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Predictive Value of the STOP-BANG Questionnaire for Perioperative Hypoxaemia: A Cohort Analysis

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Abstract: ***Background: Perioperative hypoxaemia is a common and potentially serious event after general anaesthesia[1]. Patient factors such as obesity, increasing age, and undiagnosed obstructive sleep apnoea (OSA) raise this risk[2]. The STOP-BANG questionnaire is a validated, simple tool for OSA screening and may help predict perioperative hypoxaemia[3]. Aim: To evaluate whether perioperative hypoxaemia (SpO_2 < 92 %) can be predicted using the STOP-BANG questionnaire in adults undergoing elective surgery under general anaesthesia. Materials and Methods: A prospective cohort study of 100 adults (20–60 years) scheduled for elective surgery under general anaesthesia was performed. Demographic data, BMI, Mallampati grade, and STOP-BANG scores were recorded pre-operatively; intra- and postoperative oxygen saturations were monitored for 48 h. Hypoxaemia was defined as SpO_2 < 92 %. Statistical analysis used χ^2 and t-tests; $p < 0.05$ was significant. Results: Thirty-three (33 %) patients developed perioperative hypoxaemia. The mean STOP-BANG score was 3.8 ± 1.0 in hypoxaemic and 2.4 ± 0.9 in non-hypoxaemic patients ($p < 0.001$). Age, BMI, Mallampati grade, and neck circumference were significant predictors; surgical type and anaesthetic technique were not. The STOP-BANG score showed 80.8 % sensitivity and 30 % specificity. Conclusion: The STOP-BANG questionnaire is a sensitive, non-invasive tool for identifying patients at risk of perioperative hypoxaemia (SpO_2 < 92 %). Its modest specificity supports its use as a screening—not diagnostic-instrument. Integrating STOP-BANG into pre-anaesthetic evaluation can improve perioperative safety through targeted monitoring and oxygen therapy.***

Keywords: STOP-BANG, Perioperative Hypoxaemia, Obstructive Sleep Apnoea, General Anaesthesia, Postoperative Complications

1. Introduction

Perioperative hypoxaemia is one of the most frequent complications following general anaesthesia and is associated with increased morbidity and delayed recovery[1]. The incidence is influenced by obesity, age, and unrecognised OSA[2]. The STOP-BANG questionnaire—Snoring, Tiredness, Observed apnoea, Pressure (hypertension), BMI > 35, Age > 50, Neck circumference > 40 cm, and Gender (male)—is a quick, reproducible method to screen for OSA[3]. This study examined whether pre-operative STOP-BANG scores can predict perioperative hypoxaemia (SpO_2 < 92 %) in patients undergoing elective surgery under general anaesthesia.

2. Materials and Methods

Study Design and Setting

Prospective cohort study at Dr Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, Chinaoutapalli, after Ethics Committee approval and informed consent.

Inclusion and Exclusion Criteria

- Included: Adults 20–60 years scheduled for elective surgery under general anaesthesia.
- Excluded: Emergency surgeries, pregnancy, pre-existing respiratory/cardiovascular disease.

Data Collection

- Pre-operative variables: age, sex, BMI, Mallampati grade, neck circumference, STOP-BANG score.
- Intra-operative variables: anaesthetic technique, airway management, surgery duration.
- Post-operative monitoring: continuous SpO_2 for 48 hours. Hypoxaemia = SpO_2 < 92 %.

Statistical Analysis

Analysed with SPSS v22. Quantitative data = mean ± SD; qualitative = %. t and χ^2 tests used; $p < 0.05$ significant. STOP-BANG ≥ 3 evaluated for sensitivity/specificity.

3. Results

Thirty-three (33 %) patients experienced perioperative hypoxaemia. Mean age, BMI, Mallampati grade, and STOP-BANG scores were significantly higher in these patients ($p < 0.001$).

Table 1: Severity of Hypoxaemia with Increasing Age

Age Group (years)	Patients with Hypoxaemia (n = 33)	p-value
20–30	4 (12.1 %)	< 0.001
31–50	14 (42.4 %)	
>50	15 (45.5 %)	

Table 2: Relation of Hypoxaemia According to Type of Surgery

Type of Surgery	Patients with Hypoxaemia (n = 33)	p-value
ENT	8 (24.2 %)	0.19 (NS)
Abdominal	17 (51.5 %)	
Orthopaedic	8 (24.2 %)	

Table 3: Observation of Hypoxaemia According to Mallampati Grade

Mallampati Grade	Patients with Hypoxaemia (n = 33)	p-value
I	2 (6.1 %)	< 0.001
II	8 (24.2 %)	
III	14 (42.4 %)	
IV	9 (27.3 %)	

Table 4: Prediction of Hypoxaemia with STOP-BANG Score

STOP-BANG Score Range	Patients with Hypoxaemia (n = 33)	Mean STOP-BANG ± SD	p-value
0–2	3 (9.1 %)	2.4 ± 0.9	< 0.001
3–4	11 (33.3 %)		
5–8	19 (57.6 %)	3.8 ± 1.0	

Table 5. Sensitivity and Specificity of the STOP-BANG Questionnaire

Parameter	Value (%)
Sensitivity	80.80%
Specificity	30.00%

4. Discussion

Comparison with Previous Studies

This study demonstrates that higher STOP-BANG scores correlate strongly with perioperative hypoxaemia[4]. Our findings agree with Chung et al.[2] and Nagappa et al.[3], who noted that STOP-BANG ≥ 3 predicts postoperative desaturation and airway complications. Opperer et al.[5] and Hai et al.[4] also observed greater adverse events in patients with OSA features. BMI and age showed significant influence, consistent with Young et al.[6] and Garvey et al.[7] who reported age- and obesity-related airway collapsibility. Mallampati grade and neck circumference were likewise predictive, paralleling Getahun Dendir Wolde et al.[9].

Clinical Implications

The STOP-BANG questionnaire's high sensitivity (80.8 %) and limited specificity (30 %) make it ideal for screening[9] [10]. Identifying at-risk patients enables intensified perioperative monitoring, supplemental oxygen, and avoidance of sedatives that depress respiration. Routine STOP-BANG use may reduce unrecognised OSA events and improve safety in resource-limited settings.

5. Limitations and Future Scope

Single-centre design and modest sample size restrict generalisability. Overnight oximetry or polysomnography was not performed. Ethnic variation in body habitus may alter STOP-BANG thresholds[11]. Future multicentre studies with larger cohorts and continuous monitoring could refine predictive accuracy and assess outcomes after targeted interventions.

6. Conclusion

The STOP-BANG questionnaire is a sensitive, practical tool for pre-operative identification of patients at risk for perioperative hypoxaemia (SpO_2 < 92 %). A STOP-BANG ≥ 3, especially in patients with elevated BMI and Mallampati grades, predicts desaturation reliably. Incorporating STOP-BANG into routine pre-anaesthetic evaluation can enhance patient safety by prompting early recognition and management of OSA-related respiratory compromise.

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