Original Research Article

Spirometric Changes in Hyperventilating Patients Attending Routine Psychiatric OPD: A Multidisciplinary Hospital Based Study

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ABSTRACT

Hyperventilation is breathing in excess of metabolic requirements and associated with reduction in arterial pco_2 (p_aco_2) respiratory alkalosis, and a wide range of symptoms. The association between hyperventilation and heightened response to carbon dioxide inhalation is well documented. During co_2 inhalation, patients with panic disorder report more anxiety and dyspnea than normal subjects. Many psychosomatic syndromes have been described in the past in which hyperventilation has a variable and uncertain role. It was first used in 1938 to describe patients with the somatic symptoms of both hypocapnia and anxiety. Most physicians regard hyperventilation as synonymous with anxiety and thus invariably within the provision of the psychiatrist, but anxiety many be absent or secondary to hyperventilation. Since there is paucity of relevant data from Kashmir, this study was designed to find the co morbidity in patients of COPD and Asthma in a tertiary care teaching hospital in Srinagar, Kashmir.

Methods: Thirty successive patients presents with history of hyperventilation who fulfilled inclusion and exclusion criteria were taken up for the study and administered the Hamilton Anxiety rating scale (HAM-A) scales for evaluation of anxiety spectrum disorders. Each patient was informed about the purpose of interview; his/her consent was obtained and strict confidentiality was ensured. General description, demographic data and psychiatric history were recorded using semi structured Proforma and HAM-A.

Results: Out of thirty cases of hyperventilation, 50% of the patients were in the age group of 61-80 followed by 30% in age group of 31-45 years. This could suggest that hyperventilation affects old age as well middle age. There were predominantly more females (6o%) than males (40%) in our study. Representations of gender, occupation and marital status have been found to be in accordance with socio-demographic profile of our country. Out of thirty cases of hyperventilation 50% were farmers, 30% of the patients were students and 60% had history of smoking. This reflects that smoking as well as occupational hazard is factors of importance in hyperventilation.

Discussion: Obstruction was found in 30% of patients while as 70% were normal on Spirometry. Panic disorder accounted for 50% of cases followed by generalized anxiety disorder in 40% of sample size.

Keywords: Hyperventilation, Spirometry, panic disorder, generalized anxiety disorder.

INTRODUCTION

Hyperventilation is breathing in excess of metabolic requirements and associated with reduction in arterial pco_2 (p_aco_2) respiratory alkalosis, and a wide range of symptoms. The association between hyperventilation and heightened response to carbon dioxide inhalation is well

documented. During CO_2 inhalation, patients with panic disorder report more anxiety and dyspnea than normal subjects. Many psychosomatic syndromes have been described in the past in which hyperventilation has a variable and uncertain role. It was first used in 1938 to describe patients with the somatic symptoms of both hypocapnia and anxiety. Most physicians regard hyperventilation as synonymous with anxiety and thus invariably within the provision of the psychiatrist, but anxiety many be absent or secondary to hyperventilation. [1] The suffocation false alarm and dyspnea-fear theories of hyperventilation emphasize the central role of dyspnea/suffocation symptom in panic attacks. [2] The cingulate gyrus and limbic cortex are suprabulbar structures involved in the respiratory regulation. The anterior cingulated gyrus produce an inhibitory effect on respiration, and serotonin may act as a synaptic transmitter in respiratory neurons, may change their sensitivity to external regulatory influences, and affect the respiratory response to limbic cortex stimulation. [3] A growing number of clinical and epidemiological studies suggest an association of anxiety disorder and asthma, although the specificity of this relationship remains unclear. [4-6] Van Peski-Oosterbaan *et al.* observed that baseline levels of forced expiratory volume in 1 sec (FEV1) and bronchial responsiveness to histamine were not significantly different in asthmatic patients with or without panic disorder. [7] They suggested that the presence of an airway disease or the degree of pulmonary function impairment is not related to hyperventilation. Perna *et al.* assessed lung function in 17 PD patients with or without agoraphobia and 20 healthy controls. [8] They showed that PD patients had significantly lower values for some dynamic lung parameters, namely, peak expiratory flow rate (PEFR or FEF max), forced expiratory flow at 75% of vital capacity (FEF75) and maximal mid expiratory flow rate (MMEF or FEF25-75), suggesting

subclinical impairment of lung airways. These findings, however, could not be replicated. [9] Since there is paucity of relevant data from Kashmir, this study was designed to find out Spirometric changes in hyperventilating patients in a tertiary care teaching hospital in Srinagar.

