STUDY OF SPIROMETRY FINDING IN SNORERS

Arti Dhawal Shah[1], Nihar Vishnubhai Patel[2], Stani Francis Ajay[3], Rahul Ashok Pandya[4], Ajay George Aakkara[5], Dhawal Niranjan Shah[6], Vivek Thanga Durai[7], Niraj Nandakishore Murkey[8]

[1]Associate Professor, Department of Respiratory Medicine, S.B.K.S.M.I & R. C.
[2]Consultant of Respiratory Medicine, Ruby Hall Hospital, Pune.
[3]Professor and Head, Department of Respiratory Medicine, S.B.K.S.M.I & R. C.
[4]Resident, Department of Respiratory Medicine, S.B.K.S.M.I & R. C.
[5]Professor and Head, Department of ENT, S.B.K.S.M.I & R. C.
[6]Consultant, Department of ENT, Dhawal Multispeciality Hospital, Vadodara.
[7]Resident, Department of Respiratory Medicine, S.B.K.S.M.I & R. C.
[8]Senior Resident, Department of ENT, Dr. P.D.M.M.C, Amravati.

ABSTRACT

INTRODUCTION

Spirometry is indicated to detect whether a pulmonary dysfunction is present or not, to rate the severity of a known pulmonary disease, to follow up the pulmonary function.

Snoring is the vibration of respiratory structures and the resulting sound. Snoring during sleep may be the first sign of obstructive sleep apnoea (OSA). Common signs of OSA include unexplained daytime sleepiness, restless sleep, and loud snoring (with periods of silence followed by gasps).

With this high prevalence of OSA and the rising worldwide increase in morbidity and mortality in chronic obstructive pulmonary disease (COPD), more research required comparing nocturnal respiratory disturbances with attention directed on the effect of body composition, severity of OSA and severity of airway obstruction.

MATERIAL & METHODS

A cross-sectional observational study was carried out in snorers at Department of Respiratory Medicine. All patients underwent spirometry and PSG.

RESULTS

There was no significant correlation between severity of snoring and any spirometry parameter.

CONCLUSION

In our study, there was no correlation between snoring and spirometry nor between spirometry and AHI. It may be because of less number of subjects in our study, so study with large numbers of subjects are required to bring out the correlation.

KEYWORDS

Spirometry, Snoring, Obstructive Sleep Apnoea.

MeshTerms

Spirometry, Snoring.

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INTRODUCTION: Obstructive sleep apnoea (OSA) affects around 4% of middle-aged men. With this high prevalence of OSA and the rising worldwide increase in morbidity and mortality in chronic obstructive pulmonary disease (COPD), it is not surprising that research attentions have focused on the overlap between these two highly prevalent conditions with the aim of determining their relationship. A number of studies have investigated the association between OSA and Obstructive Airway Disorders. Studies have shown that as the depth of sleep increases there is a reduction in minute ventilation with an increase in upper airway resistance with up to 20% patients with severe Obstructive Airway Disorders exhibiting co-existent OSA. Findings suggest that low lung volume and peripheral airway closure contribute to sleep-induced respiratory disorders in men with OSA, regardless of the body mass index. These suggest that there could be greater relative importance of airways obstruction than body composition in patients with snoring. More research is required comparing nocturnal respiratory disturbances with attention directed on the effect of body

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Corresponding Author:
Dr. Arti Dhawal Shah,
Dhawal Multispeciality Hospital,
#39/40, Sahajanand Society,
Harni Road, Vadodara – 390022.
E-mail: artichest@gmail.com
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composition, severity of OSA and severity of airway obstruction.

Common signs of OSA include unexplained daytime sleepiness, restless sleep, and loud snoring (with periods of silence followed by gasps). It is characterised by repetitive pauses in breathing during sleep, despite the effort to breathe, and is usually associated with a reduction in blood oxygen saturation.

The spirometry is a pulmonary function test measuring the air inhaled and exhaled by the lungs and measures pulmonary volumes and capacities.

Snoring is the vibration of respiratory structures and the resulting sound, due to obstructed air movement during breathing while sleeping. Snoring during sleep may be the first sign of obstructive sleep apnoea (OSA).

OBJECTIVE: To study spirometry findings in snorers.

MATERIAL AND METHODS: A cross-sectional study was carried out in snorers at Department of Respiratory Medicine, Dhiraj Hospital, Sumandeep Vidyapeeth, Piparia, Baroda. A total of 50 patients were included in the study, reporting to the OPD or admitted in the wards. All persons complaining of snoring with or without witnessed pause in breathing by relatives' frequent awakening in night, frequent visits to bathroom and morning headache were included in study. Patients with contraindications to spirometry were excluded from study.

