

# Study of Different Spirometric Parameters in Patients of Neurotic Disorder with Dyspnoea

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## Abstract

**Background:** The number of neurotic disorder patient, who have respiratory distress is very high, that can be due to obstructive or restrictive lung disease. Spirometry is a good tool for the diagnosis of obstructive and restrictive lung disease. Depending on spirometric parameters, different lung diseases can be diagnosed.

**Method:** 139 patients of age group 18 years - 60 years, of any gender, are included in our study. Diagnosed patients of neurotic disorder with dyspnoea are treated as case and Patients of dyspnoea who are referred to our pulmonary lab for spirometry, from departments other than psychiatry are treated as control. Spirometry is done by a portable spirometer and appropriate statistical methods are applied for the analysis.

**Results:** We find that the overall abnormal spirometric patterns are more in control group. It is 40.7% in control and it is 32.1% in case. The results, when compared, it is seen that the number of reversible obstructive pattern is more in control group than case. It is 7.8% in control and 3.5% in case. Irreversible obstructive pattern is also more common in control group. It is 22.14% in control and 4.28% in case. But the restrictive pattern is more in case than control. It is 24.285 in case and 10.71% in control. It is significantly high in case than control.

**Conclusion:** The results of this study concluded that lung functions were significantly depressed in neurotic disorder patients with dyspnoea. All types of pulmonary disorders may affect neurotic disorder patients but restrictive type of disorder was more pronounced in neurotic disorder patients with dyspnoea

**Keywords:** Respiratory Distress, Neurotic disorder, Spirometric parameters, Lung diseases, Depression.

## Introduction

Prevalence of neurotic disorder in India is

very high (around 20.7 per thousand population)<sup>1</sup>.

Depression is the most common chronic condition

next to hypertension experienced in general medical

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practice. Incident of dyspnoea among the patients of neurotic disorder is very common. Many times these patients are misdiagnosed and treated inappropriately. One study showed that about 50.1% of psychiatric patients have significant physical illness and among them 58.2% was previously undiagnosed<sup>2</sup>.

In this background we undertake our study 'study of different spirometric parameters in patients of neurotic disorder with dyspnoea' to measure the prevalence of lung disease in patients of neurotic disorder with dyspnoea.

We measure different spirometric parameters of patients from both the study group and control group. Depending on the results of spirometry parameters we plan to estimate the prevalence of different lung diseases in both the groups. And then we plan to compare the result to see the differences of prevalence of lung diseases in these two groups. We plan to divide both the group into different subgroups based on age and sex. Then we plan to compare the results of subgroups to see whether there is any difference in the subgroups or not.

If FEV1/FVC is less than 70% then it is considered as obstructive pattern. If there is an improvement of more than 12% or more than 200ml in post bronchodilator inhalation state then it is considered as reversible obstructive pattern and if it is less than this then it is considered as irreversible obstructive pattern<sup>3</sup>.

If FVC/Predicted FVC is less than 75% then it is considered as restrictive pattern<sup>4</sup>.

Through all this we wanted to measure the prevalence of undiagnosed lung disease in patients of neurotic disorder with dyspnoea and the magnitude of lung disease in different subgroups.

## Materials and Methods

**Study Area:** Department of Physiology, R.G.Kar medical college and hospital, Kolkata and Department of Psychiatry, R.G.Kar medical college and hospital, Kolkata

**Study Population:** Patients of dyspnoea who are referred to our pulmonary lab for pulmonary function test from other departments of our hospital are my

study population. Those who are referred from Dept. of psychiatry with diagnosis of any neurotic disorder are taken as "Case" & from other departments apart from Psychiatry are taken as "Control".

**Study Period:** Duration of our study is 1 year, from 2016 to 2017.

### Inclusion criteria:

#### A) For case:

- a) Diagnosed patients of neurotic disorder with dyspnoea.
- b) Patients from age group 18years - 60years.
- c) Those patients who gives consent for the study.

#### B) For control:

- a) Patients of dyspnoea who are referred to our pulmonary lab for spirometry, from departments other than psychiatry.
- b) Patients from age group 18years-60 years.
- c) Those patients who gives consent for the study.

### Exclusion Criteria:

#### A) For case:

- a) History of any previously diagnosed organic disorder which can cause dyspnoea (like- obstructive lung disease, restrictive lung disease, congestive heart disease, pneumonia, anaemia, myocardial ischemia, hypothyroidism, upper airway obstruction, obesity etc.)
- b) Patients from age group younger than 18 years and older than 60 years.
- c) Too ill or unable to participate.

