 ± 3.1
IBS-SSS	
• Severity of Abdominal Pain	53.86 ± 13.16
• Frequency of Abdominal Pain	53.46 ± 13.15
• Severity of Abdominal Distension	53.7 ± 13.29
• Satisfaction with Bowel Habits	53.53 ± 13.29
• Interference with Quality of Life	54 ± 13.32
IBS-SSS score	268.55 ± 65.46
• Mild	23 (7.67%)
• Moderate	185 (61.67%)
• Severe	92 (30.67%)

IBS-D (Irritable Bowel Syndrome with Diarrhea), IBS-C (Irritable Bowel Syndrome with Constipation), IBS-M (Irritable Bowel Syndrome with Mixed Symptoms), IBS-SSS (Irritable Bowel Syndrome Symptom Severity Score)

(Table.3) illustrated that the Epworth Sleepiness Scale averaged 3.78 ± 6.72, with 86% (258) having no excessive daytime sleepiness with score of ≤ 10 and 14% (42) having excessive daytime sleepiness with score of > 10. STOP BANG score averaged at 2.49 ± 1.89, with 217 (72.33%) classified as low risk, 39 (13%) as intermediate risk, and 44 (14.67%) as high risk**.**

Table 3. Sleep questionnaire results of the study subjects

	N = 300
Epworth sleepiness Scale" (mean± SD)	3.78 ± 6.72
• No excessive daytime sleepiness (≤ 10)	258 (86%)
• Excessive daytime sleepiness (> 10)	42 (14%)
STOP BANG (mean± SD)	2.49 ± 1.89

• Low	217 (72.33%)
• Intermediate	39 (13%)
• High	44 (14.67%)

(**Table.4**) the correlations among the IBS-SSS score, Epworth Scale, and STOP-BANG score were analyzed, revealing several significant relationships. The IBS-SSS score showed a significant positive correlation with the Epworth Scale (r = 0.149, P = 0.0095) (**Fig.1**) and with the STOP-BANG score (r = 0.232, P < 0.0001) (**Fig.2**). Furthermore, the Epworth Scale exhibited a significant positive correlation with the STOP-BANG score (r = 0.885, P < 0.0001) (**Fig.3**).

Table 4. Correlation between different scales and each others

Variables	IBS-SSS score		Epworth Scale		STOP BANG	
	r	P. Value	r	P. Value	r	P. Value
IBS-SSS score			0.149	0.0095	0.232	<0.0001
Epworth Scale	0.149	0.0095			0.885	<0.0001
STOP BANG	0.232	<0.0001	0.885	<0.0001		

