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Original Research Article

The prevalence of syndrome Z (the interaction of obstructive sleep apnoea with the metabolic syndrome) in a tertiary care center, Gujarat, India

Bhavesh R. Sureja, Gaurav D. Bhambhani*

Department of General Medicine, GMERS Medical College, Junagadh, Gujarat, India

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***Correspondence:**
Dr. Gaurav D Bhambhani,
E-mail: drbhambhanigaurav@gmail.com

ABSTRACT

Background: The interaction of obstructive sleep apnoea (OSA) with vascular risk factors is known as syndrome Z which is also known as the metabolic syndrome or the insulin resistance syndrome and these include the hypertension, central obesity, insulin resistance and hyperlipidaemia. The objective of the present study was to investigate the prevalence and severity of syndrome Z at tertiary care center.
Methods: This prospective study was conducted among 40 eligible patients between May and July 2018 at the tertiary care center included adult patients >18years of age. Overnight fasting glucose and lipid levels were measured, and baseline anthropometric data recorded. All sleep studies were scored and reported by a sleep physician. OSA was deemed to be present if the respiratory disturbance index (RDI) was >5, with mild, moderate and severe categories classified according to the Chicago criteria.
Results: Mean age of participants was 52.7years, 77.5% were male, Mean BMI and waist circumference were 29.2kg/m^2 and 113.8cm respectively. Almost 92.5% participants were known case of HTN, 85.0% were DM and 67.5% Dyslipidemia. Around 60.0% participants were belonged to severe grade of OSAS and 7 (17.5%) patients who fulfilled all five criteria for the diagnosis of the metabolic syndrome had severe OSAS. The prevalence of OSA in the entire group was 95.0%.
Conclusions: The prevalence of syndrome Z in present study participants was very high. With the help of history and polysomnogram, metabolic syndrome should be screened for OSA. Early diagnosis and treatment of OSA is the essential part in the treatment of metabolic syndrome and hence CAD.

Keywords: Metabolic syndrome, Obstructive sleep apnoea, Polysomnography, Severe obesity, Syndrome Z

INTRODUCTION

The interaction of obstructive sleep apnoea (OSA) with vascular risk factors is known as syndrome Z which is also known as the metabolic syndrome or the insulin resistance syndrome and these include the hypertension, central obesity, insulin resistance and hyperlipidaemia.[1,2] To maintain the well-functioning of body system, Regular sleep, duration and quality of sleep is play important part. Breathing covers; simple snoring, upper airway resistance syndrome, obstructive sleep apnea syndrome (OSAS), central sleep apnea syndrome, Cheyne-Stokes respiration and obesity hypoventilation syndrome are all included in sleep disorders. Obstructive sleep apnea syndrome (OSAS) is define as a syndrome characterized by attacks of recurrent complete (apnea) or partial (hypopnea) upper airway obstruction and often a decrease in blood oxygen saturation during sleep.[3] OSAS

is usually observed in both genders, all races, age and all socio-economic status and ethnic groups. Prevalence of OSAS was found around 4 to 5% in the general population.[4,5]

Still, Pathophysiology of OSAS is not much explained but according to some investigators, pathologies narrowing of the upper airway can cause OSAS development and also obesity, male gender, anatomical features, such as short neck, cigarettes, alcohol and sedative drug play important part in development of OSAS.[6]

Association was found between OSAS and metabolic syndrome (MetS) and the continuing increase in the prevalence of OSAS worldwide is nearly followed by increased number of MetS.[7-9] This study investigated the prevalence and severity of syndrome Z at tertiary care center.

METHODS

This prospective study was conducted among 40 eligible patients between May and July 2018 at the tertiary care center after ethical permission of Institutional Ethical Committee. Study included adult patients >18years of age from the General Medicine Department. The inclusion criteria were based on minor modifications of the National Cholesterol Education Program, Adult Treatment Panel III (NCEP ATP III) definition of the metabolic syndrome and were as follows:[7,10]

- A fasting serum glucose 6.1mmol/l or on oral blood glucose lowering drugs,
- Blood pressure >130/85mmHg or on antihypertensive drugs,
- HDL cholesterol, 1.04mmol/l (in men) and, 1.2mmol/l (in women) or on lipid lowering agents,
- Serum triglycerides >1.7mmol/l or on triglyceride lowering agents
- A waist circumference 102cm in men and 88cm in women.