Aims & Objectives
Aim: To study the Spirometric changes in hyperventilation patients attending routine Psychiatric OPD

Objectives
1. To find out the socio-demographic details of patients of Hyperventilation patients
2. To screen for co morbid Anxiety Disorder using Hamilton Anxiety rating scale (HAM-A) scales in patients of Hyperventilation.

MATERIALS AND METHODS
Materials
1. Study Proforma: It consisted of a self-designed interview schedule to record the socio-demographic data, respiratory status of the patient.

2. Hamilton Anxiety rating scale (HAM-A): HAM-A is one of the first rating scales developed to measure the severity of anxiety symptoms consists of 14 items. Each item has 4 options ranging from 0(not present) to 4(severe) with a total score ranging from 0-56, where <17 indicates mild severity, 18-24 mild to moderate severity and 25-30 moderate to severe. The patient responds to each and can complete the questionnaire in 15 minutes or less. The clinician can quickly score the questionnaire and identify those patients whose scores suggest the presence of anxiety. [10]

3. Methodology:
Study site: Patients referred to the Department of Psychiatry of a tertiary care teaching hospital in Srinagar.
Sample size: 30
This study has been done in collaboration with pulmonary medicine where pulmonary function test and related parameters where evaluated by the consultant of the said department.

Inclusion Criteria:

- Patients with history of hyperventilation referred to Psychiatry Department for evaluation
- Patients who gave consent.
- Patients between the ages of 30 to 90 years.

Exclusion Criteria:

- Patients who did not give consent
- Patients suffering from severe neurological illnesses
- Patients suffering from severe psychiatric disorders.

Method

This was a hospital based cross-sectional observational study which included all referred patients with history of hyperventilation Department of Psychiatry for evaluation.

Successive patients satisfying the inclusion and exclusion criteria were taken up for the study and administered the Hamilton Anxiety rating scale (HAM-A) to assess anxiety.
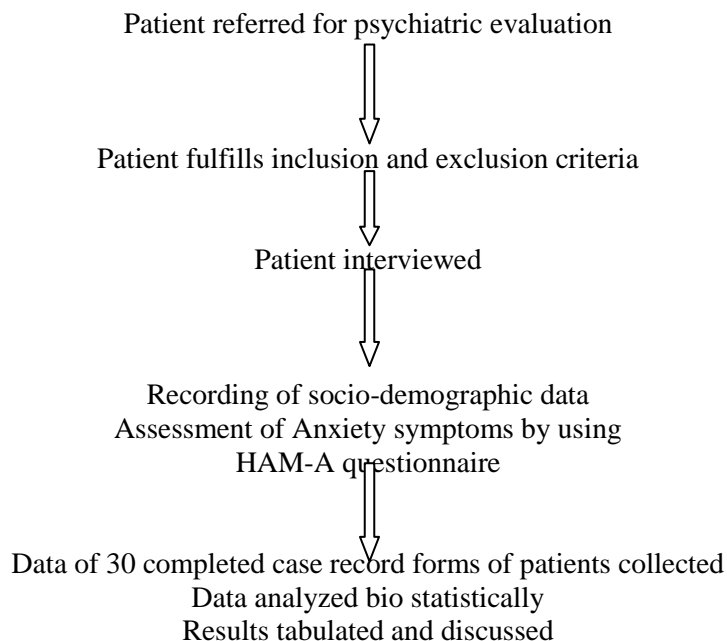
Each patient was informed about the purpose of interview; his/her consent was obtained and strict confidentiality was ensured. The interview was conducted as soon as possible after the patient had satisfactorily recovered medically and was able to co-operate for the interview. Those patients were evaluated and interviewed in Psychiatry OPD. General description, demographic data and psychiatric history were recorded using the self designed proforma.

Statistics

Statistical Software SPSS (Version 22.0) and Microsoft Excel were used to carry out the statistical analysis of data. Continuous variables were summarized as means and standard deviations and categorical variables were expressed as percentages. Chi-square test or Fisher's exact test, whichever appropriate, was used for comparison of categorical variables. Graphically the data was presented by bar and pie diagrams. A P-value of less than 0.05 was considered statistically significant. Data was expressed in actual number, percentage and mean ± standard deviation. The Chi –square test was used for categorical data with 'p' value less than 0.05 taken as statistically significant.

