

# Prevalence of obstructive sleep apnea among patients with coronary artery disease in Saudi Arabia



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**Background:** Despite the association between obstructive sleep apnea (OSA) and coronary artery disease (CAD), few studies have investigated this issue in Saudi Arabia.

**Objectives:** This study aimed to identify the prevalence of OSA among CAD patients.

**Subjects and methods:** This was a cross-sectional (descriptive) study conducted at King Abdul-Aziz University Hospital in Jeddah, Saudi Arabia from April 2012 to December 2013. All consecutive patients referred to the cardiac catheterization lab for coronary angiography who exhibited evidence of CAD were included in this study. This study was conducted in two stages. During the first stage, each participant was interviewed individually. The administered interview collected data pertaining to demographics, comorbidities, and the STOP-BANG questionnaire score. The second stage of this study consisted of a diagnostic overnight polysomnography (PSG) of 50% of the subjects at high risk for OSA according to the STOP-BANG questionnaire.

**Results:** Among the patients with CAD (N = 156), 128 (82%) were categorized as high risk for developing OSA. PSG was conducted on 48 patients. The estimated prevalence of OSA in the study sample was 56.4%. Approximately 61% of the documented sleep apnea patients suffered from moderate to severe OSA.

**Conclusion:** This local study concurs with reports in the literature indicating that OSA is very common among CAD patients.

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## Introduction

Patients with obstructive sleep apnea (OSA) experience repetitive episodes of apnea or reduced airflow due to upper airway obstruction during sleep. OSA appears to be related to several cardiovascular diseases, even after adjustment for confounding variables. These diseases include systemic hypertension [1]; pulmonary hypertension, particularly in cases of comorbid daytime hypoxemia [2–6]; coronary artery disease (CAD) [7–9]; heart failure [9]; and nocturnal cardiac arrhythmia [10–12].

Furthermore, there is increasing evidence that severe OSA is associated with increased morbidity and mortality related to cardiovascular disease. In an observational study, patients with untreated severe OSA experienced a higher incidence of fatal and non-fatal cardiovascular events than healthy participants, patients with mild-moderate OSA, and even patients with severe but treated OSA [13]. In a prospective longitudinal epidemiological cohort study, Gottlieb et al. followed 1927 men and 2495 women aged 40 years or more who were free of coronary heart disease and heart failure at the time of recruitment [9]. All participants underwent baseline polysomnography (PSG) and were followed up for a median of 8.7 years. After adjustment for multiple risk factors, OSA was found to be a significant predictor of incident CAD in men younger than or equal to 70 years of age, but not in older men or in women of any age. Accordingly, the authors concluded that the association between OSA and the incidence of coronary heart disease in this sample was ambiguous [9].

Data from Saudi Arabia regarding OSA in stable CAD patients are scarce. Hence, the aim of our study was to identify its prevalence among CAD patients (confirmed by coronary angiography) attending a university hospital.

## Subjects and methods

This was a cross-sectional (descriptive) study conducted at King Abdulaziz University Hospital in Jeddah, Saudi Arabia, from April 2012 to December 2013. Approval was obtained from the hospital research ethics committee prior to conducting the study. Each participant was required to sign a consent form.

All consecutive patients referred to the cardiac catheterization lab for elective coronary angiography were eligible for this study. Only those with

### Abbreviations

AASM	American Academy of Sleep Medicine
ACS	Acute Coronary Syndrome
AHI	Apnea-Hypopnea Index
BMI	Body Mass Index
CAD	Coronary Artery Disease
IHD	Ischemic Heart Disease
MI	Myocardial Infarction
OSA	Obstructive Sleep Apnea
PSG	Polysomnography
SPSS	Statistical Package for Social Sciences

demonstrated CAD based on coronary angiography were recruited. Patients who refused or were unable to participate were excluded. This study was conducted in two stages. During the first stage, trained physicians interviewed each participant individually. The administered questionnaire collected data pertaining to patient demographics, comorbidities, the STOP-BANG questionnaire score, and coronary angiographic findings (positive or negative for CAD). The second stage of the study consisted of a diagnostic overnight PSG. Due to limitation of budget, 50% of the subjects – categorized into the high-risk OSA group according to the STOP-BANG questionnaire – were randomly selected for PSG to confirm OSA. A systematic random sampling technique was followed by choosing odd numbers on the sample list.

## Instruments

The STOP-BANG questionnaire [14] screens for symptoms of OSA and has been validated for individuals with a mean age of  $57 \pm 16$  years. It was originally intended for use in a preoperative setting because untreated OSA is associated with increased post-operative complications and longer hospital stays [15]. This questionnaire consists of four yes/no and fill-in-the-blank questions represented by the mnemonic 'STOP BANG' as follows: S (Do you Snore loudly?), T (Do you often feel Tired, fatigued, or sleepy during the daytime?), O (Has anyone Observed you to stop breathing during sleep?), and P (Do you have or are you being treated for high blood Pressure?). To improve the accuracy of the scale, B (body mass index or BMI), A (age), N (neck circumference), and G (gender) are recorded. The STOP-BANG questionnaire is scored as follows: for the first four yes/no questions, each positive response is assigned one point. An additional point is added for each of the following conditions: a

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