Check for updates

OPEN ACCESS

DOI: 10.46903/gjms/16.01.1890

ORIGINAL ARTICLE

SPIROMETRY FINDINGS IN SUBJECTS PRESENTING WITH DYSPNEA IN BANNU DISTRICT, PAKISTAN

Fazli Maula[1], Nargis Noman[2], Iftikhar Ahmad[5], Abdul Razaq[3], Muhammad Aadil[6], Muhammad Nadeem[4], Kashif Habib[2], Muhammad Jamil[2], Nuzhat Afza[2], Rabail Khan[2], Muhammad Bilal[2]

Departments of [1]Pulmonology, [2]Community Medicine, [3]Medicine, [4]Cardiology, Bannu Medical College, Bannu, [5]Department of Community Medicine, Gomal Medical College, D.I.Khan, [6]Department of Cardiology, Peshawar, Pakistan

ABSTRACT

Background: Dyspnea is a common symptom in patients presenting to emergency departments worldwide. The objective of the study was to determine the pattern of spirometry findings in subjects presenting with dyspnea in Bannu, KP, Pakistan.

Materials & Methods: This descriptive cross-sectional study was conducted in Bannu Medical College, Bannu, KP, Pakistan from 1st December 2015 to 31st march 2018. Sample size was 4300 selected through convenient sampling technique. All patients with acute and chronic dyspnea were included. Any patient unable to perform spirometry, recently diagnosed smear positive pulmonary tuberculosis (PTB), recent myocardial infarction and any infectious disease patient were excluded. A self-administered proforma was used for data collection. The demographic variables were sex and age groups. The research variables were type of lung pathology, severity of obstructive lung pathology, severity of restrictive lung pathology, causes of obstructive lung pathology and causes of restrictive lung pathology. All variables being categorical were analyzed through count and percentages using SPSS version17.

Results: Out of 4300 subjects, (55.72%) were males and (44.28%) were females. Two thousands four hundred and forty five (52.32%) had obstructive, (22.49%) restrictive, (12.9%) with mixed pattern and (4.3%) had normal spirometry. In obstructive patients bronchial asthma were (35.13%), COPD 741(30.3%) asthma-COPD overlap syndrome (ACOS) (9.48%), acute bronchitis (05.64%), bronchiectasis 173(7.07%) and unclear diagnosis (04.17%). In restrictive patients post pulmonary tuberculous fibrosis (PTB) were (33.77%), cardiovascular disorders (28.35%), interstitial lung diseases (17.79%), chest wall disorders (6.47%) and unclear diagnosis in 143(13.6%).

Conclusion: Ninety five percent of individuals were having an abnormal spirometeric pattern. mostly old males were having bronchial asthma & COPD as obstructive and PTB & CVDs as restrictive lung disease.

KEY WORDS: Spirometry; Dyspnea; Pattern; Obstruction; Restriction.

This article may be cited as: Maula F, Noman N, Ahmad I, Razaq A, Aadil M, Khan MN, et al. Spirometry findings in subjects presenting with dyspnea in Bannu district, Pakistan. Gomal J Med Sci 2018 Jan-Mar; 16 (1): 20-3. https://doi.org/10.46903/gjms/16.01.1890

INTRODUCTION

Dyspnea is a common problem, it may be acute or chronic depending on the duration, and may sometime be a challenge for the treating physician, to find the cause and treat. Spirometry is one of the best investigations to help in diagnosing the cause of dyspnea by analysing the different patterns depending on the age, sex, weight, smoking status and effort of the patients.[5]

The basic part of any pulmonary assessment is simple spirometry comprising the measurement of forced vital capacity (FVC) and forced expiratory volume in first second 1s (FEV1). Historically these measurements represent refinements made by Tiffeneau in 1947 of the original concept of vital capacity (VC), introduced by John Hutchinson more than100 years earlier.[1]

Burney and Hooper, using data from a US cardiovascular study of a general population sample, explored the relationship between spirometry and mortality. This time the particular focus is on FEV1, FVC or FEV1/ FVC. Their main message is that it is not the presence of obstruction as such but rather the value

Corresponding Author:

Dr. Nargis Noman
Assistant Professor
Department of Community Medicine
Bannu Medical College, Bannu, Pakistan
E-mail: nargis.noman@yahoo.com

Date Submitted: 30-08-2018
Date Revised: 26-11-2018
Date Accepted: 14-12-2018

of FVC (and also of FEV1) that is most important.[2]

Burney and Hooper underline that spirometry should be a part of every standard medical assessment just like the measurement of blood pressure. A study published in CHEST2006, conducted in dyspnoeic patients, have shown that there is a close relation among dyspnoea severity on spirometry and attenuation areas of the lungs parenchyma on HRCT (high resolution computed tomography).[3] So in some difficult cases of these patients, spirometry may not be the only tool to find the cause of dyspnea, because there are so many causes of dyspnea.

The objective of the study was to determine the pattern of spirometry findings in subjects presenting with dyspnea in Bannu, KP, Pakistan.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in Bannu Medical College, Bannu, KP, Pakistan from 1st December 2015 to 31st march 2018. Chest outpatient department of Khalifa Gul Nawaz Teaching hospital, Bannu and a private chest clinic in Bannu were the data collection sites. Sample size was 4300 individuals selected through convenient sampling technique. All patients with acute and chronic dyspnea were included. Any patient unable to perform spirometery, recently diagnosed smear positive pulmonary tuberculosis, recent myocardial infarction and any infectious disease patient etc were excluded.

A self-administered proforma was used by the students for the data collection. The latest version of spirrodox spirometer was used by an experienced technician. Spirometry was performed according to ATS/ BTS (American thoracic and British thoracic society guidelines). Pre-bronchodilator spirometry FEV1 and FVC measurement was performed in accordance with British Thoracic Society guidelines. Separate categories of spirometric patterns were defined using prior published definitions as follows:[4] obstructed (FEV1/ FVC<0.70), restricted (FEV1/ FVC≥0.70 and FVC<80% predicted and any FEV1 value), undefined (FEV1/ FVC≥0.70 and FVC≥80% predicted and FEV1<80% predicted) and normal (FEV1/FVC≥0.70 and FVC≥80% predicted and FEV1≥80% predicted). The demographic variables were sex and age groups. The research variables were type of lung pathology (obstructive/ restrictive/ mixed/ normal), severity of obstructive lung pathology (mild/ moderate/ severe), severity of restrictive lung pathology (mild/ moderate/ severe), causes of obstructive lung pathology (bronchial asthma/ COPD / asthma - COPD overlap syndrome (ACOS)/ acute bronchitis/ bronchiectasis/ unclear) and causes of restrictive lung pathology (interstitial lung disease / post-TB fibrosis/ CVDs / chest wall diseases/ unclear). All variables being categorical were analyzed through count and percentages using SPSS version17.

RESULTS

Out of 4300 subjects, 2396 (55.72%) were males and 1904 (44.28%) were females (Table 1). Four hundred and forty three (10.31%) were of 06-15 years, 918 (21.33%) were of 16-30 years, 1142 (26.57%) were of 31-45 years and 1797 (41.77%) were of above 45 years age group. Table 2

Two thousands four hundred and forty five (52.32%) had obstructive, 1051 (22.49%) restrictive, 603 (12.9%) with mixed pattern and 201 (4.3%) had normal spirometry. Table 3

Out of 2445 patients, mild obstructive disease was found in 943 (38.56%), moderte in 856 (35.01%) and severe in 646 (26.42%) patients. Out of 1051 patients with restrictive pathology mild were 421 (40.05%), moderate 343 (32.65%) and severe 287 (27.30%). Table 4

In obstructive patients bronchial asthma were 859 (35.13%), COPD 741(30.3%), ACOS 232 (9.48%), acute bronchitis 138 (05.64%), bronchiectasis 173 (7.07%) and unclear diagnosis 102 (04.17%). Table 5

In restrictive patients post pulmonary tuberculous fibrosis (PTB) were 355 (33.77%), cardiovascular disorders (CVDs) 298 (28.35%), interstitial lung diseases (ILDs) 187 (17.79%), chest wall disorders 68 (6.47%) and unclear diagnosis in 143 (13.6%). Table 6