Flow Chart:

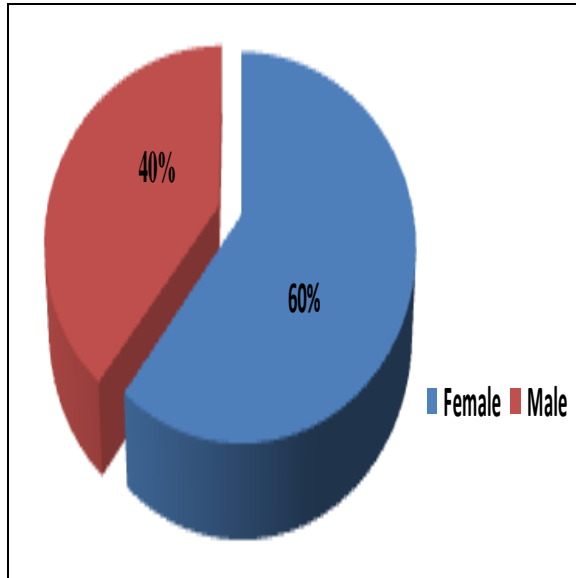Patient referred for psychiatric evaluation

⬇

Patient fulfills inclusion and exclusion criteria

⬇

Patient interviewed

⬇

Recording of socio-demographic data
Assessment of Anxiety symptoms by using
HAM-A questionnaire

⬇

Data of 30 completed case record forms of patients collected
Data analyzed bio statistically
Results tabulated and discussed

RESULTS

Figure 1: Gender wise distribution of patients of Hyperventilation

Figure 3: Distribution of Hyperventilation patients according to their marital status

There were predominantly more females (60%) than males (40%).

Gender	Distribution	Chi-square: 1.200a
Female	60%	DF: 1
Male	40%	P Value: .273

70% of the Hyperventilation patients were married and 30% were unmarried.

Marital Status	Distribution		Chi-square: 4.800a
Married	70%	n=21	DF: 1
Unmarried	30%	n=9	P Value: .028

Figure 2: Age wise distribution of patients of Hyperventilation
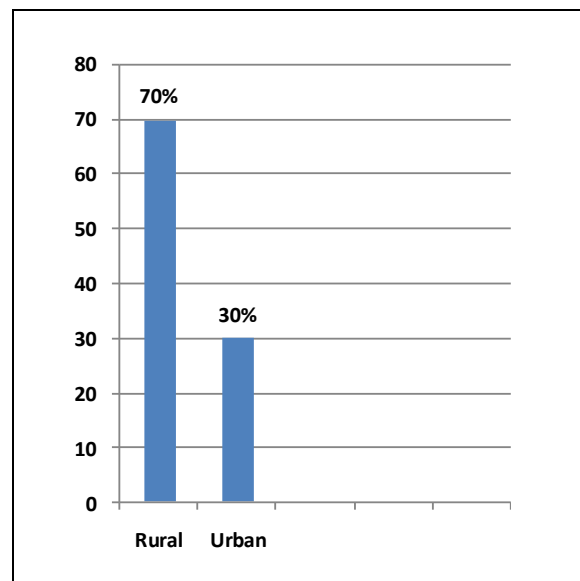
Figure 4: Distribution of Hyperventilation patients as per their residence

10% of patients were in the age group of 15-30 years, 30% patients between 31-45 years, 20% in the 46-60 years age group and 40% patients in the 61-80 years age group.

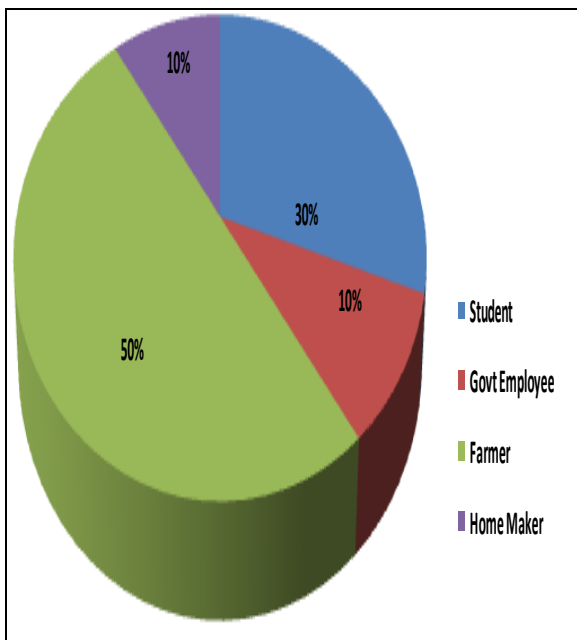| Age	Distribution		Chi-square: 1.200a
15-30	10%	n=3	DF: 1
31-45	30%	n=9	
46-60	20%	n=6	P Value: .273
61-80	40%	n=12	

70% of the study sample resided in rural area while as rest of 30% resides in urban area.

