

Original Research Article

## Comparative Study of Vital Capacity in Male and Female Students of First Year MBBS Batch 2015-2016 in Patna Medical College

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**Abstract:** Vital capacity are used to measure baseline status of respiratory function to monitor treatment and to estimate prognosis. The present study was aim to determine vital capacity and to compare in male and female students coming from urban and rural region. The study included 130 students in which 83 were male and 47 were female. Male students coming from urban area were 33 and from rural area were 14. The result show higher value of vital capacity in male students coming from rural region due to more pollution in the urban area.

**Keywords:** Spirometer, Vital capacity, Pollution Male, Female, Urban- rural difference.

### INTRODUCTION

Among the various investigation modalities available pulmonary function test are an invaluable tool for the assessment of lung function[1]. PFT for lung can be comparable to the ECG for heart[4].

Pulmonary function in healthy normal individual is closely related to growth and development and are influenced by anthropometric environment genetic ethnic socio-economic and technological variation[2]. Vital capacity is an important index of pulmonary function. It is the amount of air expired forcefully after maximum inspiration. It is also called forced expiratory volume. Vital capacity is computed as the sum of Tidal volume, inspiratory volume and expiratory reserve volume. it provide useful information about the strength of respiratory muscle. Maximum inspiratory and expiratory effort can be assess by vital capacity. Individual variations in vital capacity are great and depends upon age sex and physical build[3]. vital capacity is affected by posture being greatest in upright position. It get reduced in pregnancy and elderly. vital capacity also depends on the body surface area. normally vital capacity is about 2.6l/sq meter of body surface in male and 2.1L/sq meter in female. normally vital capacity in male is 3to5L and in female 2 to 3 L vital capacity get reduced in pulmonary disease[4,5].

Vital capacity is used to determine the severity of respiratory muscles involvement in neuro muscular disease and can guide treatment decision in Guillain-barre syndrome and myasthenic crises vital capacity is

often of prognostic value. It also gives an idea about the progress of a chronic disease like emphysema vital capacity is measured with the help of spirometer used as early as 1846 by Hutchinson[6,7].

Timed vital capacity is also known as force expiratory volume in 1<sup>st</sup> second, in 2<sup>nd</sup> second and 3<sup>rd</sup> second (FEV<sub>1</sub>, FEV<sub>2</sub>, FEV<sub>3</sub>) is also an important aspect of vital capacity[8]. This vital capacity is also known as one stage vital capacity Two stage vital capacity is measured in Two stages

Stage-1:- Subject is asked to breath in maximally after a normal expiration. Then he takes a few normal breath.

Stage-2 Subject is asked to breathout maxionally after a normal expiration.

Sum of stage 1 and 2 volume gives the two stage vital capacity. It is slightly larger than one stage vital capacity[5].

Vital Capacity can also be measured by taking the age sex and height of an individual.

Male VC (ml) = (27.63-0.112) × age × height (cm)

Female VC (ml) = (21.78-1.101) × age × height (cm)

Recently vital Capacity can be measured accurately by expirograph, medspiror (recorder and medicare system pvt . ltd)[6].

## MATERIALS AND METHODS

This present cross-sectional study was conducted at Department of Physiology Patna Medical College, Patna with the permission of the head of department among the male and female students of first year MBBS batch 2015-2016 of Patna Medical College prior to the test subjects (students) were explained in brief how and why the study will be carried out and written consent were also taken from all concerned.

Vital Capacity of first year medical students of 2015-2016 batch were taken with the help of spirometer in standing, sitting and supine position. It is recorded three times in each position with a gap of at least two minutes and the best of three were taken. Retrospective study of vital capacity of 150 students was done. Some students were suffering from common cold and cough. Healthy individuals were included and diseased individuals suffering from common cold and cough are excluded in this study. Total 130 students were included in which 83 were male and 47 were female. The spirometer used here was student spirometer. It is a double walled cylindrical chamber. The outer chamber is filled with water. The inner chamber consist of inverted cylinder made up of light weight material like aluminum. it is called bell. It floats on the water contained in the outer cylinder and is air tight due to water seal surrounding. The bell is attached to a chain that goes over a pulley which has very little friction. At the other end of the chain is attached a weight which

balances the belly. The pulley is calibrated to indicate volume. It has a spring loaded indicator needle attached to it. When air volume inside the bell increases the bell moves up. The movement of the bell causes movement of indicator needle which gives the volume of air in the bell by pointing to the volume indicated on the calibrated pulley. The bottom of the spirometer carries a pipe with a one way breathing valve. The pipe is connected to a corrugated rubber tube which is attached to a mouth piece.