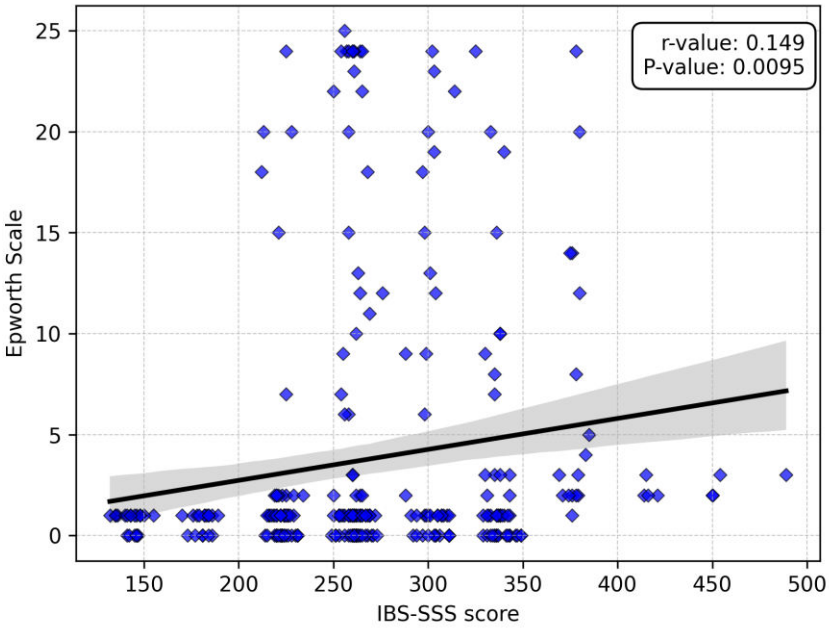

Fig.1. Correlation between IBS-SSS score and Epworth Scale

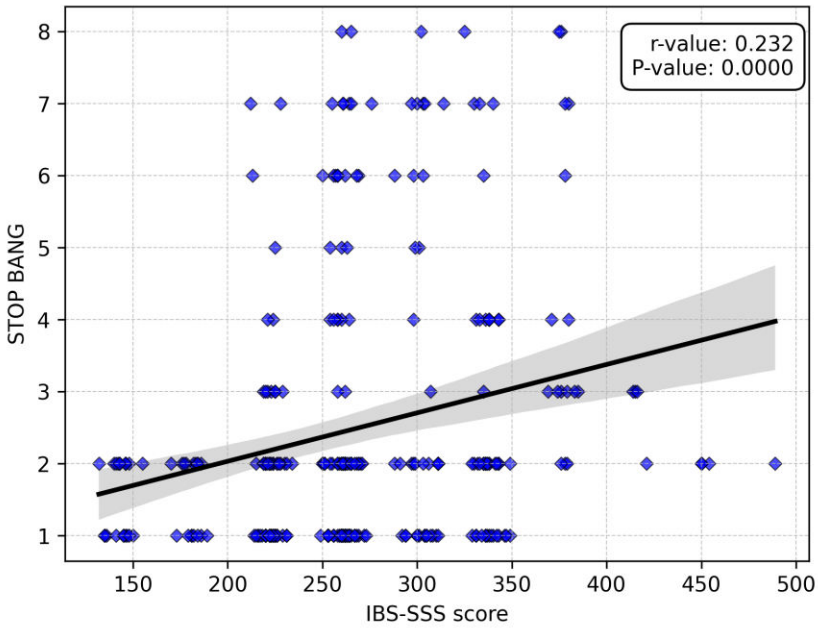

Fig.2.Correlation between IBS-SSS score and STOP BANG

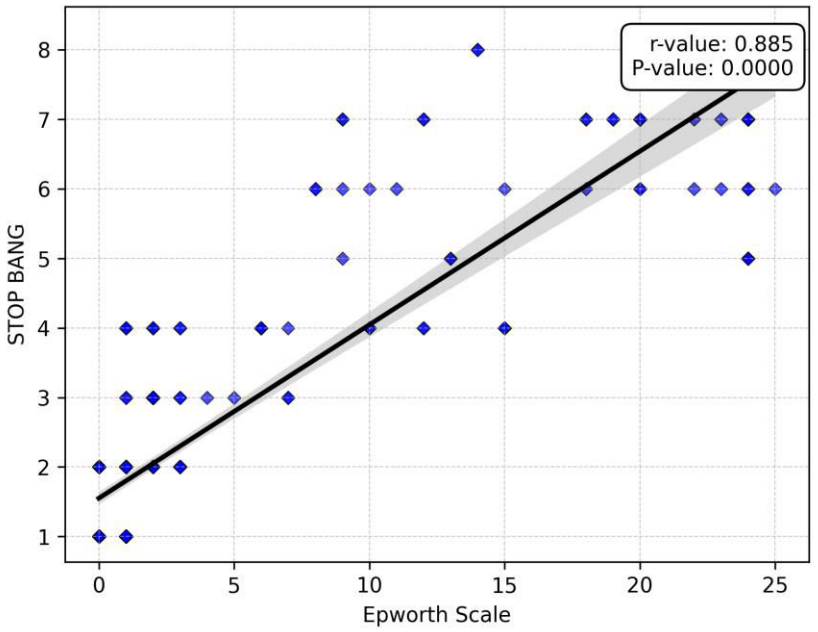

Fig.3. Correlation between Epworth Scale and STOP BANG

Patients with high risk for OSAS exhibited a significant increase in age compared to those with low or intermediate scores (56.75 ± 10.99 years vs. 45.28 ± 11.91 years and 43.82 ± 9.71 years, respectively; P < 0.0001)**.** There was also a significant increase in BMI among those with high risk compared to those with low or

intermediate risk (38.77 ± 8.78 kg/m² vs. 20.82 ± 4.11 kg/m² and 33.35 ± 9.29 kg/m², respectively; P < 0.0001)**.** High risk patients were associated with a significantly higher prevalence of certain special habits such as smoking, bird breeding, and previous smoking, as well as higher rates of chronic diseases including hypertension (P < 0.0001) and chest diseases (P = 0.011) (**Table.5, Fig.4).**