Residence	Distribution		Chi-square: 4.800a
Rural	70%	n=21	DF: 1
Urban	30%	n=9	P Value:.028
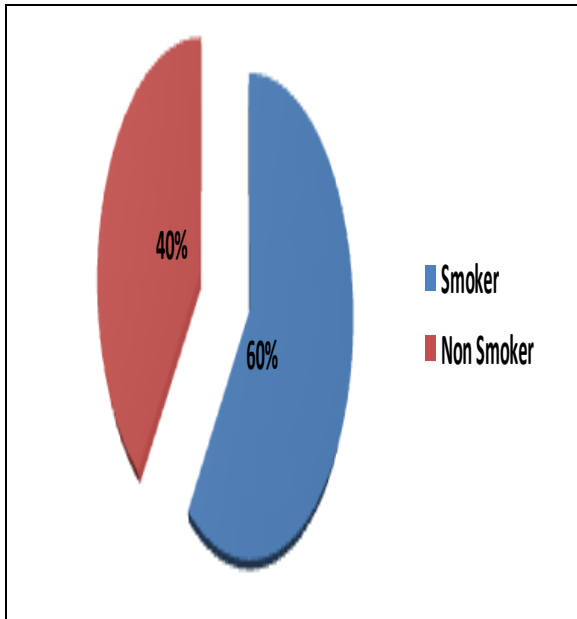
Figure 5: Distribution of Hyperventilation patients as per history of Smoking

60% of the total sample size was smokers while as remaining 40% were non smokers.

Smoker/ Non Smoker	Distribution		Chi-square: 2.133a DF: 1 P Value: .144
Smoker	60%	n=18	
Non Smoker	40%	n=12	

Figure 6: Distribution of Hyperventilation patients according to Occupation

50% of patients were farmers, followed by students with 30%, government employee and house maker were 10% each.
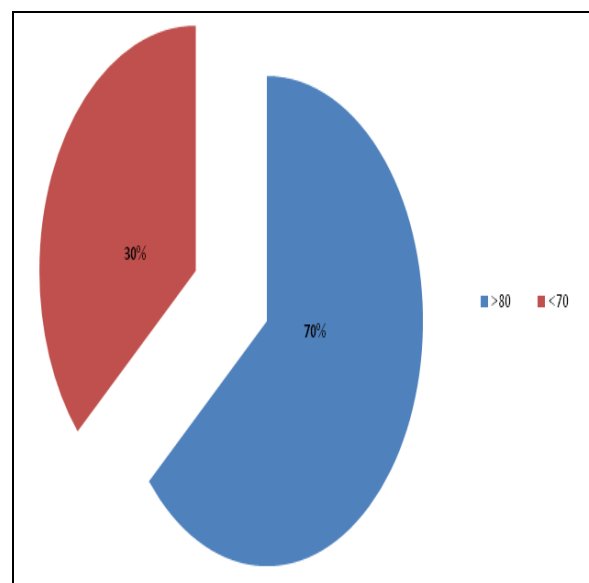
Occupation	Distribution		Chi-square: 13.200a DF: 3 P Value: .004
Farmer	50%	n=15	
Student	30%	n=9	
Government Employee	10%	n=3	
Home Maker	10%	n=3	
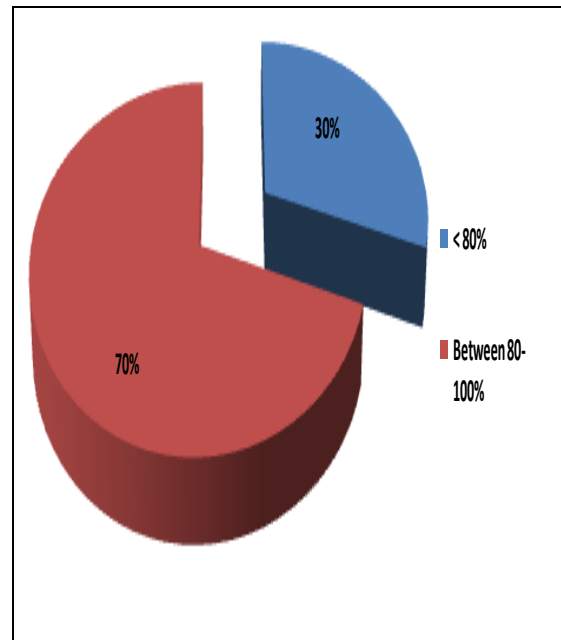
Figure 7: Severity of FVC in patients of Hyperventilation