- **Method:** After taking detailed clinical history physical examination, both general and systemic was done with specific emphasis on respiratory system. All patients underwent spirometry and PSG.

- **Machine used for Spirometry:** BPL ARPEMIS (BPTA5L1122) working according to ATS criteria.

Sample Size: All the patients (50) complaining of snoring coming to Dhiraj General Hospital from December 2012 to December 2013 was included in this study.

Duration of the study: One year.

Test procedure: The subjects were tested in the sitting position with proper instructions, measurements that are made include forced expiratory volume in one second (FEV1), forced vital capacity (FVC), the ratio of the two volumes (FEV1/FVC).

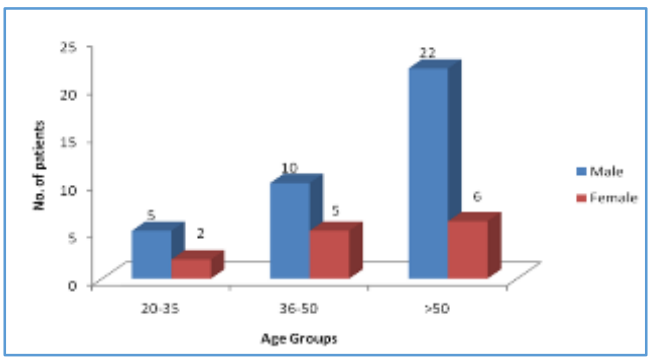
ETHICS: The study was conducted after getting approval from the Sumandeep Vidyapeeth University Ethical Committee.

STATISTICAL METHODS

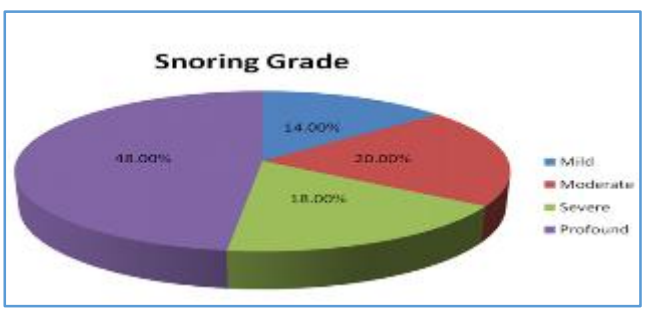
- Data were collected, tabulated, coded then analysed using SPSS® computer software version 14.0.
- Fisher's Exact Test, Pearson Correlation, One way ANOVA, R square (regression) were also used.
- **Null hypothesis**: There is no correlation between severity snoring and Spirometry.

OBSERVATIONS AND RESULTS: The study was carried out in 50 snorers with suspected OSA patients.

- In the study, out of total 50 patients, 37 were males (74%), while 13 were females (26%). Majority of patients were in age group of >50 years.

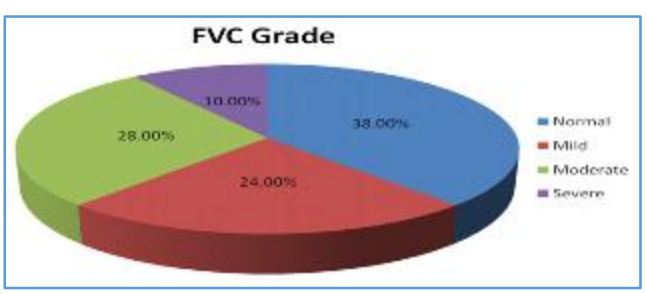


Graph 1: Age & Sex Distribution



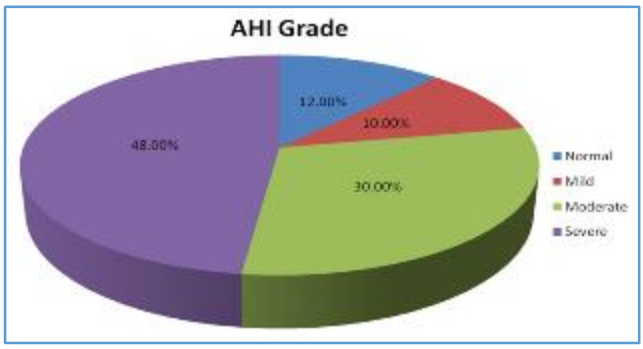
Graph 2: Pie chart of Snoring Grading

- 48% patients had profound grade of snoring.



