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Different Spirometry Pattern in Patient Attending Respiratory Medicine OPD for Diagnostic Evaluation

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Abstract*: Pulmonary function testing has come into widespread use since the 1970s. This has been facilitated by several developments.1,2Pulmonary function tests are valuable investigations in the management of patients with suspected or previously diagnosed respiratory disease. They aid diagnosis, help monitor response to treatment and can guide decisions regarding further treatment and intervention. The interpretation of pulmonary functions tests requires knowledge of respiratory physiology. This study was carried out on patient attending pulmonary medicine OPD. Patient above 20 years of age was included in this study. The test group had 193 patients- comprising of 51 females and 142 males.Subjects were divided in six groups depending on their age and also on the basis of gender. The results showed that values of FVC, FEV 1 , FEF 2 5 - 7 5 % , PEFR were observed to be normal in the age group of 20 -30 years. Pulmonary function, as measured by spirometry is an important predictor in estimating the lung function of persons. Differences in the respiratory patterns of healthy adults and the elderly with no underlying airway and parenchymal pathology, suggesting that age also impacts on lung function. Patient with underlying lung pathology have shown to have poor lung function as compared with the normal individuals.*

Keywords: PFT, FVC, FEV1, FEV1 /FVC%, FEF 2 5 - 7 5 % , PEFR, COPD, TV, IRV, ERV, RV, TLC, VC, IC, FRC.

Introduction:

Pulmonary function tests (PFT'S) are an important tool in the investigation and monitoring of patients with respiratory pathology. They provide important information relating to the large and small airways, the pulmonary parenchyma and the size and integrity of the pulmonary capillary bed. Although they do not provide a diagnosis per se, different patterns of abnormalities are seen in various respiratory diseases which helps to establish a diagnosis. The *percentage of predicted normal* is used to grade the severity of the abnormality. Practicing clinicians must become familiar with pulmonary function testing because it is often used in clinical medicine for evaluating respiratory symptoms such as dyspnoea and cough, for stratifying

preoperative risk, and for diagnosing common diseases such as asthma and chronic obstructive pulmonary disease. Guidelines for performing and interpreting PFTS have been published both by the European Respiratory and American Thoracic Societies[3-8]. Indications for performing PFT'S are patient presenting symptoms like cough, breathlessness, wheeze, abnormal chest radiograph[9]. Monitoring patient with known pulmonary disease for progression and response to treatment e.g. interstitial fibrosis, COPD, asthma etc[9]. Preoperative evaluation prior to lung resection, abdominal surgery, cardiothoracic

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surgery[9]. Evaluation of patient with higher risk of lung disease like exposure to pulmonary toxins such a radiation, medication, or environmental or occupational exposure[9]. Contraindications to performing PFT'S are Myocardial infarction, Unstable angina, Recent thoraco-abdominal surgery, Recent ophthalmic surgery, Current pneumothorax[9]. Patients with active respiratory infections such as tuberculosis are not precluded from having PFTS however the tests should ideally be deferred until the risk of cross contamination is negligible. A sitting position is typically used at the time of testing to prevent the risk of falling and injury in the event of a syncopal episode, although PFTS can be performed in the standing position. Patients are advised not to smoke for at least one hour before testing, not to eat a large meal two hours before testing and not to wear tight fitting clothing as under these circumstances results may be adversely effected[3]. PFTS should be performed three times to ensure that the results are reproducible (less than 200ml variation) and accurate. Different volume and capacities are given in fig.-1.