70% of patients had FVC % between 80-100%, while as 30% of patients had FVC% less than 80%

FVC	Distribution		Chi-square: 3.903a DF: 1P Value: .048
< 80%	30%	n=9	
Between 80-100%	70%	n=21	

Figure 8: Severity of FEV1/FVC in patients of Hyperventilation

FEV1/FVC%	Distribution		Chi-square: 3.903a
< 70%	30%	n=9	DF: 1
>80%	70%	n=21	P Value: .048
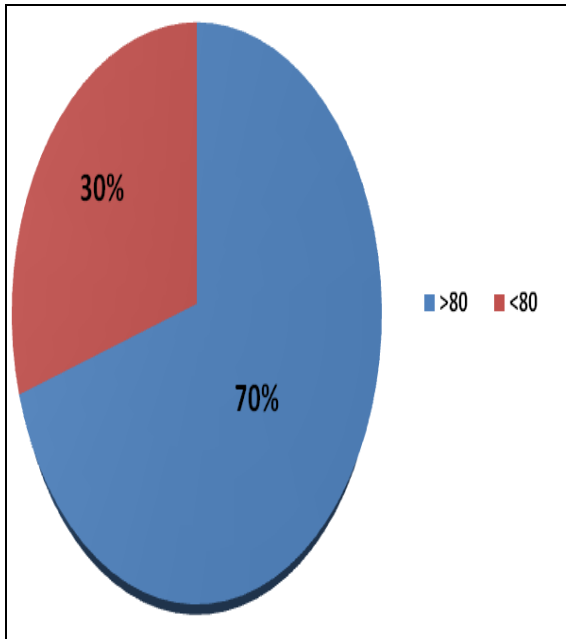
Figure 9: Severity of FEV1 in patients of Hyperventilation

FEV1	Distribution		Chi-square: 3.903a
< 80%	30%	n=9	DF: 1
>80%	70%	n=21	P Value: .048
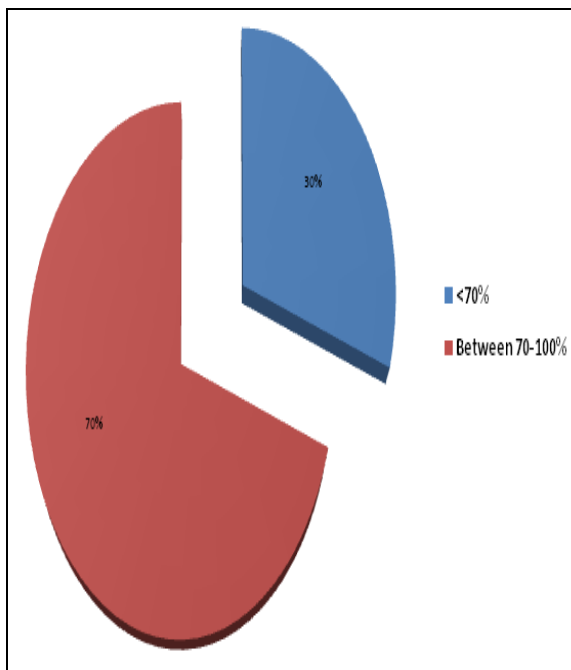
Figure 10: Severity of FEF 25-75 in patients of Hyperventilation