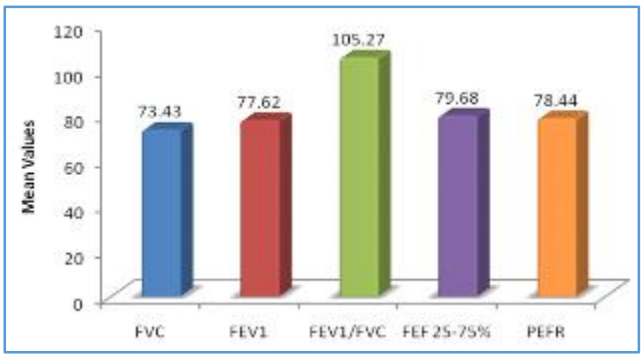
Graph 3: Pie chart of FVC Grading

- The above graph shows the FVC grades of the patients. FVC was normal in 19 patients forming 38% of the total patients. There was mild decrease in 12 patients forming 24% of the total. Moderate decrease was seen in 14 patients and severely decreased in 5 patients forming 28% and 10% respectively.



Graph 4: Pie chart of AHI grading

- AHI grading were found normal in 6 patients (12%), mildly decreased in 5 patients (10%), moderately decreased in 15 patients (30%) and severely decreased in 24 patients (48%).



Graph 5: Mean Value of Spirometry Parameter

- The above graph and table describe the mean value of spirometry. FVC had a minimum value of 40 and maximum value of 103 giving a mean value of 73. The standard deviation for the same was 16.
- FEV1 had a minimum value of 41 and maximum value of 118 giving a mean value of 77. The standard deviation for the same was 18.
- The ratio FEV1 and FVC had a minimum value of 71 and maximum value of 120 giving a mean value of 105. The standard deviation for the same was 12.
- FEF had a minimum value of 42 and maximum value of 134 giving a mean value of 79. The standard deviation for the same was 20.
- PEFR had a minimum value of 35 and maximum value of 111 giving a mean value of 78 and a standard deviation as 18.

Descriptive Statistics					
	n	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
FVC	50	40.00	103.50	73.4290	16.60421
FEV1	50	41.25	118.50	77.6224	18.60916
FEV1/FVC	50	71.69	120.70	105.27	12.065
FEF 25-75%	50	42.51	134.90	79.6766	20.38190
PEFR	50	35.39	111.10	78.4388	18.47807

Table 1: Mean Value of Spirometry parameter

	Snoring Grade	**N**	**Mean**	**Std. Dev.**	**Std. Error**	**95% Confidence Interval for Mean**		**Minimum**	**Maximum**
						Lower Bound	**Upper Bound**		
FVC_Pr	Mild	7	69.60	21.10	7.98	50.08	89.11	40.00	100.20
	Moderate	10	68.23	18.11	5.73	55.27	81.19	45.69	94.98
	Severe	9	79.59	13.37	4.46	69.31	89.87	58.00	100.60
	Profound	24	74.40	15.77	3.22	67.74	81.06	43.62	103.50
	Total	50	73.43	16.60	2.35	68.71	78.15	40.00	103.50
FEV1_Pr	Mild	7	76.12	22.56	8.53	55.25	96.99	46.00	107.30
	Moderate	10	73.66	18.45	5.83	60.46	86.86	50.38	96.41
	Severe	9	83.86	16.80	5.60	70.95	96.77	52.00	108.50
	Profound	24	77.37	18.73	3.82	69.46	85.28	41.25	118.50
	Total	50	77.62	18.61	2.63	72.33	82.91	41.25	118.50
FEV1/FVC_Pr	Mild	7	106.10	7.85	2.97	98.84	113.36	95.89	118.00
	Moderate	10	104.50	12.46	3.94	95.59	113.41	89.43	120.00
	Severe	9	108.67	8.34	2.78	102.26	115.08	95.60	120.30
	Profound	24	104.07	14.24	2.91	98.06	110.08	71.69	120.70
	Total	50	105.27	12.07	1.71	101.84	108.70	71.69	120.70
FEF 25-75%_Pr	Mild	7	75.01	5.90	2.23	69.55	80.47	68.25	85.00
	Moderate	10	84.10	23.57	7.45	67.24	100.96	52.50	133.80

	Severe	9	87.82	23.33	7.78	69.89	105.75	62.00	134.90
	Profound	24	76.14	20.38	4.16	67.54	84.74	42.51	131.50
	Total	50	79.68	20.38	2.88	73.88	85.47	42.51	134.90
PEFR_Pr	Mild	7	80.60	11.66	4.41	69.82	91.38	66.04	96.00
	Moderate	10	79.21	16.28	5.15	67.57	90.86	51.93	100.70
	Severe	9	80.97	21.99	7.33	64.07	97.87	47.00	111.10
	Profound	24	76.54	20.30	4.14	67.96	85.11	35.39	104.10
	Total	50	78.44	18.48	2.61	73.19	83.69	35.39	111.10