#### B) For control:

- a) Patients who have neurotic disorder.
- b) Patients from age group younger than 18years and older than 60 years.
- c) Patients from age group younger than 18years and older than 60 years.
- d) Too ill or unable to participate.

**SAMPLING METHOD:** All patients referred from psychiatry department, who satisfy inclusion criteria, will be included in our study.

**SAMPLE DESIGN:** Total enumeration.

**STUDY TYPE:** Case control study.

**STUDY DESIGN:** Cross sectional study.

**PARAMETERS MEASURED:** Forced vital capacity (FVC), Forced expiratory volume of 1st second (premedication and post medication), FEV1/ FVC% and predicted FVC/FVC%.

**STUDY TECHNIQUE:** Patients of neurotic disorder, diagnosed by psychiatry department, who have dyspnoea, who attend our pulmonary lab, and who satisfy our inclusion criteria for the study are properly explained about the study protocol and informed consent is taken from them. Then spirometric parameters are measured in these patients. Patients of dyspnoea, who are referred to

our pulmonary lab for pulmonary function test from departments other than psychiatry, are taken as control group. They are properly informed about our study protocol and informed consent is taken from them.

**STUDY TOOLS:** Spirometry is done by a portable spirometer (HELIOS 702)

**DATA ANALYSIS:** Data is recorded in MS excel sheet and appropriate statistical methods are applied for the analysis.

**Results and Analysis**

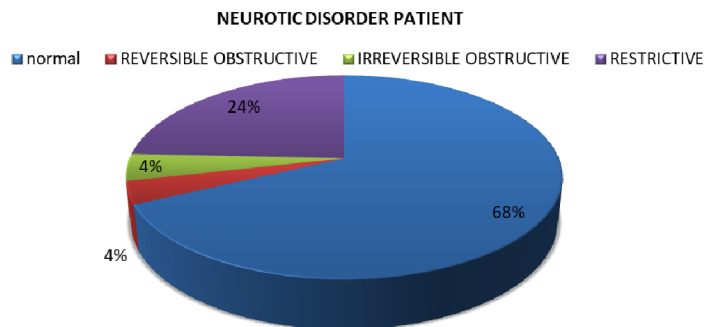
Spirometry is done in patients of case & control groups. Then the results are divided into normal, reversible obstruction, irreversible obstruction and restrictive pattern. Then we compare the results to determine the difference in prevalence of different patterns in both the groups.

**Table 1: Shows the comparison of spirometric parameters between cases and control**

	SL. NO.	N	Mean	Std. Deviation	Std. Error Mean	p-value
FVC(L)	control	140	2.20	.737	.062	.984
	case	140	2.20	.650	.055	
% of PREDICTED FVC	control	140	84.20	21.75	1.83	.208
	case	140	87.25	18.5	1.56	
FEV1 (L)	control	140	1.71	.68	.06	.270
	case	140	1.79	.55	.05	
% of FEV1/FVC	control	140	76.53	12.8	1.08	.000
	case	140	82.08	9.755	.82	

Here we can see that there is no significant difference in the measured spirometric parameters of

both the groups except FEV1/FVC%.



**Figure 1: Shows the distribution of cases according to the spirometric pattern.**

Normal- 95(67.85%)  
 Reversible obstruction- 5(3.57%)  
 Irreversible obstruction-6(4.28%)  
 Restrictive- 34(24.28%)

32.14% of patients with neurotic disorder have either obstructive or restrictive lung disease. Among this restrictive lung disease is 75.55%.

Result of patients from departments other than psychiatry

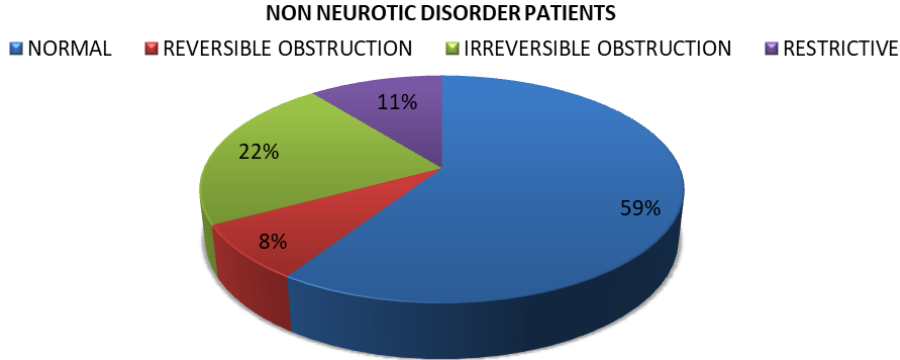


Figure 2: Shows the distribution of control according to the spirometric pattern.