Participants who fulfilled the three of the five criteria had included in the study. Authors obtained fasting glucose and lipid profiles in patients who were not previously diagnosed as dyslipidemia or diabetic, as well as anthropometric data such as height, weight, waist and neck circumference from every subject. The patients then underwent standard overnight polysomnography which included multichannel electroencephalographic (EEG), electromyographic (EMG) and electrooculographic (EOG) recording and respiratory monitoring using a nasal thermistor. All sleep studies were supervised and performed with the Alice 4 recording system (Respironics, Carlsbad, CA, USA). The studies were scored by a single sleep technologist according to the criteria of Rechtschaffen and Kales, after which they were reported by an accredited sleep physician. The patient was deemed to have OSA if the respiratory disturbance index (RDI) was >5 and was further classified as having mild, moderate or severe disease based on the Chicago criteria. Patients with respiratory disturbance index (RDI) <5 were evaluated OSAS absent, from 5-15 mild OSAS, 16-30 medium OSAS and >30 were evaluated as severe OSAS. Data was cleaned, validated and analysed by Epi. Info 7 software and range, mean and standard deviation were calculated.

RESULTS

Table 1 shows that highest number of participants (42.5%) belonged to more than 55 years age group which is followed by 45-55 (30.0%), 35-45 (17.5%) and 25-35 (10.0%) respectively. Mean age of participants was 52.7years with 7.3 SD.

Table 1: Clinico-social demographic information of study participants (N=40).

Indicators	Number (%)
Age (in years)	
25-35	4 (10.0)
35-45	7 (17.5)
45-55	12 (30.0)
>55	17(42.5)
Mean±SD	52.7±7.3
Gender	
Male	31 (77.5)
Female	9 (22.5)
Education level	
Illiterate	21 (52.5)
Literate	19 (47.5)
Socio-economic status	
Upper (I)	4 (10.0)
Upper middle (II)	8 (20.0)
Lower middle (III)	11 (27.5)
Upper lower (IV)	9 (22.5)
Lower (V)	9 (22.5)
Marital status	
Married	14 (35.0)
Unmarried	26 (65.0)
BMI (kg/m^2) Mean±SD	29.9±6.4
Waist circumference (in centimeters) Mean±SD	113.8±13.2
Past history	
Hypertension (HTN)	37 (92.5)
Diabetes mellites	34 (85.0)
Dyslipidemia	27 (67.5)

Almost 77.5% participants were male, 22.5% female, 52.5% were illiterate, 47.5% literate and 65.0% were unmarried. Socio-economic classification was done according to Kuppuswami classification. Almost 45.0% participants were belonged to upper lower and lower socio-economic groups and only 10.0% participants were in upper socioeconomic group. BMI and waist circumference were analyzed according to WHO classification. Mean BMI was 29.2kg/m^2 with 6.4 SD and

waist circumference was 113.8 cm with 13.2 SD. Almost 92.5% participants were known case of HTN, 85.0% were DM and 67.5% dyslipidemia.

Table 2: Distribution of participants according to OSAS severity classification (N=40).

Severity	Number (%)
Absent	2 (5.0)
Mild	3 (7.5)
Moderate	11 (27.5)
Severe	24 (60.0)

Table 2 shows that 60.0% participants were belonged to severe grade of OSAS and 27.5 were moderate and 7.5% were mild grade of OSAS classification respectively. According to that, highest number of participants were belonged to severe grade of OSAS followed by moderate grade of OSAS.

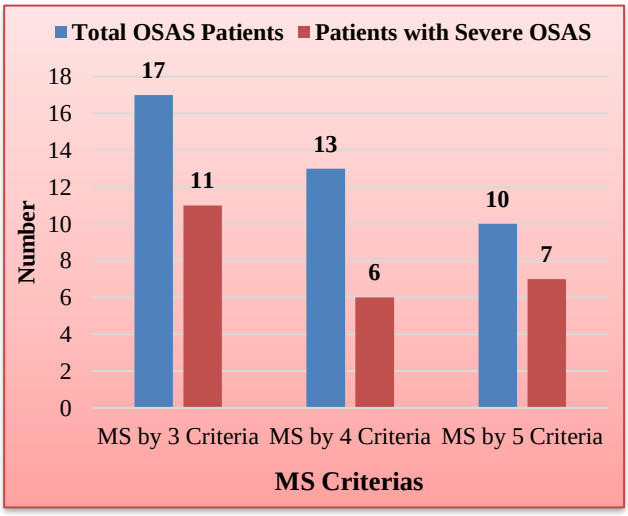

Figure 1: Distribution of metabolic syndrome (MS) by severity of OSAS (N=40).

