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CHANGES IN LUNG FUNCTION WITH AGING

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ABSTRACT

Kirkwood, 1996 defined Aging as a progressive, generalised impairment of function resulting in a loss of adaptive response to a stress & in a growing risk of age-associated diseases. New alveoli are formed until about age 20. After that, the lungs begin to lose some of their tissue. The number of alveoli decreases, and there is a corresponding decrease in lung capillaries. The maximal force that can be generated while inspiration and expiration decreases with age, as the diaphragm and intercostals muscles become weaker. The chest is less able to stretch to breathe, and the pattern of breathing may change slightly to compensate for this decreased ability to expand the chest. Maximum lung function decreases with age. Changes in Lung function is seen in elderly with age group of 60 – 75 years compared with other age groups of 20 – 39 years and 40 -59 years. There are significant changes in following parameters: FEV_1, FEV_1/FVC, PEFR, Chest Expansion but no difference in FVC in elderly group. There is no significant changes in lung function between predicted and subjects value in all the three groups. This study concludes that there are significant changes in lung function in Age group 60 – 75 years and no significant changes between predicted and subjects value.

Keywords: Pulmonary Function Testing Unit (RMS Helios), Baseline Respiratory Symptom Questionnaire

INTRODUCTION

Kirkwood, 1996 defined Aging as a progressive, generalised impairment of function resulting in a loss of adaptive response to a stress & in a growing risk of age-associated diseases. Aging is associated with diminished physical ability as a result of a decrease in a muscle strength, endurance, flexibility & neuromuscular

coordination [**1**]. As aging progress, respiratory system undergoes a measurable decline in the physiologic function. The thoracic cage stiffens with advancing age; with the increased possibility for increased kyphosis coupled with increased work demand of the respiratory muscles thus increases the work of breathing. The rate of air flow through the airways slowly declines after age 30. And the maximal force that can be generated on inspiration and expiration decreases. All measures of lung functioning show age-related losses from approximately age 40 & above. New alveoli are formed until about the age of 20 years. After that, the lungs begin to lose some of their tissue. The number of alveoli decreases, and there is a corresponding decrease in lung capillaries. The lungs also become less elastic (able to expand and contract) due to various factors including the loss of a tissue protein called elastin. In elderly, structural changes to respiratory system encompass modifications that occur in lungs, rib cage, respiratory muscle, & respiratory drive [**2-5**]. The main change relating to rib cage is its reduction in compliance, although they are present from the age of 50 onwards [**6**]. The respiratory bronchioles & alveolar ducts on other hand, increase in size significantly over time, particularly after age of 60 years. Chest wall stiffness increases because of calcification of intercostal

cartilages, arthritis of costovertebral joints, & gradual atrophy & weakening of intercostals muscles with advancing age [**2**]. Pulmonary function test changes are most affected by age-related decreased compliance of pulmonary system & muscle strength [**7**]. The main objectives of the study were to compare the changes in lung function amongst different age groups and to compare the lung function changes seen in elder individual with that of the normal predicted value.

MATERIALS AND METHODS

1. Pulmonary Function Testing Unit (RMS Unit)
2. Cardio-respiratory assessment proforma
3. Respiratory Baseline Symptom Questionnaire
4. Weighing Machine
5. Height scale
6. Chair
7. Measuring Tape

Sample Size: 90 individuals

Source of Sample: Out – subject department & Relatives of In – subject department

Study Setting: Physiotherapy OPD

Inclusion Criteria: Normal individuals of ages between 20 to 75 years

Exclusion Criteria

1. Any of the neurological, cardiovascular, respiratory &

systemic involvement will be excluded

2. Recent chest wall trauma
3. Cigarette Smoking
4. Industrial population

Outcome Measures

1. Forced Expiratory Volume in 1Second (FEV_1)
2. Forced Vital Capacity (FVC)
3. FEV_1/FVC
4. Peak Expiratory Flow Rate (PEFR)
5. Chest Expansion

Statistical Method

Comparison between Groups was done by using One way ANOVA Test and Tukey's Test was applied when ANOVA was significant.

