

Sleep Apnea in Hypertensive Patients: Relationship with Duration of Hypertension and the Effect of Age

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Abstract

Background: Hypertension is identified as the third leading risk factor for morbidity and as the leading risk factor for mortality worldwide which is estimated to result in 7.5 million deaths annually. Sleep apnea is a breathing disorder characterized by brief interruptions of breathing during sleep. Even though literature consistently relates presence of sleep apnea with hypertension, there is a dearth of data evaluating the relationship between duration of hypertension and presence of sleep apnea, both locally and internationally.

Objectives: 1) To study the relationship between duration of hypertension and sleep apnea in hypertensive patients and 2) To assess the effect of age on such a relationship.

Materials and Methods: A cross-sectional study was carried out on a total of 300 conveniently sampled patients, aged 18 or above, from the medical outpatient department of a secondary care hospital of Karachi after taking ethical approval. The inclusion criteria were self-reported history of hypertension and being on anti-hypertensive medication. Age, duration of hypertension and presence of sleep apnea in each patient were evaluated with the help of a structured questionnaire developed specifically for the study. The data were analyzed on SPSS version 20. Qualitative data were expressed as frequency and percentages. Chi-square-test was used for inferential analysis. The significance level was set at 0.05.

Results: The study results revealed a significant positive association between longer duration of hypertension and presence of sleep apnea ($p=0.02$) where patients with longer duration of hypertension had higher prevalence of sleep apnea than those with shorter duration (42.1% vs. 29.0%) though after controlling for the confounding effects of age through stratification this association no longer persisted.

Conclusion: The study results revealed a positive association between longer duration of hypertension and presence of sleep apnea, albeit only before controlling for the potential confounding effects of age. Nevertheless, further evaluation of this intriguing relationship is recommended.

Key words: Sleep apnea, hypertensive patients, duration of hypertension, age.

Study was carried out on a total of 300 conveniently sampled patients, aged 18 or above, from the medical outpatient

Introduction

Hypertension is defined as a systolic blood pressure of 140 mm Hg or more, or a diastolic blood pressure of 90 mm Hg or more, or taking antihypertensive medication. [1] Because of its high prevalence, hypertension is considered a leading

public health challenge globally. [2, 3] The Comparative Risk Assessment Collaborating Group identifies hypertension as the third leading risk factor for morbidity and as the leading risk factor for mortality worldwide. [4] As estimated by World Health Organization, hypertension results in 7.5 million deaths annually. [5] Prior to 2004, the prevalence of hypertension in Pakistan was

reported to be 17%. [6] In 2014 however, WHO estimated 25.2% of the Pakistani population to suffer from raised blood pressure. [7]

Sleep apnea is a breathing disorder characterized by brief interruptions of breathing during sleep. It has two types: central and obstructive. Central sleep apnea occurs when the brain fails to send the appropriate signals to the breathing muscles to initiate respirations whereas obstructive sleep apnea occurs when air cannot flow into or out of the nose or mouth even though efforts to breath continue. [8] Available data on sleep apnea is scant at its best in Pakistan. Studies put the prevalence of sleep apnea from 7% to 25%; the estimates vary with type of the population surveyed. [9-11]

Although literature consistently relates presence of sleep apnea with hypertension [12-21], to the best of authors' knowledge, there is a dearth of data evaluating the relationship between duration of hypertension and presence of sleep apnea, both locally and internationally. Our objectives therefore were 1) to study the relationship between duration of hypertension and sleep apnea in hypertensive patients and 2) to assess the effect of age on such a relationship.

Materials and Methods

After taking ethical approval, a cross-sectional department of a secondary care hospital of Karachi. The inclusion criteria were self-reported history of hypertension and being on anti-hypertensive medication. Patients with history of diabetes, cardiac events, neurological disorders, cluster headache, gastrointestinal disease and morbid obesity were excluded from the study.

Age, duration of hypertension and presence of sleep apnea in each patient were evaluated with the help of a structured questionnaire developed specifically for the study.