Table 1. Gender distribution of subjects undergoing spirometry in Bannu, Pakistan (n=4300)

Male	Female
2396 (55.72%)	1904 (44.28%)

Table 2. Age group-wise distribution of subjects undergoing spirometry in Bannu, Pakistan (n=4300)

06-15 years	16-30 years	31-45 years	> 45 years
443 (10.31%)	918 (21.33%)	1142 (26.57%)	1797 (41.77%)

Table 3. Pattern of lung pathology among subjects undergoing Spirometry in Bannu, Pakistan (n=4300)

Obsructive	Restrictive	Mixed	Normal
2445 (52.32%)	1051 (22.49%)	603 (12.90%)	201 (4.30%)

Table 4. Breakup of obstructive and restrictive lung pathology among subjects undergoing Spirometry in Bannu, Pakistan (n=4300)

Obstructive (2445)			Restrictive (1051)		
Mild	Moderate	Severe	Mild	Moderate	Severe
943 (38.56%)	856 (35.01%)	646 (26.42%)	421 (40.05%)	343 (32.65%)	287 (27.30%)

Table 5. Etiology-wise distribution of lung diseases among subjects having obstructive pathology undergoing Spirometry in Bannu, Pakistan (n=4300)

Bronch. Asthma	COPD	ACOS	AC. Bronchitis	Bronchi Actasis	Unclear
859 (35.13%)	741 (30.30%)	232 (09.48%)	138 (05.64%)	173 (07.07%)	102 (04.17%)

Table 6. Etiology-wise distribution of lung diseases among subjects having restrictive pathology undergoing Spirometry in Bannu, Pakistan (n=4300)

Post. PTB. Fibrosis	CVS. Disorders	Interstitial Lung diseases	Chest wall diseases	Unclear diagnosis
355 (33.77%)	298 (28.35%)	187 (17.79%)	68 (06.47%)	143 (13.6%)

DISCUSSION

In our study the minimum age was o6 years as compared to an old study by buckly et al where 09 years was the lowest age and maximum of our patients were above 45 years which closely correlates with the international studies.[6]

There was much difference in male 2396 (55.72%) and female 1904 (44.28%) distribution, from one of the Indian study, but they had very small sample of 155 (73%males) and 60 (28%females).[7]

Our sample size was very large (4673) as compared to many studies Like Bros et al has a sample size of 1173, but he had conducted his study only in patients with restrictive aetiology of spirometry and we had multiple causes.[8]

In our series about 79% spirometries were abnormal having 52% obstruction, 22% restriction and 12% mixed pattern, while study conducted by Drummondaids et al, had 40% abnormal spirometries with 30% obstruction and only 10% restriction and they had not mentioned about the mixed pattern. This big difference could be due to different sample selection that they had HIV patients irrespective of symptoms and we had general population presenting with dyspnea.[9]

In a Pakistani series by Imran N et al,the frequency of obstructive pattern on spirometry was 28.72% and that of restrictive pattern was 19.68% having a population sample of 200. It was a community based study and we had high frequency of obstruction due to symptomatic population in our series[10]. In our study 12% of patients had mixed pattern on spirometry which was not discussed by many international studies. The only series found was by Majumdar et al in which he had small number of mixed pattern, the reason may be less education and poor effort of patients especially the female gender in the southern districts of our province in our article.[11] But a very good study by Boros and colliques conducted to look for the cause of mixed pattern, did body plathysmography of all these patients and found increased residual volume in all and proved that they are actually part of the obsruction.[12]

We further looked for sub division of obstruction and restriction into mild (38%), modrate (35%) and severe (26%) obstruction and mild (40%),modrate(32%) and severe restriction (27%). In contrast to our results, the study by Wesolowski S et al ,showed mild (14%), modrate (26%) and severe (64%) restriction having more number of severe and small number of modrate and mild restriction may be due to selection of severely diseased population sample.[13]

In our study we had not looked for the relation among symptoms and spirometric findings but some authors like Saburi N et al and colliques had found statistically significant correlation of dyspnea, cough and wheezing with mild, modrate and severe obstruction.[14]

Looking into the aetiology, in obstructive pattern we mainly have COPD, bronchial asthma and ACOS (asthma-copd overlape syndrome), while in restrictive we have ILDs, PTB fibrosis and cardiovascular disorders. Comparing our results with Aduen et al,he found emphysema, cardiovascular disorders and interstitial diseases (ILDs) in 68% of patients. Moreover he had emphysema in both obstructive and restrictive pattern of spirometry.[14]

CONCLUSION

Ninety five percent of individuals were having an abnormal spirometeric pattern. Mostly old males were having bronchial asthma & COPD as obstructive and PTB fibrosis & CVDs as restrictive lung disease.