Comparison within Groups with its Predicted value was done using Students paired t – test

RESULTS

Changes in Lung function was seen in elderly with age group of 60 – 75 years compared with other age groups of 20 – 39 years and 40 -59 years. There were significant changes in following parameters and the data is shown in **Figure 1-3**. FEV_1/FVC **(Figure 1)**; PEFR **(Figure 2)** and Chest Expansion **(Figure 3)**.

Comparison of actual and predicted values of FEV_1/FVC and FEPR was also performed between the three groups was also performed and results can be seen in

Figure 4 and 5, It can seen that no difference was observed.

DISCUSSION

Lung function remains steady with very minimal change from age 20 to 35 years and starts declining thereafter. Studies on lung function are done either to establish the reference values for the pulmonary function laboratories or to determine the age-related decline. Aging is associated with reduction in chest wall compliance and increased air trapping. Respiratory muscle strength decreases with age and much more so in men than in women.

CONCLUSION

This study concludes that there are significant changes in lung function in Age group 60 – 75 years and no significant changes between predicted and subjects value.

ACKNOWLEDGEMENT

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Effects of the aging process on respiratory function, Gerontol., 55 (5), 2009, 505-10.

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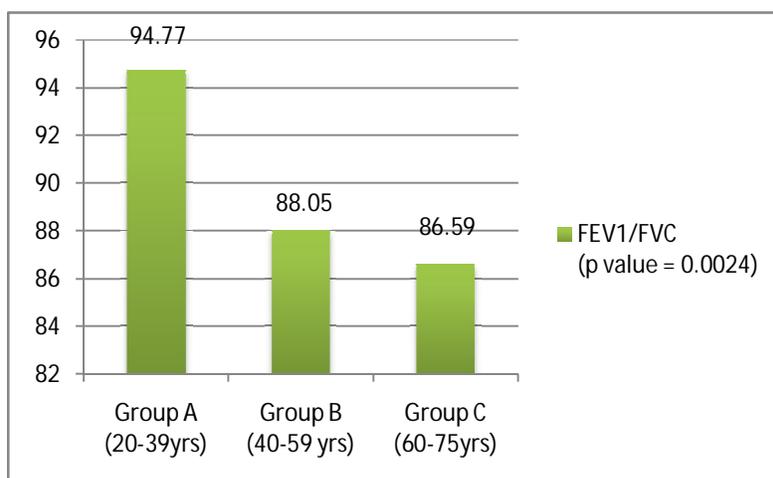
Figure 1: Comparison of FEV1/FVC Between the Three Gorups
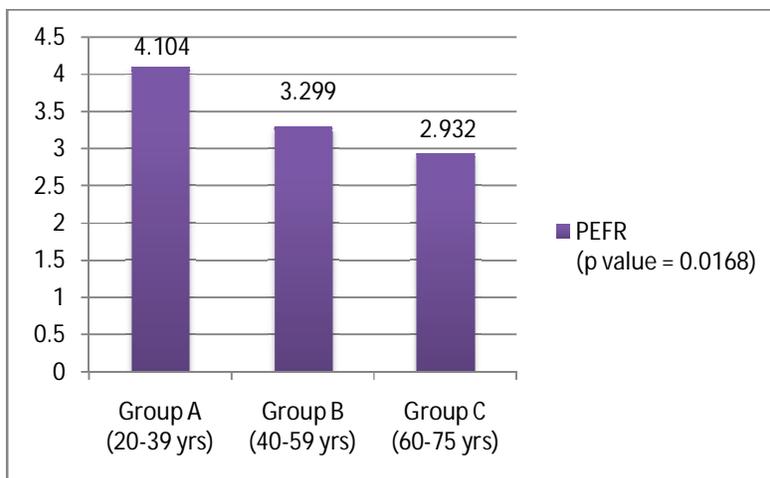
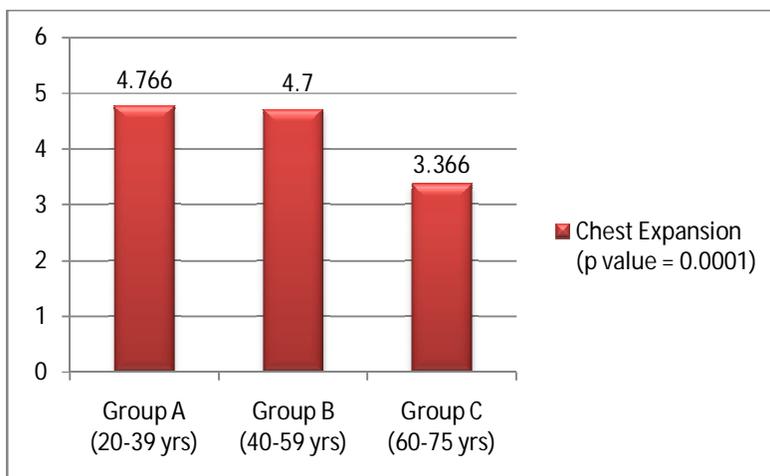**Figure 2: Comparison of Peak Expiratory Flow Rate (PEFR) Between the Three Groups**