Data Analysis

The collected data were coded, entered and analyzed on SPSS version 20. Qualitative data were expressed as frequency and percentages. Chi-square test was used for inferential analysis. Stratification was used to control for the potential confounding effects of the age. The significance level was at 0.05. The duration of study was 4 months.

Results

The study results revealed a significant positive association between longer duration of hypertension and presence of sleep apnea (p=0.02) where patients with longer duration of hypertension had higher prevalence of sleep apnea than those with shorter duration (42.1% vs. 29.0%) (Table 1).

Post stratification analysis to control for the potential confounding effects of age showed that the significant association earlier seen between duration of hypertension and presence of sleep apnea no longer persisted in any of the two age groups (p>0.05 for both) (tables 2A and 2B).

Table 1: Cross Tabulation between Duration of Hypertension and Sleep Apnea

Variable (n=300)		Sleep Apnea		p
		Yes (n=102)	No (n=198)	
		Frequency (%)	Frequency (%)	
Hypertension Duration	<5 Years	54(29.0)	132(71.0)	0.02
	≥5 Years	48(42.1)	66(57.9)	

Table 2A: Duration of Hypertension and Sleep Apnea in Patients <50 Years Old

Variable (n=169)		Sleep Apnea		p
		Yes (n=43)	No (n=126)	
		Frequency (%)	Frequency (%)	
Hypertension Duration	<5 Years	31(23.3)	102(76.7)	0.221
	≥5 Years	12(33.3)	24(66.7)	

Table 2B: Duration of Hypertension and Sleep Apnea in Patients ≥50 Years Old

Variable (n=131)		Sleep Apnea		p
		Yes (n=59)	No (n=72)	
		Frequency (%)	Frequency (%)	
Hypertension Duration	<5 Years	23(43.3)	30(56.6)	0.756
	≥5 Years	36(46.2)	42(53.8)	

Discussions

The study results revealed a significant positive association between longer duration of hypertension and presence of sleep apnea in hypertensive patients where those with longer duration of hypertension had higher prevalence of sleep apnea than those with shorter duration though after controlling for the confounding effects of age through stratification this association did not persist anymore.

As cited above, the relationship between sleep apnea and hypertension is well established [12-21], but literature did not reveal any pertinent evaluation of this association being affected by the duration of hypertension. It is plausible that after an individual develops hypertension the level of blood pressure

is not necessarily always well controlled. This lack of adequate management of hypertension may eventually lead to exacerbation of the already known association between sleep apnea and hypertension resulting in higher prevalence of sleep apnea in people with longer duration of hypertension and vice versa. This study was therefore undertaken with the very same objective and the initial assessment of the data did reveal a significant positive association of longer duration of hypertension with higher prevalence of sleep apnea ($p=0.02$).

Literature also consistently reports that frequency of sleep apnea events tends to increase with advancing age of an individual. [22-26] As expected, age based post stratification cross tabulation no longer showed the earlier association observed between duration of hypertension and sleep apnea, signifying that it was confounded by the age of the study participants. Nevertheless, as it is estimated that a significant majority of patients with sleep apnea are not clinically diagnosed [27], and as sleep apnea is reported to be an independent risk factor for all-cause mortality [HR] = 6.24, 95% CL 2.01, 19.39 [28], any hypertensive patient with advanced age is suggested to be screened for the presence of sleep apnea.

Limitations

The assessment of duration of hypertension may have suffered from limitation of recall, an inherent weakness of a cross-sectional study design. Moreover, due to resource constraints, the presence of sleep apnea was determined by history only and not by polysomnography.

Conclusions and Recommendation

The study results revealed a positive association between longer duration of hypertension and presence of sleep apnea, albeit only before controlling for the confounding effects of age. Nevertheless, further evaluation of this intriguing relationship by more rigorous study designs, such as case control and cohort studies is recommended.

Conflict of Interests: The authors report no conflict of interests.

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