Figure 1 shows that the 7 (17.5%) patients who fulfilled all five criteria for the diagnosis of the metabolic syndrome had severe OSAS. Almost 6 (15.0%) patients who fulfilled four criteria for the diagnosis of the metabolic syndrome had severe OSAS. Around 11 (27.5%) patients who fulfilled three criteria for the diagnosis of the metabolic syndrome had severe OSAS. The prevalence of OSA in the entire group was 95.0%.

DISCUSSION

In comparison of normal individual's blood pressure and heart rate, in situation of OSAS the daily changes in heart rate and blood pressure are breathtaking-which lead to haemodynamic stresses in the body during sleep.[11,12] The reason for behind it that the circadian alteration of acute coronary incidence is contrary in patients with OSAS. Early hours after awakening is the result of the effect of the obstructed breathing during sleep. More peripheral sympathetic nerve exercise during sleep continue during wakefulness at around double the normal levels and may affect acute coronary incidence in the early hours of the day.[13,14]

Present study observed much higher prevalence of syndrome Z among study participants. One of similar study done by Wilcox et al investigated a new association of metabolic syndrome (syndrome X) and OSAS as syndrome (syndrome Z).[1] Similar observation was also found by study done by Gruver A et al, and Coughlin SR et al.[15,16]

In the studies, the prevalence of metabolic syndrome in OSAS patients were between 30-77% and increases with increasing severity of OSAS.[17,18] A METSAR study done in Turkey found prevalence of metabolic syndrome was 33% in the adult age group.[19]

A study done by Venkateswaran S et al, conducted in 2006 observed a prevalence of 62.5% of OSA.[2] In another similar study, by Agrawal et al, found the prevalence of 82% of Z syndrome in a sample of 272 patients with MetS undergoing polyso mnography (PSG).[20] These authors also observed that the prevalence of MetS increases according to the severity of the proven OSA.

In 2013, Barreiro et al, found a prevalence of 82.2% of OSA and a significant association with the components of MetS in a sample of 141 patients with MetS.[21]

All the indicators of the syndrome have significant association on the cardiovascular and cerebrovascular systems, so it is essential to treat every individual component to decrease the morbidity and mortality.[2] According to some similar studies.[22,23] Treatment of OSA with nasal CPAP (continuous positive airway pressure), has dramatically decrease cardiovascular morbidity and mortality.

In the pathophysiologic mechanisms of OSA, including sympathetic activation, endothelial dysfunction, oxidative stress, systemic inflammation, hypercoagulability, hyperleptinemia, and insulin resistance, may affected the development and progression of cardiac and vascular pathology. Similar mechanisms are also found in metabolic syndrome. Also, OSA is more prevalent in individual with obesity, diabetes, and hypertension.[24]

CONCLUSION

The prevalence of syndrome Z in present study participants was very high. With the help of history and polysomnogram, metabolic syndrome should be screened for OSA. OSA can change the indicators of metabolic syndrome and vice versa. That's why, the existence of metabolic syndrome in patients with obstructive sleep apnea syndrome should be investigated. Early diagnosis and treatment of OSA is the essential part in the treatment

of metabolic syndrome and hence CAD. Thus, physician should keep the clue of suspicion for OSA while treating of patients with known risk factors for cardiovascular complications.