Table 5. Comparison between groups of different categories of the STOP BANG score regarding the basal characters and clinical data:

Variables	Low risk (n = 217)	Intermediate risk (n = 39)	High risk (n = 44)	P. value
Age (years)	45.28 ± 11.91	43.82 ± 9.71	56.75 ± 10.99	<0.0001*
	P1= 0.7497, P2= <0.0001*, P3= <0.0001*			
Residence				
• Urban	106 (48.85%)	15 (38.46%)	11 (25%)	0.0111*
• Rural	111 (51.15%)	24 (61.54%)	33 (75%)	
Sex				
• Male	101 (46.54%)	20 (51.28%)	14 (31.82%)	0.1409
• Female	116 (53.46%)	19 (48.72%)	30 (68.18%)	
BMI (Kg/m^2)	20.82 ± 4.11	33.35 ± 9.29	38.77 ± 8.78	<0.0001*
	P1= <0.0001*, P2= <0.0001*, P3= 0.0001*			
Smoking status				
• Smoker	10 (4.61%)	7 (17.95%)	1 (2.27%)	0.0029*
• Bird breeder	52 (23.96%)	15 (38.46%)	17 (38.64%)	0.042*
• Ex smoker	11 (5.07%)	4 (10.26%)	7 (15.91%)	0.032*
Comorbid diseases				
• DM	14 (6.45%)	7 (17.95%)	16 (36.36%)	0.523
• HTN	12 (5.53%)	10 (25.64%)	20 (45.45%)	0.0001*
• Cardiac Diseases	10 (4.61%)	2 (5.13%)	5 (11.36%)	0.2073
• Chest Diseases	16 (7.37%)	7 (17.95%)	9 (20.45%)	0.011*
BP (mmHg)				
• Systolic	116.96 ± 8.19	120.36 ± 9.1	123.43 ± 9.61	<0.0001*
	P1= 0.0603, P2= <0.0001*, P3= 0.235			
• Diastolic	78 ± 5.58	80.03 ± 5.34	78.11 ± 6.45	0.123
	P1= 0.1036, P2= 0.9914, P3= 0.2819			

P1: Low risk group vs Intermediate risk group, P2: Low risk group vs High risk group, P3: Intermediate risk group vs High risk group. (Post hoc test)

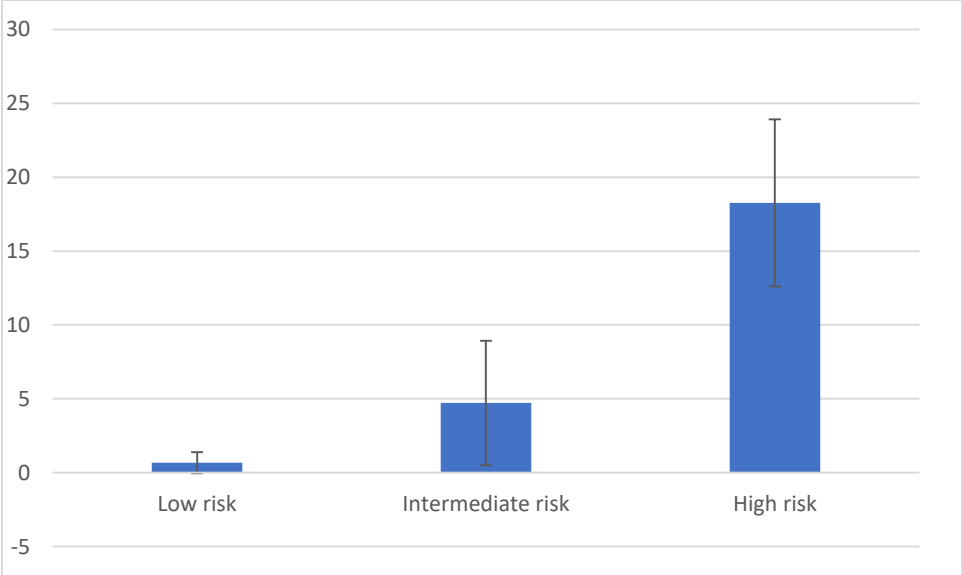

Fig.4. Epworth Scale among studied subjects

Discussion

IBS is recognized as one of the most common chronic gastrointestinal disorders, significantly affecting the quality of life and healthcare costs. Irritable bowel syndrome (IBS) and obstructive sleep apnea are among the common diseases in community. Our study disclosed a significant prevalence of high risk OSA among IBS patients.