Normal-83(%)  
 Reversible obstruction -11  
 Irreversible obstruction -31

Restrictive-15  
 40.71% of patients have either obstructive or restrictive lung disease. Among them restrictive lung disease is 26.31%.

Table 2: Shows the comparison of presence of reversible obstructive spirometric pattern between cases and control.

			control	case	p-value
REVERSIBLE OBSTRUCTIVE	absent	Count	129	135	>0.05
		% within subjects	92.1%	96.4%	
	present	Count	11	5	>0.05
		% within Subjects.	7.9%	3.6%	

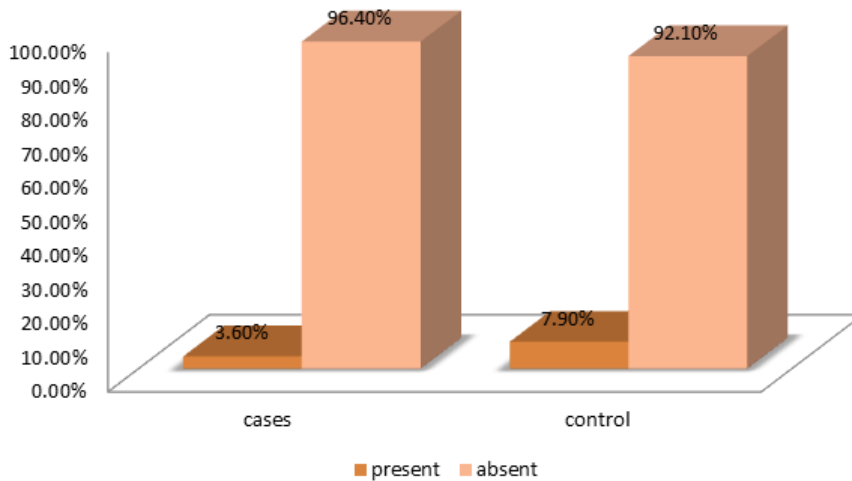
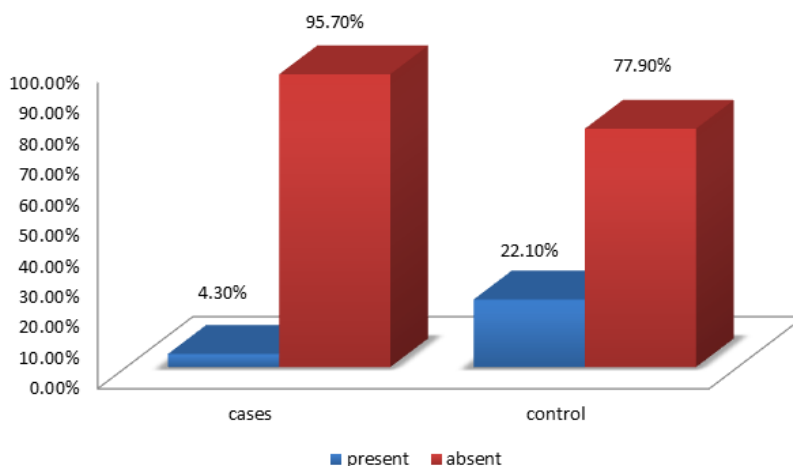


Figure 3: Shows the distribution of presence and absence of reversible obstructive spirometric pattern in cases and control

Table-2 and figure-3 shows that presence of reversible spirometric pattern is less in cases than that of the control but that change is not significant (p>0.05)

**Table 3: Shows the comparison of presence of irreversible obstructive spirometric pattern between cases and control.**

			SL. NO.		p-value
			Control	case	
IRREVERSIBLE OBSTRUCTIVE	absent	Count	109	134	0.001
		% within subjects	77.9%	95.7%	
	present	Count	31	6	0.001
		% within SL. NO.	22.1%	4.3%	