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REFERENCES

1. Wilcox I, McNamara SG, Collins FL, Grunstein RR, Sullivan CE. "Syndrome Z": the interaction of sleep apnoea, vascular risk factors and heart disease. Thorax. 1998 Oct 1;53(suppl 3):S25-8.
2. Venkateswaran S, Shankar P. The prevalence of syndrome Z (the interaction of obstructive sleep apnoea with the metabolic syndrome) in a teaching hospital in Singapore. Postgrad Med J. 2007 May 1;83(979):329-31.
3. American Academy of Sleep Medicine ICSD-2: The International Classification of Sleep Disorders. Diagnostic and Coding Manuel. 2nd ed. 2005.
4. Young T, Palta M, Dempsey J, Skatrud J, Weber S, Badr S. The occurrence of sleep-disordered breathing among middle-aged adults. New Eng J Med. 1993 Apr 29;328(17):1230-5.
5. Bınıci DN, Kayabekir M, Tımur O, Sanıbas AV, Tasar PT. Prevalence of metabolic syndrome in patients with obstructive sleep apnea syndrome: a single center experience. Ann Clin Exp Metabol. 2016;1(1):1010.
6. Young T, Skatrud J, Peppard PE. Risk factors for obstructive sleep apnea in adults. JAMA. 2004 Apr 28;291(16):2013-6.
7. Expert Panel on Detection. Evaluation, and treatment of high blood cholesterol in adults. executive summary of the third report of the national cholesterol education program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III). JAMA. 2001;285:2486-97.
8. National cholesterol education program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III). Third report of the national cholesterol education program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III) final report. Circulation. 2002;106:3143-421.
9. Perez EA, Oliveira LV, Freitas WR, Malheiros CA, Ilias EJ, Silva AS, et al. Prevalence and severity of syndrome Z in women with metabolic syndrome on waiting list for bariatric surgery: a cross-sectional study. Diabetol Metabolic Syndrome. 2017 Dec;9(1):72.
10. Grundy SM, Cleeman JI, Daniels SR, Donato KA, Eckel RH, Franklin BA, et al. Diagnosis and management of the metabolic syndrome: an American Heart Association/National Heart, Lung, and Blood Institute scientific statement. Circulation. 2005 Oct 25;112(17):2735-52.
11. Mayer J, Becker H, Brandenburg U, Penzel T, Peter JH, Wichert PV. Blood pressure and sleep apnea: results of long-term nasal continuous positive airway pressure therapy. Cardiol. 1991;79(2):84-92.
12. Schroeder JS, Motta J, Guilleminault C. Hemodynamic studies in sleep apnea. In: Guilleminault C, Dement WC, eds. Sleep apnea syndromes. New York: Alan R Liss, 1978:177-196.
13. Hedner JA, Ejnell H, Sellgren J, Hedner T, Wallin G. Is high and fluctuating muscle nerve sympathetic activity in the sleep apnea syndrome of pathogenetic importance for the development of hypertension? J. Hypertens. 1988;6(Suppl):5529-31.
14. Carlson JT, Hedner J, Elam M, Ejnell H, Sellgren J, Wallin BG. Augmented resting sympathetic activity in awake patients with obstructive sleep apnea. Chest. 1993 Jun 1;103(6):1763-8.
15. Gruber A, Horwood F, Sithole J, Ali NJ, Idris I. Obstructive sleep apnoea is independently associated with the metabolic syndrome but not insulin resistance state. Cardiovasc Diabetol. 2006 Dec;5(1):22.
16. Coughlin SR, Mawdsley L, Mugarza JA, Calverley PM, Wilding JP. Obstructive sleep apnoea is independently associated with an increased prevalence of metabolic syndrome. Eur Heart J. 2004 May 1;25(9):735-41.
17. Lam JC, Lam B, Lam CL, Fong D, Wang JK, Tse HF, et al. Obstructive sleep apnea and the metabolic syndrome in community-based Chinese adults in Hong Kong. Respiratory Med. 2006 Jun 1;100(6):980-7.
18. Shiina K, Tomiyama H, Takata Y, Usui Y, Asano K, Hirayama Y, et al. Concurrent presence of metabolic syndrome in obstructive sleep apnea syndrome exacerbates the cardiovascular risk: a sleep clinic cohort study. Hypertension Res. 2006 Jun;29(6):433.
19. Kozan O, Oguz A, Erol C, Senocak M, Ongen Z, Abacı A, et al. Results of METSAR. Metabolic Syndrome Research Group. Antalya: XX. National Congress of Cardiology. 2004.
20. Agrawal S, Sharma SK, Sreenivas V, Lakshmy R. Prevalence of metabolic syndrome in a north Indian hospital-based population with obstructive sleep apnoea. Indian J Med Res. 2011 Nov;134(5):639-44.
21. Barreiro B, Garcia L, Lozano L, Almagro P, Quintana S, Alsina M, et al. Obstructive sleep apnea and metabolic syndrome in spanish population. Open Respiratory Med J. 2013;7:71-6.
22. Nieto FJ, Young TB, Lind BK, Shahar E, Samet JM, Redline S, et al. Association of sleep-disordered breathing, sleep apnea, and hypertension in a large community-based study. JAMA. 2000 Apr 12;283(14):1829-36.

23. Doherty LS, Kiely JL, Swan V, McNicholas WT. Long-term effects of nasal continuous positive airway pressure therapy on cardiovascular outcomes in sleep apnea syndrome. Chest. 2005 Jun 1;127(6):2076-84.
24. Ravidran C, Arun P, Hari L. Syndrome Z - the new metabolic syndrome. Calicut Med J. 2007;5(1):e1.

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