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OBSTRUCTIVE SLEEP APNEA IN ESRD PATIENTS ON MAINTENANCE HEMODIALYSIS: A CROSS SECTIONAL OBSERVATIONAL STUDY

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Abstract

Introduction: Approximately 10–36% of the general population have moderate-severe OSA. OSA is far more common in CKD populations, with prevalence rates of over 40% .Furthermore, it has been shown that the prevalence of OSA is further increased in more advanced stages of CKD .Although this does not necessarily imply a causal relationship given that both conditions are associated with similar comorbidities such as hypertension, diabetes, and obesity, there is definite biological plausibility to support a role for OSA in the pathogenesis of accelerated decline in kidney function.
The prevalence is higher in patients with chronic kidney disease (CKD) due to the presence of classical risk factors like obesity but also to factors peculiar to uremia and dialysis

Material and Methods: This study was conducted in the department of Nephrology in a tertiary care institute in South India. Patients of End stage renal disease on maintainance hemodialysis were interviewed for OSA questionaires including Stop Bang Questionnaire, Berlin Questionnaire and Epsworth Sleepiness Score. 152 cases were studied in the study.

Results: Of the three questionnaires, the risk of OSA as per Stop Bang Questionnaire was 27% (41/152); as per Berlin questionnaire and Epworth sleepiness score were 21.7% (33/152) and 21.1% (32/152), respectively**.**

Conclusion: Obstructive sleep apnea is more common among ESRD patients on hemodialysis. Stage 5 chronic kidney disease patients should be screened for OSA risk with questionairres, preferably Stop Bang Questionaire.

Keywords: Obstructive sleep apnea, End stage renal disease, Chronic kidney disease

Introduction:

Sleep apnea syndrome (SAS) is characterized by repeated interruption of breathing secondary to partial (hypopnea) or complete (apnea) pharyngeal collapse during the sleep period[1,2]. Although recent studies have estimated that approximately 10–36% of the general population have moderate-severe OSA [7,8], OSA is far more common in CKD populations, with prevalence rates of over 40%

[9–11] . Furthermore, it has been shown that the prevalence of OSA is further increased in more advanced stages of CKD [11].
OSA has many consequences like impairment in quality of life, cognitive functioning, and most commonly excessive daytime somnolence (EDS) which predispose the patient to traffic or occupational accidents. In addition, untreated OSA patient is under risk of developing systemic hypertension, polycythemia, cardiovascular events, and cerebrovascular accidents [22-23].

Aims & objectives of the study

1] To study the prevalence of obstructive sleep apnea among selected ESRD patients on dialysis.
2] To study the risk factors and complications of sleep related disorders in selected ESRD patients on dialysis.

Material and Methods:

This study was conducted in the department of Nephrology, Nizam's Institute of medical sciences Hyderabad over a period of 12 months. It was a cross sectional observational study. A total of 152 End stage renal disease patients on maintainanace hemodialysis who completed 3 months on dialysis were included in the study. Basic demographic data and clinical examination was conducted in all subjects.All enrolled patients were interviewed for standard OSA questionnaires , including Stop Bang questionnaire ,Berlin questionnaire and Epworth sleepiness score.

Results:

152 ESRD patients on MHD were enrolled in the study. Overall Mean age of patients 45.7 +/- 12.84 years (age range 21-79). 67.8% patients were males, 32.2% were females. There was male preponderance in our study population, in a ratio of 2.1:1. The mean HD vintage in our study population was 23.1 +/- 16.58 months. Majority of patients had HD vintage of 12-24 months (38.8%). The mean BMI of our study population was 23.9+/- 4.56 kg/m^2.Majority of our study patients were having normal BMI (52.0%), and 25.7% patients were overweight (BMI=25-29.9kg/m^2)

The prevalence of hypertension, diabetes and obesity (BMI> 30 kg/m^2)in our study dialysis population was 77.6%,22.4% and 38.8%,respectively.
The mean Hemoglobin in our study population was 9.5 +/- 1.48. Majority of patients had hemoglobin in the range of 9.5-11.5 g/dl, 42.8%.out of 152 study patients, severe anemia was present in 14 cases,9.2%.
Of the three questionnaires, the risk for OSA as per Stop Bang score was 27% (41/152); as per Berlin questionnaire and Epworth sleepiness score were 21.7% (33/152) and 21.1% (32/152),respectively.

Table 1: Showing risk stratification of OSA according to different questionnaires

OSA		**Number**	**Percentage**
Epworth Sleepiness Score	High Risk	32	21.1
	Low Risk	120	78.9
Berlin Questionnaire	High Risk	33	21.7
	Low Risk	119	78.3
STOP BANG Questionnaire	High Risk	41	27.0
	Intermediate Risk	111	73.0

Table 2: Correlation of gender with risk of OSA in study patients

Gender	**High Risk OSA**		**Low Risk OSA**		**P-value**
	No.	**%age**	**No.**	**%age**	
Male	29	70.7	74	66.7	0.634
Female	12	29.3	37	33.3	
Total	41	100	111	100	

Table 3: Correlation of age with risk of OSA in study patients

Age (Years)	High Risk OSA		Low Risk OSA		P-value
	No.	%age	No.	%age	
20-29	1	2.4	17	15.3	0.324
30-39	11	26.8	23	20.7	
40-49	12	29.3	27	24.3	
50-59	10	24.4	21	18.9	
≥ 60	7	17.1	23	20.7	
Total	41	100	111	100	
Mean±SD	47.4±10.91		45.1±13.48		

Discussion:

Obstructive sleep apnea (OSA) is far more common in patients with chronic Kidney disease than in the general population. Although recent studies have estimated that approximately 10–36% of the general population have moderate-severe OSA [7,8], OSA is far more common in CKD populations, with prevalence rates of over 40% [9–11]. The presence of OSA in this population is associated with reduced quality of life, and an increased risk of cardiovascular morbidity and mortality.