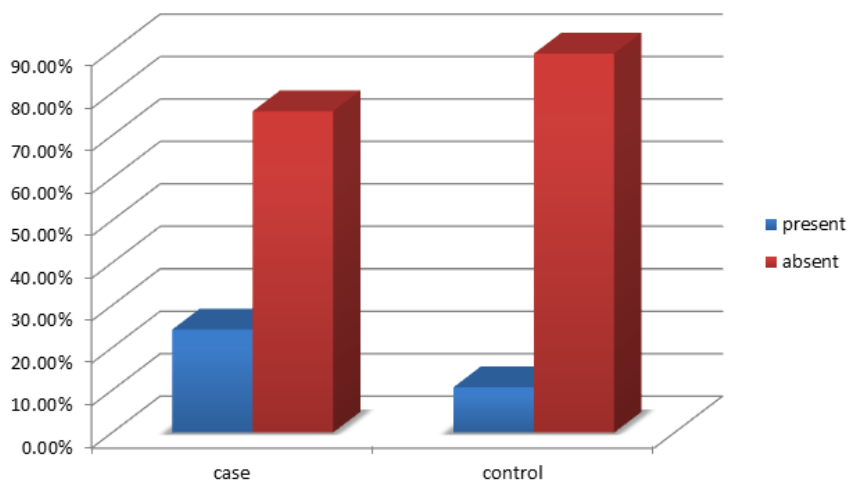


**Figure 4: Shows the distribution of presence and absence of irreversible obstructive spirometric pattern in cases and control**

Table 3 and and figure 4 shows that among irreversible obstructive pattern than that of the cases. the control there is significantly ( $p < 0.001$ ) more

**Table 4: Shows the comparison of presence of restrictive spirometric pattern between cases and control**

			control	case	p-value
RESTRICTIVE	absent	Count	125	106	<0.05
		% within subjects	89.3%	75.7%	
	present	Count	15	34	0.003
		% within Subjects	10.7%	24.3%	



**Figure 5: Shows the distribution of presence and absence of restrictive spirometric pattern in cases and control**

Table-4 and figure-5 shows that among the cases restrictive spirometric pattern is significantly ( $p < 0.03$ ) more than that of the control.

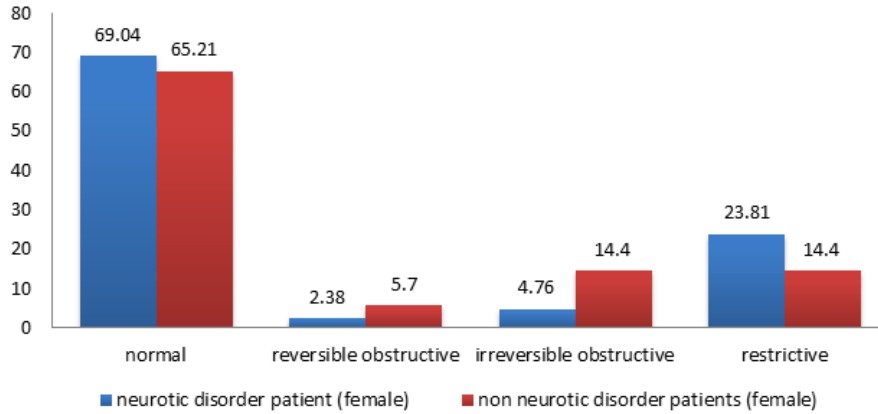


Figure 6: Distribution of spirometric pattern results in female patients from both case and control group

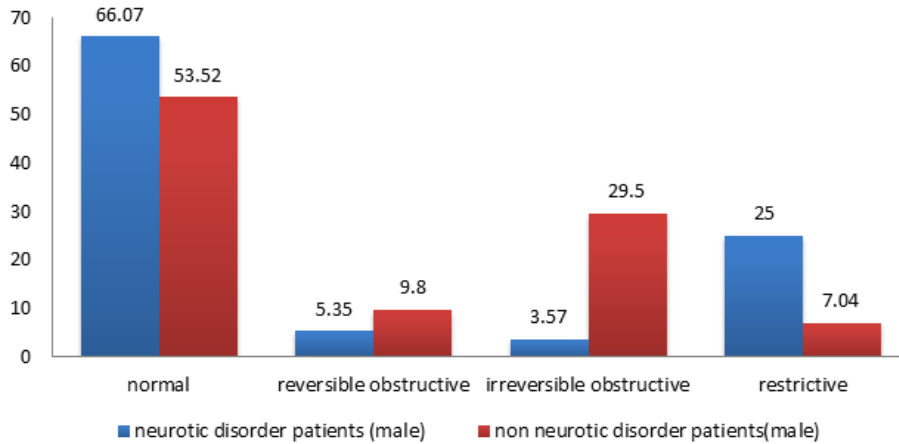


Figure 7: Shows the distribution of spirometric pattern in male patients from both groups