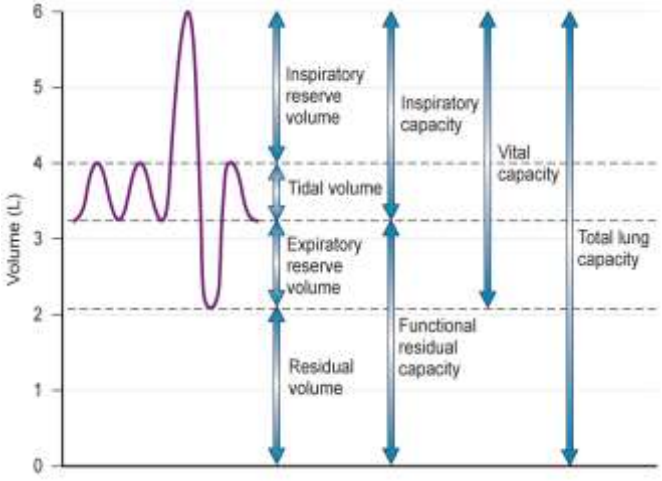

Fig.- 1

LUNG VOLUMES

- *Tidal Volume* (TV): volume of air inhaled or exhaled with each breath during quiet breathing(6-8ml/kg)
- *Inspiratory Reserve Volume* (IRV): maximum volume of air inhaled from the end-inspiratory tidal position (1900-3300ml)
- *Expiratory Reserve Volume* (ERV): maximum volume of air that can be exhaled from resting end-expiratory tidal position(700-1000ml)
- *Residual Volume* (RV): Volume of air remaining in lungs after maximium exhalation(20-25ml/kg)

LUNG CAPACITIES

- *Total Lung Capacity* (TLC): Sum of all volume compartments or volume of air in lungs after maximum inspiration
- *Vital Capacity* (VC): TLC minus RV or maximum volume of air exhaled from maximal inspiratory level
- *Inspiratory Capacity* (IC): Sum of IRV and TV or the maximum volume of air that can be inhaled from the end-expiratory tidal position.
- *Functional Residual Capacity* (FRC): Sum of RV and ERV or the volume of air in the lungs at end-expiratory tidal position.

Material and Methodology

SUBJECTS: -Patients attending pulmonary medicine OPD above 20 years of age.

INCLUSION CRITERIA: -

1. Patient above 20 years of age.
2. Patient having respiratory symptoms, pre-operative evaluation and routine medical check-up.

EXCLUSION CRITERIA: -

1. Patient unable to perform spirometry.
2. Unable to get a proper loop
3. Recent myocardia infarct, unstable angina.
4. Recent eye surgery or abdominal surgery.

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STUDY PROCEDURE: -

This study is carried in pulmonary medicine OPD, 193 was taken, out of which 142 were male and 51 were females. Informed consent was taken. Patient proper history was taken and subjected to spirometry for evaluation of lung function on the basis of above inclusion and exclusion criteria. Pulmonary function test was performed in sitting position by uni-em. Before recording the Pulmonary Function Tests, subjects were shown demonstration of the tests.

Subjects were asked to begin relaxed tidal breathing through the mouth piece (fixed over the transducer) and then to take a deep breath in. Immediately after this the subject was asked to blow out as hard and fast as possible and to continue blowing for six seconds. Then the subject was instructed to take another deep breath in, with the mouthpiece still in his mouth, until the lungs were full with air. When finished the effort/manoeuvre was completed. Consequently, minimum three readings were recorded of each test for every subject and the best of the three was selected for having reproducibility and validity of the recorded test.

Results

Table-1

Group's	Group-A	Group-B	Group-C	Group-D	Group-E	Group-F
Age	20-30	31-40	41-50	51-60	61-70	71-above years
No. of subjects	30	25	37	34	44	24
Male	20	13	28	27	34	20
Female	10	11	9	7	10	4