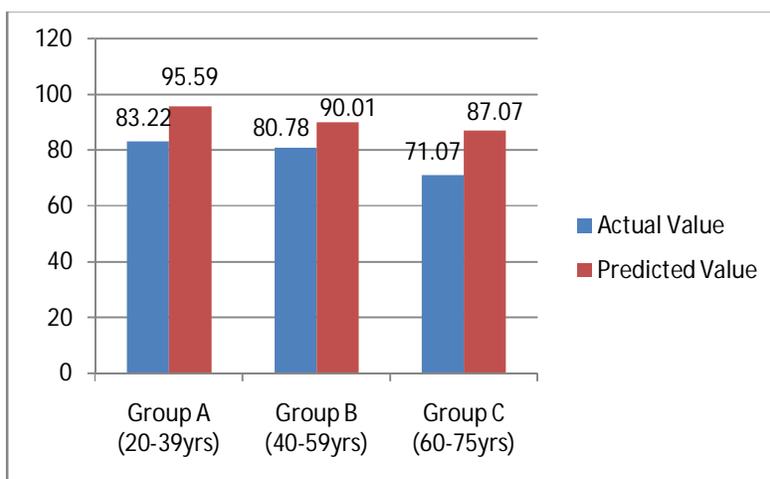**Figure 3: Comparison of Chest Expansion Between the Three Groups**

Figure 4: Comparision of FEV1/FVC(%) Within Groups with its Predicted Value
NOTE: P Value: Group A – FEV1/FVC =1.04; Group B – FEV1/FVC = 0.07; Group C – FEV1/FVC = 6.50
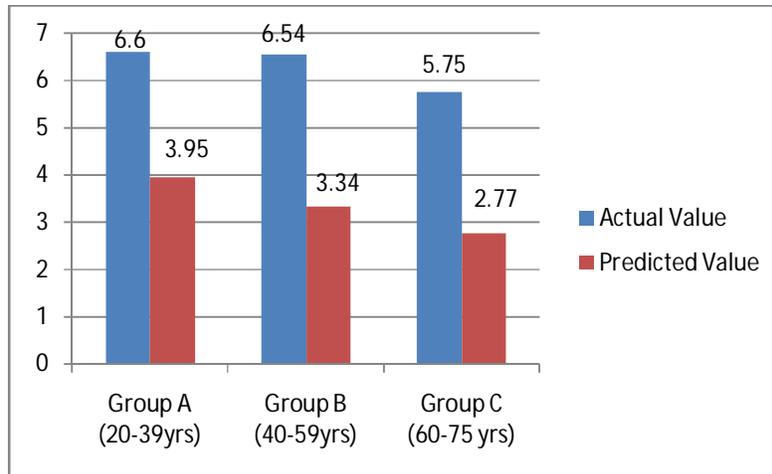
Figure 5: Comparision of PEFR (L/sec) Within Groups with its Predicted Value
NOTE: P Value: Group A – PEFR = 3.73; Group B – PEFR = 5.53; Group C – PEFR = 3.65