In our study we disclosed that Epworth Sleepiness Scale averaged 3.78 ± 6.72, with 14% (42) having excessive sleepiness (score>10). STOP-BANG score averaged [2.49 ± 1.89], classifying 72.33% (217) as low risk, 13% (39) as intermediate risk, and 14.67% (44) as high risk for obstructive sleep apnea (OSA). High-risk patients were older (mean age 56.75 years) and had higher BMI (38.77kg/m²) compared to low and intermediate risk groups (P<0.0001).

Our study findings contrast with those of **Baniasadi et al. (2017),** who found that 71% of IBS patients experienced depression, 79% had stress, and 76% suffered from anxiety. Furthermore, 62% of these patients reported poor sleep quality. In contrast, our study did not find such high prevalences of depression, stress, or anxiety among IBS patients, nor did we observe such a significant impact on sleep quality.

Similarly, **Morito et al. (2014)** investigated the relationship between daytime sleepiness and abdominal symptoms in a nonclinical population. They categorized participants into sleep disturbed (≥11 points) and undisturbed (≤10 points) groups based on the Epworth Sleepiness Scale (ESS) score. They noted that the sleep disturbed group had more than twice the number of symptomatic subjects compared to the undisturbed group.

Furthermore, patients with IBS who had higher mean STOP BANG scores were significantly older compared to those with low or intermediate scores (P < 0.0001). Similarly, BMI was markedly higher in those with high scores compared to those with low or intermediate scores (P < 0.0001). Similarly, higher STOP BANG scores were allied with a greater prevalence of certain behaviors such as smoking and bird breeding, as well as higher rates of chronic conditions including hypertension (P < 0.0001) and chest diseases (P = 0.011).

This study findings were consistent with **Chung et al. (2012),** who assessed the relationship between STOP-Bang scores and obstructive sleep apnea (OSA). OSA

prevalence was 68.4%, with 29.9% mild, 20.5% moderate, and 18.0% severe. The odds ratios (ORs) for moderate/severe and severe OSA increased with higher STOP-Bang scores, ranging from 4.8 to 14.9. Moreover, **Tan et al. (2016)** studied OSA prevalence among different ethnic groups, reporting 68 subjects (28.1%) with moderate-to-severe OSA and 26 subjects (10.7%) with severe OSA. The mean STOP-Bang score was 2.1 ± 1.5, with 36.8% classified at high risk for OSA (score ≥3). They also found prevalences of 16.1% for hypertension and 8.7% for diabetes, with 18.2% of subjects being smokers. Similarly, **Huh et al. (2023),** in a nationwide study, found a 12.0% prevalence of high-risk OSA via the STOP-Bang questionnaire. They identified that older age, male gender, current smoking, heavy alcohol consumption, and greater comorbidities were associated with higher STOP-Bang scores. In adjusted analyses, diabetes mellitus (OR 1.57, 95% CI 1.25–1.97), hypertension (OR 4.81, 95% CI 3.88–5.97), and obesity (OR 2.02, 95% CI 1.60–2.56) independently increased the risk of OSA, with a synergistic effect observed when these conditions were combined (OR 3.88, 95% CI 2.94–5.11).

However, this study had several limitations including its small sample size, its cross-sectional design, reliance on self-reported data, limited sample generalizability, lack of objective sleep measures, and unaccounted confounding factors.

Conclusion

In conclusion, this study at Qena University Hospitals highlights a significant prevalence of obstructive sleep apnea among patients with IBS particularly among older and higher BMI patients. The effective use of the STOP-BANG questionnaire underscores the need for routine OSA screening in these patients to improve overall health outcomes. The findings advocate for incorporating sleep apnea screenings into the standard care for patients with IBS to address both gastrointestinal symptoms and underlying sleep disturbances, encouraging further research to refine these integrated management strategies.

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