## RESULT

In male vital capacity in standing position ranges from 2150 ml to 5200ml. in sitting position ranges from 1950 ml to 4800ml in supine position ranges from 1700ml to 4300ml.

In female vital capacity in standing position ranges from 1800 ml to 4300 ml, in sitting position ranges from 1700 ml to 3800 ml, in supine position ranges from 1600 ml to 3300 ml, male students from urban area were 46 and from rural area were 37. Vital capacity in urban male students in standing position ranges from 1250 ml to 3550 ml, and in rural male students from 3600 ml to 5200 ml. Female students commonly from urban area were 33 and from rural area were 14. Vital capacity in urban female students in standing position ranges from 1800 ml to 2550 ml and in rural female students from 2600 ml to 4300 ml.

**Table 1: vital capacity in male and female in different position**

Sex	Position	V.C. Range (in ml)
Male	Standing	2150-5200
	Sitting	1950-4800
	Supine	1700-4300
Female	Standing	1800-4300
	Sitting	1700-3800
	Supine	1600-3300

**Table 2: vital capacity in male and female in different position from rural and urban region**

Sex	Region	Position	VC (range in ml)
Male	Urban	Standing	1250-3550
	Rural	Standing	3600-5200
Female	Urban	Standing	1800-2550
	Rural	Standing	2600-4300

## DISCUSSION

The vital capacity of male students are more than female students in standing sitting and supine position. Vital capacity is more in standing position than sitting and supine position in both male and female students. Vital capacity is minimum in supine position of female students. Vital capacity is more in rural students than urban areas. The Vital capacity is highest in the standing lower in sitting and lowered in recumbent position. This is due to the fact that the respiratory muscles are not able to work in sitting and recumbent position as effectively as in standing position. In supine position the abdominal viscera move

up pushing the diaphragm up and restricting its movements. In supine position the blood vessels of lung contains more blood which reduces the total lung capacity and vital capacity. Pollution is the cause of many lung diseases e.g. chronic obstructive lung diseases which will decrease the vital capacity.

## INFERENCE

The vital capacity of male students are more than females students. Vital capacity of both male and female students are within normal physiological limit. Vital capacity of rural students are more than the urban students due to more pollution in the urban areas.

## REFERENCES

1. Dikshit MB, Raje S, Agrawal MJ. Lung function with spirometry an Indian perspective II on the vital capacity of Indian. *Indian J. Physiol Pharmacol.* 2005; 49 (3): 25-70.
2. Raju PS, Prasad KV, Ramana YU, Murthy KJ. Pulmonary function tests in Indian girls- prediction equation. *Indian J Pediatr.* 2004; 75(10): 893-7.
3. Algadir A, Zafar AF. sex based difference in lung function of saudi adults. *J phys ther sci.* 2012; 24(1):5-9.
4. Vijayasekaran D, subramanyan L, Balachandran A, shivbalan S. spirometry in clinical practice *Indian pediatr.* 2003;40: 626-632
5. American Thoracic Society. lung function testing *Am Rev Respir Dis.* 1991;144 (5): 1202-1218.
6. Johannsen ZM, Erasmus LD. clinical spirometry in normal Bantu. *Am Rev Respir Dis.* 1968;97: 585-597.
7. Viju T Mhase VT Reddy PSN. effect of smoking on Lung function of worker exposed to dust and fumes *Indian J community Medicine.* 2002;27(1): 26-9.
8. Schneider A, Gindner L, Tilemann L, Schermer T, Dinant GJ. Diagnostic Accuracy of spirometry in Primary care *BMC Pulmonary Medicine.* 2009;9:3.