Table 2.1: Comparison of Spirometry Parameter with Snoring Grading (Descriptives)

		Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
FVC_Pr	Between Groups	737.225	3	245.742	.885	.456
	Within Groups	12772.071	46	277.654		
	Total	13509.296	49			
FEV1_Pr	Between Groups	524.579	3	174.860	.489	.692
	Within Groups	16444.157	46	357.482		
	Total	16968.736	49			
FEV1/FVC_Pr	Between Groups	149.104	3	49.701	.327	.806
	Within Groups	6984.135	46	151.829		
	Total	7133.239	49			
FEF 25-75%_Pr	Between Groups	1245.297	3	415.099	.999	.402
	Within Groups	19110.364	46	415.443		
	Total	20355.662	49			
PEFR_Pr	Between Groups	183.070	3	61.023	.170	.916
	Within Groups	16547.451	46	359.727		
	Total	16730.521	49			

Table 2.2: ANOVA table

- We have applied one way ANOVA test between different groups of severity of snoring and spirometry parameters (pre values). There was no significant correlation between severity of snoring and any spirometry parameter, as p value for FVC was 0.456 (>0.05), FEV1 was 0.692 (>0.05), FEV1/FVC was 0.806 (>0.05), FEF 25-75% was 0.402 (>0.05), PEFR was 0.916 (>0.05).

	Value	**Exact P-value**
Fisher's Exact Test	7.085	.708

Table 3: Fisher's Exact Test

DISCUSSION: Though snoring is often considered a minor affliction, snorers can sometimes suffer severe impairment of lifestyle. The between-subjects trial by Armstrong et al. discovered a statistically significant improvement in marital relations after snoring was surgically corrected. This was confirmed by evidence from Gall et al,[1] Cartwright and Knight [2] and Fitzpatrick et al[3]

In 2006, a population-based survey from North India had estimated the prevalence of obstructive sleep apnoea syndrome (OSAS) at 3.6 percent (males and females being 4.9 and 2.1% respectively).[4]

Although the 'Sleep Heart Health Study' found that OSA prevalence was not increased in mild COPD. Undiagnosed airways obstruction can be present in ≥10 percent of patients with OSA. These observations may simply reflect that the clinical relevance of the overlap between OAD and OSA only become apparent when one or both of these conditions are severe. Sandres et al have concluded in their study that (1) there is no association between generally mild OAD and SAH; (2) an FEV1/FVC value less than 65% is associated with increased risk of sleep desaturation; (3) desaturation is greater in persons with both OAD and SAH compared with each of these alone; and (4) individuals with generally mild OAD and without SAH in the community have minimally perturbed sleep. [5]

Ergun Onal et al, in their study found relationships between pulmonary function and sleep induced respiratory events found that there was decreased pulmonary volume and increased RAW contribute to the severity of sleep-induced respiratory abnormalities in patients with sleep apnoea syndrome regardless of the degree of obesity.[6]

In our study, there was no correlation between snoring and Spirometry nor between Spirometry and AHI which is same as in C Kliam et al in their study found that AHI had significant relationship with alveolar arterial O_2 gradient and SpO_2, BMI, neck circumference, awake room air SpO_2, but

there was no correlation between anthropometric parameters and other awake subjects measured.

Zerah- Lancner Francoisez et al[7] evaluated that pulmonary function abnormalities associated with the sleep apnoea syndrome in 170 habitual snorers and have suggested that SAS may be an independent risk factor for small airway disease. SAS appears to be highly correlated to lower and upper airway obstruction, as demonstrated by a reduction in specific respiratory conductance, which adds to the increase in breathing load due to obesity. Forced expiratory flows decreased as the SAS severity increased.

V.M. Amado et al[8] in their study analysed the flow-volume curves of 50 patients with complaints of snoring and daytime sleepiness in treatment at the Pulmonology Unit of the University Hospital of Brasília. There was no significant difference in the ratio of forced expiratory and inspiratory flows (FEF50%/FIF50%) in any group.

CONCLUSION: In our study, there was no correlation between snoring and spirometry nor between spirometry and AHI. It may be because of less number of subjects in our study, so study with a large number of subjects is required to bring out the correlation. Thus, further studies are needed to confirm any correlation between snoring and spirometry and to exclude the role of spirometry in snorer. It will help further in management of OSA and to decreases its prevalence.

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