FEF 25-75	Distribution		Chi-square: 3.903a
< 70%	30%	n=9	DF: 1
Between 70-100%	70%	n=21	P Value: .048
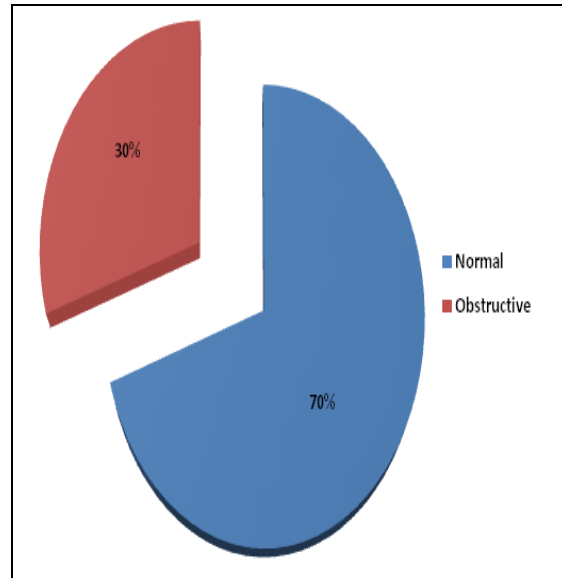
Figure 11: Final Interpretation of Spirometric values

Normal/Obstructive	Distribution		Chi-square: 3.903a
Obstructive	30%	n=9	DF: 1
Normal	70%	n=21	P Value: .048

Obstructive findings were found in 30% (n=9) of patients. Out of this, 20% (n=6) patients fall in the age group of 46-60 years. While as 10% (n=3)of patients were in age group of 61-80 years.
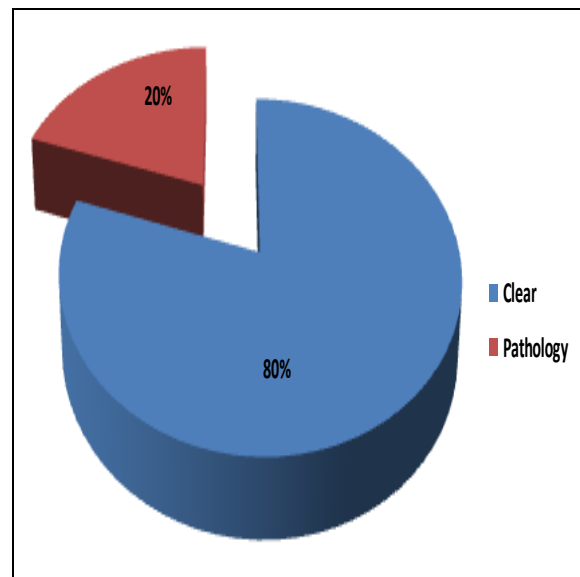

Figure 12: Chest X-ray finding in patients of Hyperventilation

80% of patients had clear chest X-ray while as 30% had some pathology.

X-ray Findings	Distribution		Chi-square: 10.800 a
Clear	80%	n=24	DF: 1
Pathology	20%	n=6	P Value: .001

Pathology in X-ray was found in 20% (n=6) of patients with 10% (n=3) each in age group of 46-60 and 61-80 years.
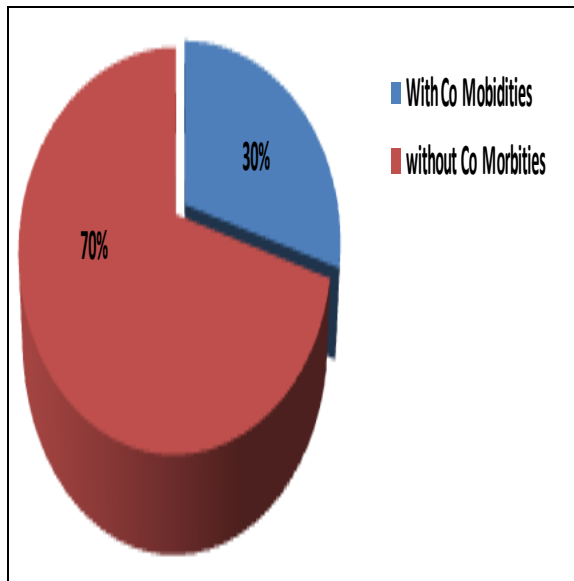

FIGURE 13: Medical co-morbidities in patients of Hyperventilation

30% of patients had medical co-morbid, 20% with Hypothyroidism and 10% had history of Diabetes Mellitus.