Figure-6 and figure-7 shows that both among the cases and control in both sexes normal spirometric pattern is more than the other spirometric pattern {**Female neurotic disorder** [Normal-69.04%, Reversible obstruction- 2.38%, Irreversible obstruction- 4.76%, Restrictive- 23.81%] **Female non neurotic disorder** [Normal-65.21%, Reversible obstruction- 5.7%,

Irreversible obstruction-14.4%, Restrictive- 14.4%] **Male neurotic disorder** [Normal-66.07%, Reversible obstruction- 5.35%, Irreversible obstruction-3.57%, Restrictive- 25%] **Male non neurotic disorder**- [Normal-53.52%, Reversible obstruction- 9.8%, Irreversible obstruction-29.5%, Restrictive- 7.04%]}

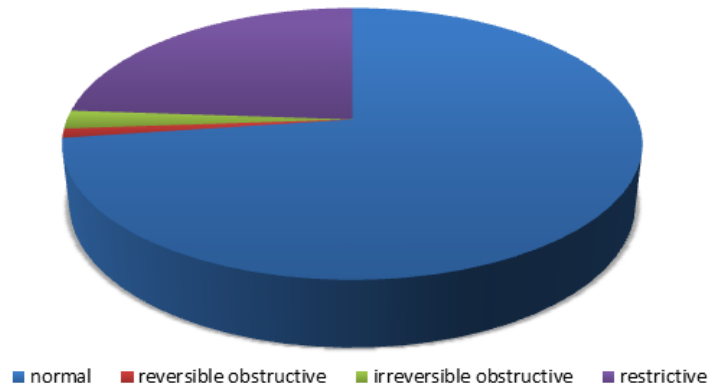


Figure 8: Distribution of spirometric pattern in patients below 40 years (neurotic disorder)

Figure -8 shows that normal spirometric pattern is more [Normal-67 (72.8%) Reversible obstruction-1 (1.08%), Irreversible obstruction-2 (2.17%), Restrictive- 22 (23.9%)] in cases below 40 years.

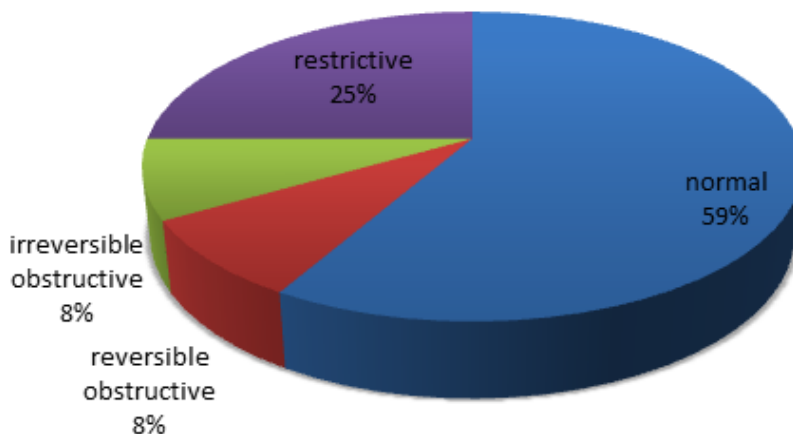


Figure 9: Shows the distribution of spirometric pattern in cases aged above 40 years

Figure 9 shows the following distribution of spirometric pattern in cases above 40 years Normal-28 (58.3%), Reversible obstruction- 4 (8.3%), Irreversible obstruction-4 (8.3%) Restrictive- 12 (25%)