REFERENCES

1. Hutchinson J. On the capacity of the lungs, and on respiratory function, with a view of establishing a precise and easy method of detecting disease by spirometer. Med Chir Trans (Lond) 1846; 29:137e61. https://doi.org/10.1177/095952874602900113
2. Burney PGJ, Hooper R. Forced vital capacity. Airway obstruction and survival in a general population sample from the USA. Thorax 2011;66:49e54. https://doi.org/10.1136/thx.2010.147041
3. Camiciottoli G, Bartolucci M, Maluccio NM, Moroni C, Mascalchi M, Giuntini C, et al. Spirometrically gated high-resolution CT findings in COPD: Lung attenuation vs lung function and dyspnea severity. Chest. 2006;129:558-64.1. https://doi.org/10.1378/chest.129.3.558
4. Guidelines for the measurement of respiratory function. Recommendations of the British Thoracic Society and the Association of Respiratory Technicians and Physiologists. Respir Med 1994; 88:165-194. https://doi.org/10.1016/S0954-6111(05)80346-4
5. Lonita D. Pulmonary function tests in bronchial asthma. Pneumologia. 2008 Apr-Jun; 57(2):70-4.
6. P Buckley JM, Souhrada JF. A comparison of pulmonary function tests in detecting exercise-induced bronchoconstriction. Pediatrics. 1975 Nov; 56(5 pt-2 suppl):883-9. Majumdar S, Sen S, Mandal SK. A hospital-based study on pulmonary function tests and exercise tolerance in patients of chronic obstructive pulmonary disease and other diseases' J Indian Med Assoc. 2007 Oct;105(10):565-70.
7. Boros P.W. Franczuk M. Wesolowski S. Value of spirometry in Detecting Volume Restriction in Interstitial Lung Disease Patients. Respiration 2004;71:374-379. https://doi.org/10.1159/000079642
8. Drummondaids MB, Laurence H, Philip T D, Gregory D. K, Eric C K, Alison M, et al. Factors associated with abnormal spirometry among HIV-infected individuals. AIDS 2015 Aug 24; 29(13):1691-1700. https://doi.org/10.1097/QAD.0000000000000750
9. Imran N,Abbasi N,Ashan A,Nafees A A. Correlation of respiratory symptoms and spirometric lung patterns in a rural community setting, Sindh, Pakistan: a cross sectional survey. BMC Pulmonary Medicine.2012,12:81 . https://doi.org/10.1186/1471-2466-12-81
10. Majumdar S, Sen S, Mandal SK. A hospital-based study on pulmonary function tests and exercise tolerance inpatients of chronic obstructive pulmonary disease and other diseases. J Indian Med Assoc. 2007 Oct;105(10):565-6,568,570.
11. Boros P,Franczuk M, Wesołowski S. "Mixed" changes in spirometry--verification of the pattern of lung function impairment]. Pneumonol Alergol Pol. 2003;71(11-12):527-32.
12. Wesołowski S, Boros P.Restrictive pattern in spirometry: does FEV (1)/FVC need to be increased?. Pneumonol Alergol Pol. 2011; 79(6):382-7.
13. Saburi A, Hajihashemi A, Ghanei M. Relationship between clinical findings and spirometry parameters among patients with mild asthma. Am J Exp Clin Res 2015;2(3):113-117.

CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	FM, IA
Acquisition, Analysis or Interpretation of Data:	FM, NN, AR, MA, MNK, MB
Manuscript Writing & Approval:	FM, NN, IA, KH, MJ, NA, RK

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.