Table-2

Sex	Number of patients	Percentage
Male	142	74%
Female	51	26%
Total	193	100%

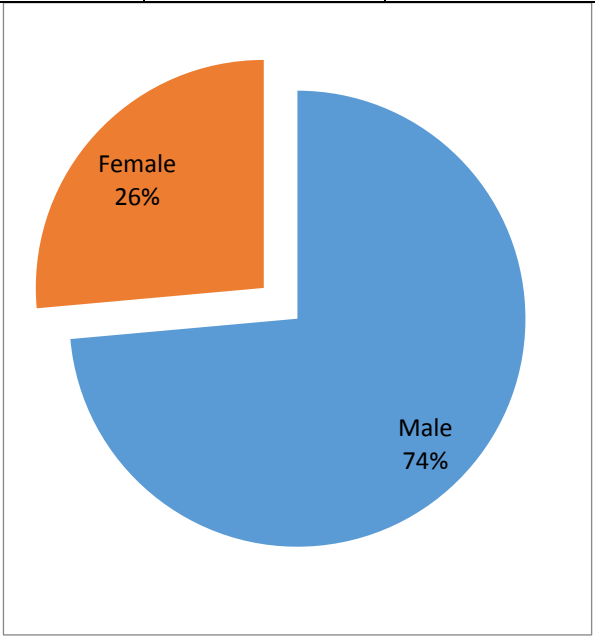
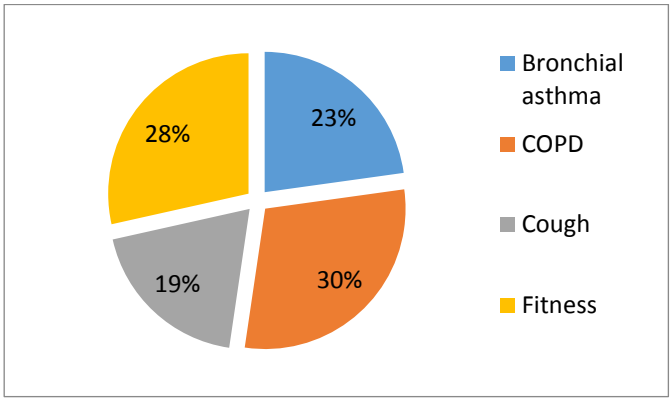


Table-3

Sex	Bronchial asthma	COPD	Cough	Fitness
Male	29	45	24	39
Female	15	12	13	16
Total	44	57	37	55



Discussion:

Culver and Butler reported that lung function does not necessarily decline in the linear fashion, once thought from age 18 or 20 years. Rather it may reach a maximum in the late 20 years and then

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decline, but there is variability in older adulthood, depending on lung capacity at the time of lung maturation [10].

Our study reveal following important observation about the value of spirometry's. That these values were found to be altered or decline with age, sex, weight, height and underlying lung and airway condition

Present study data showed that patient was diagnosed to have COPD, bronchial asthma on the basis of spirometry results. Secondly patient who came to OPD for with the complains of cough were found to have normal lung function test, apart from their age. Patient who came to OPD for pre-operative evaluation were having normal lung function upto a particular age and found to have decline in lung function in elderly person.

Our study also shows a decline in FVC, FEV1, FEF25-75% and PEFR with increment in age. As the age increases lung function decreases. Our study also showed patient's lung function also decreases with cigarettes smoking, environmental exposures (fumes, dust, etc), family history of bronchial asthma is also an important factor and lastly occupation exposures also plays an important role in decline of the lung function testing in healthy and young individuals.

In study patient was diagnosed to have COPD on the basis of GOLD guidelines that is by predicting FEV_1 and FEV_1/FVC ratio. And also diagnosed to have bronchial asthma on the basis of gina guidelines. Although it has been suggested that PEF can be used rather than spirometry,[11] this is not the case in primary care, as the gold standard in diagnosing and tracking the pathogenesis of COPD, bronchial asthma and other lung disease is spirometry.

There can be a wide range of quality among staff who administer the spirometry tests; however, with a quality assurance program, spirometry can be performed and interpreted for asthma and COPD patients, and the spirometry results used to modify care.[12] Even the elderly can perform good spirometry.[13]

In summary, spirometry can guide therapies for COPD, asthma pre and post operative evaluation of patients, and can predict outcomes when used in a primary or tertiary care setting.

Conclusion :

In our study of 193 patient's, spirometry played an important role in diagnosing the patient. This was the study carried in our department to assess the different pattern of spirometry in patient attending pulmonary medicine OPD. This study showed different pattern of lung function with different age group, with different underlying lung and airway pathology. Out of 193 cases 44 patients were diagnosed to have bronchial asthma, 57 patients were diagnosed to have COPD, 37 were those who came to OPD with complains of cough and 55 patients were those who came for medical check-up and pre-operative fitness.

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