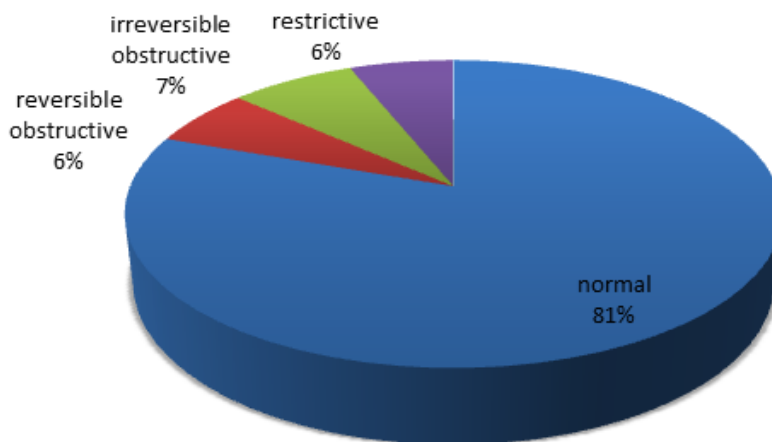


Figure 10: Distribution of results in non neurotic disorder patients aged below 40 years

Normal-66 (80.48%), Reversible obstruction- 5 (6.09%), Irreversible obstruction-6 (7.3%), Restrictive- 5 (6.09%)

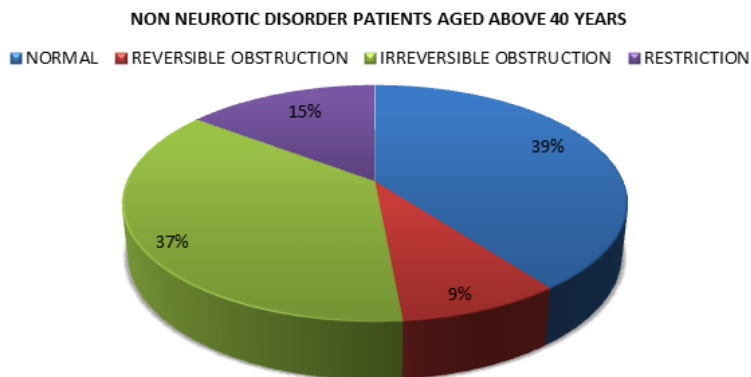


Figure 11: Distribution of results in non neurotic disorder patients aged above 40 years

Normal-27 (39.7%), Reversible obstruction- Restrictive- 10 (14.7%)  
 6(8.8%), Irreversible obstruction- 25(36.7%),

**Table 5: Shows the comparison of spirometric parameters in different age groups of females between cases and controls**

SEX	age group		SL. NO.	N	Mean	Std. Deviation	Std. Error Mean	P-value
female	≤40 yrs	FVC(L)	Control	41	2.10	.483	.075	.161
			Case	60	1.97	.417	.054	
		% of PREDICTED FVC	Control	41	91.61	19.92	3.1	.622
			Case	60	89.60	20.10	2.5	
		FEV1 (L)	Control	41	1.69	.47	.07	.727
			Case	60	1.67	.34	.04	
	% of FEV1/FVC	Control	41	80.68	10.76	1.67	.028	
		Case	60	84.96	8.4	1.09		
	>40 yrs	FVC(L)	Control	28	1.57	.515	.097	.319
			Case	24	1.70	.388	.079	
		% of PREDICTED FVC	Control	28	77.57	23.3	4.4	.174
			Case	24	85.50	17.01	3.5	
		FEV1 (L)	Control	28	1.26	.46	.09	.382
			Case	24	1.36	.37	.08	
% of FEV1/FVC	Control	28	80.06	10.96	2.07	.744		
	Case	24	79.13	9.42	1.92			

**Table 6: Shows the comparison of spirometric parameters in different age groups of male between cases and controls**

SEX	age group		SL. NO.	N	Mean	Std. Deviation	Std. Error Mean	p-value
male	≤40 yrs	FVC(L)	control	29	2.91	.722	.134	.344
			case	32	2.74	.680	.120	
		% of PREDICTED FVC	control	29	89.69	20.02	3.7	.508
			case	32	86.53	17.02	3.0	
		FEV1 (L)	control	29	2.3	.69	.12	.862
			case	32	2.35	.61	.10	
	% of FEV1/FVC	control	29	79.5	11.94	2.19	.040	
		case	32	84.7	5.7	.91		
	>40 yrs	FVC(L)	control	42	2.22	.66	.1	.077
			case	24	2.52	.63	.13	
		% of PREDICTED FVC	control	42	77.60	20.8	3.2	.208
			case	24	84.08	18.2	3.7	
		FEV1 (L)	control	42	1.56	.658	.11	.142
			case	24	1.77	.48	.09	
% of FEV1/FVC	control	42	67.8	12.86	1.98	.047		
	case	24	74.17	12.8	2.63			

## Discussion

The present study showed that there is a significant difference in percentage of predicted value of FEV1/FVC% between cases and control. In case the mean value of percentage of predicted of FVC were 87.25 and mean observed value of FVC and FEV1 were 2.2 L and 1.79 L respectively. In control population the mean value of percentage of predicted of FVC were 84.20 and mean observed value of FVC and FEV1 were 2.2 L and 1.71 L respectively.