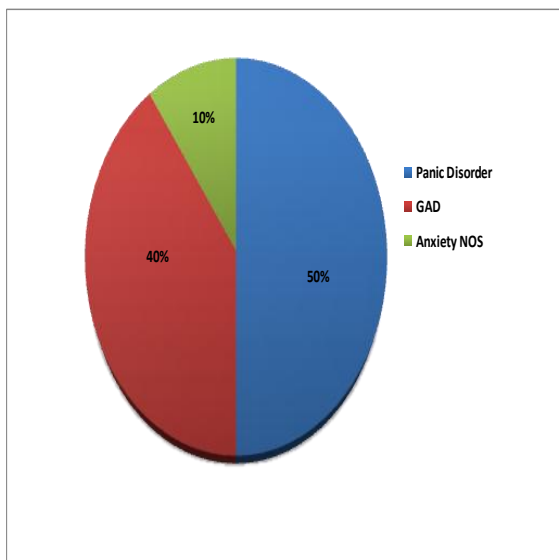| Medical co-morbidity	Distribution		Chi-square: 33.467
Hypothyroidism	20%	n=6	DF: 3
Diabetes Mellitus	10%	n=3	P Value: .000

Figure 14: Psychiatric co-morbidity in patients of Hyperventilation

65% of patients were found to have predominant anxiety symptoms in which 23% has panic disorder followed by 29%

with GAD, while rest of 35% had depressive symptoms in which 10% has mild form.

Psychiatric co-morbidity	Distribution		Chi-square: 7.800a
Panic Disorder	50%	n=15	DF: 1
GAD	40%	n=12	P Value: .028
Anxiety NOS	10%	n=3	

DISCUSSION

In this study an attempt has been made to find out Spirometric changes in Hyperventilating patients who come to seek treatment in Psychiatric OPD in a tertiary care hospital Srinagar. Our study investigated the prevalence of anxiety disorders in male and female Hyperventilating patients with a wide range of disease severity. The significant findings of our study are as follows: (1) The prevalence of Panic Disorder is high in patients of Hyperventilation; (2) Male patients have higher levels of anxiety (3) Less patients had obstructive findings on spirometry. Female patients appear to be more susceptible to psychological impairment. There were predominantly more females (60%) than males (40%). Female patients had more percentage of hyperventilation as compared to males. Isabella Nascimento et showed contrary results with males outnumbered females by 54.5% to 45.5% in females. [11] 70% of the hyperventilation patients were married and 30% were unmarried. 70% of the study sample resided in rural area while as rest of 30% resides in urban area. Representations of gender, occupation, family type and marital status have been found to be in accordance with socio-demographic profile of our country. In our study 30% of patients had medical co-morbidity with hypothyroidism in 20% followed by diabetes mellitus in 10%. Out of the total sample size, 60% gave positive history for smoking, rest 40% were non smokers. Hyperventilation was found in 50% of patients who were farmers followed by students with 30%. Government employee and home makers constitutes remaining 20% with 105 each. Spirometry

interpretation showed obstruction in 30% of sample size and was normal in remaining 70%. C. P. Engström, L. O. Persson et al, found out that forty six patients with expiratory volume in one second (FEV1) below 50% predicted showed particularly high levels of dysfunction. [12] Van Ede et al. underlined the lack of studies having adequate sample sizes. [13] In our study prevalence of Panic Disorder was found in majority 50% of sample size followed by Generalized Anxiety Disorder in 40% and Anxiety NOS in 10%.

A literature review on the prevalence of anxiety in hyperventilation patients reported rates of anxiety ranging from 10% to 40%. [14] This finding is not in concordance with our results. 80% of patients had clear chest X-ray while as 20% had some pathology. Out of thirty cases of hyperventilation, fifty percent of the patients were in the age group of 61-80 followed by 30% in age group of 31-45 years. Somewhat similar findings were found in Isabella Nascimento et who found out mean age as 35.6 (± 7.2) years. This could suggest that Hyperventilation is a problem of old age as well middle age group. This is supported by the study done by Jennifer A Cleland, Amanda J Lee et al which showed old age has an impact on COPD and other hyperventilation related problems. [15]

CONCLUSION

In this study we found that Hyperventilation was more common in old age people. An obstructive finding in Spirometry was found in middle age as well as old age group of patients. More than half of the patients were married with most of them being smokers. More than 70% patients belonged to rural background.

50% of patients were farmers by occupation. 30% of patients showed obstruction on spirometry.

70% of patients had no finding in x-ray chest while as remaining 30% showed pathology. 30% of patients had a medical co-morbidity with hypothyroidism found in 20% of patients followed by diabetes mellitus in 10% of patients and Panic Disorder was found in 50% followed generalized anxiety disorder in 40%.

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