The prevalence of OSAS in our study is 27.7% as per STOP BANG questionnaire and is comparable to previous reports from other populations Italy (23.6%) [40], Egypt (31.8%) [37] and Brazil (36%) [38] .Many other studies in dialysis patients reported prevalence of sleep apnea in Saudi Arabia (44.2%) [34] ,Spain (44%) [32] , Switzerland (47%) [33] , USA (3.4%) [35] China (14%) [36] , Germany (16.4%) [39]. Hamdan Al-Jahdali [28] et al found overall prevalence of sleep apnea as defined by the Berlin questionnaire (BQ) ,37% in males and 34% in females. On the contrary, *Maria-Eleni Roumelioti et al* [27] , found there were similar proportions of participants with excessive daytime sleepiness between the controls (33%), the CKD patients (29.3%), and the HD patients (40.6%).the low prevalence of OSA in our CKD population can be explained by predominatly normal or slightly overweight BMI (mean BMI = 24.4 kg/m^2)

In our study, the mean age of high risk patients was 47. years, and most of the patients (29.3%) were in their fifth decade of life. This is in contradiction with Sidy Mohamed Seck [31] et al, where mean age of patients was 46.8 ± 16.9 (16– 85 years). Obstructive sleep apnea syndrome was found in 53 patients (overall prevalence of 41.4%) with predominance among individuals aged ≥50 years (52.6%). This is likely because, most of our elderly End stage renal disease patients opt for peritoneal dialysis. The majority of patients were not aware of their disease before the interview, and none was treated

There is predominance of males in the study population, which is also reflected in the high risk group. Around 70% of cases for high risk for obstructive sleep apnea were males. A study by *Maria- Eleni Roumelioti et al* [27] found patient had a median age 58.1 years, predominantly male (57.4%) and white (62.5%), and had a median body mass index of 28.1 kg/m^2.

In our study, the prevalence of Obstructive sleep apnea risk as per Stop Bang questionnaire, Berlin Questionairre and Epworth sleepiness score was 27.7%,21.7% and 21.1%, respectively.A study by Alaa A. Sabry et al has shown excessive daytime sleepiness (Epworth sleepiness score) in 27.3% patients, consistent with our findings. Sidy Mohamed Seck [31] found OSAS prevalence of 41.4% with predominance among individuals aged ≥50 years (52.6%) in their study. Compared to general population, the risk of obstructive sleep apnea is high in end stage renal disease patients on maintainance hemodialysis.

As far as age, there was no disparity among patients at high and low risk for obstructive sleep apnea. There was no difference in the profile of comorbidities, including hypertension, diabetes and obesity in high and low risk patients for sleep apnea. On the contrary, Sidy Mohamed Seck et al [31], demonstrated Hypertension and diabetes were more frequent in patients with OSAS, while the prevalence of obesity and sedentary was not different. Hamdan Al-Jahdali et al [28], found Sleep apnea was significantly associated with age, neck size, afternoon and evening hemodialysis shift, obesity, diabetes, and hypertension (*P*-values, 0.001, 0.029, < 0.0001, < 0.0001, < 0.008, 0.002, and < 0.001, respectively). Sleep apnea was also significantly associated with other sleep disorders such as restless leg syndrome, insomnia, habitual snoring, and EDS (*P*-values, < 0.001, < 0.001, < 0.001,

respectively). The prevalence of EDS was 44%, and EDS was significantly more prevalent in patients undergoing peritoneal dialysis ($P < 0.001$); it was also associated with older age, diabetes mellitus, and other sleep disorders. SA and EDS are common in dialysis patients and are significantly associated with other sleep disorders.

Anemia was associated with increased risk for obstructive sleep apnea and correlate with severity. however, this was statistically not significant.

Table 4: Comparison of the prevalence of OSA reported in different studies, as determined by validated questionnaires

study	population	Size of study population	Prevalence of OSA (%)
Kuhlmann *et al*., 2000 [40]	Germany	77	31
Musci *et al*., 2004 [41]	Hungary	78	32
Chen *et al* ., 2006 [42]	Taiwan	700	20
Merlino *et al* ., 2006 [43]	Italy	883	27
Argekar *et al* ., 2007 [44]	USA	270	28
Szentkiralyi *et al* ., 2011 [45]	Canada	823	28
Al-Jahdali *et al* ., 2012 46 [28]	Saudis	227	71
Wali *et al* ., [46]	Saudis	355	44.2
Our study	Indians	152	27.7

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