Another study by Islam et al also investigated other varieties of depressive illness including small number of MDD patients and found significant decreased lung function compared to control<sup>5</sup>.

The present result correlates with the study Khandaker Nadia Afreen et al<sup>6</sup>, who found very high abnormal lung function in MDD patients. In their study, among 60 newly diagnosed MDD patients, only 6(10%) patients had normal and 54 (90%) patients had abnormal lung function. It is noteworthy that majority of the patients suffered from restricted type of disorder and small percentage of patients were presented with irreversible obstructive disorder and in some patients there were coexistence of both abnormalities. These results corroborate with the other study<sup>6,7</sup>.

We found that the overall abnormal spirometric patterns were more in control group. It was 40.7% in control and 32.1% in case. The results, when compared, it was seen that the number of both reversible and Irreversible obstructive pattern is more in control group than case. But the restrictive pattern was more in case than control. It was 24.28% in case and 10.71% in control which was significantly high. All these patients with obstructive disorder had small airway obstruction according to spirometer.

Kupfer Et al<sup>8</sup> shows, apparent impact of neurotic disorder on poor lung functioning may be explained by the reduced psychomotor activity along with poor respiratory muscle strength in depressive illness.

Our study also showed the spirometry in different age groups of the study subjects which was not explored by the other previous study. Distribution of results of both patients group aged 40 years or below and above 40 years shows that restrictive pattern is

more common than control population of the same age group, and reversible and irreversible obstructive patterns are more common in control population of this age group.

In case of female patients aged 40years or below from both groups shows that the control population have more reversible and irreversible obstructive pattern. Restrictive pattern is more common in case population.

In female patients aged above 40years from both case and control groups shows that the control population have more irreversible obstructive pattern than case. Reversible obstructive patterns are more common in case population. Restrictive pattern is same in both the groups.

In male patients, both age group of below and above 40years shows that the control population have more reversible and irreversible obstructive pattern and restrictive pattern is more common in case population.

To our knowledge, five large epidemiologic studies to date have attempted to examine associations between lung function and depressive symptoms. The first two studies focused on risk and prevalence of depression in the presence of chronic lung disease. Findings from Bisschop et al suggest that chronic lung disease is associated with increased risk of depression over 3 years of followup; however they reported no association of incident lung disease and CES-D<sup>9</sup>. These findings may suggest that the association of chronic lung disease and depression is more important over a longer time period, which is in agreement with our evidence for an association in "healthy" adults of depression and pulmonary function measures earlier in the CLD disease process.

NIH-PA Author Manuscript studies have assessed lung function and mental health<sup>10,11</sup> [26, 27 p3] but only one was performed in a sample representative of the general population<sup>10</sup> [27p3]; this study reported that asthma and chronic bronchitis were associated with mental health problems but objective lung function assessed by spirometry was only associated with anxiety<sup>10</sup> [27p3]. The final study was conducted in a population of adults who had served in Vietnam<sup>7</sup> [26]; generalized anxiety disorder and major depressive disorder was associated with

poor lung function; however, only generalized anxiety disorder remained significant after adjustment for covariates.

Our study shows that the prevalence of restrictive spirometric pattern is high in patients of neurotic disorder. This restrictive spirometric pattern may be due to decreased psychomotor activity.

Limitation of the study:

1. The sample size is less.
2. It is an observational cross-sectional study not a follow up study.
3. Different categories of neurotic disorder patients were included in this study but as our sample size is less the comparison of lung function between the different categories of neurotic disorder were not done.

### Conclusion

Overall, our results suggest that neurotic disorder may play a role in the chronic lung disease process, and that sex and age play a role. If this association is replicated in other studies, it would be very interesting to evaluate whether improvement in mental status would translate into improvement in pulmonary function. That is why each neurotic disorder patient with dyspnoea should undergo spirometry screening.

**Conflict of Interest:** No Conflict of interest.

**Source of Funding:** No Funding is required.

**Ethical Clearance:** The study was granted permission by Institutional Ethics Committee Reference No.- RKC/SS/1361, dated - 16/12/2015.

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