

# PULMONARY FUNCTIONS IN HEALTHY ADULTS - 17-25 YEARS OLD OF TIRUPATI

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**Summary:** Pulmonary function tests (ERV, IC, VC, MVV, FEV<sub>1</sub> % and MEFV) were studied on one hundred and sixty six subjects of either sex, age group ranging from 17 years to 25 years. ERV, IC, VC, MVV and MEFV values were found to be significantly higher in males than in females, whereas mean values of FEV<sub>1</sub> were higher in females when compared to males, but the difference was not significant.

In males, vital capacity with weight index could not be correlated.

**Key words:** pulmonary functions                      weight index                      correlation coefficient

## INTRODUCTION

It has been observed that the regional variations, changes in body weight, height, BSA, race, climate and health status alter the values of pulmonary function tests (1, 4, 6, 9, 10, 11, 12, 14, 17, 20, 21, 23, 24, 27, 28). Although enough data have been reported by various workers (3, 4, 6, 11, 12, 13, 14, 15, 16, 22, 23, 24) on this problem from different parts of our country, no such study seems to have been conducted in this area (Tirupathi) of Royalaseema, Andhra Pradesh; hence the present study.

## MATERIAL AND METHODS

One hundred and fourteen males and fifty-two females of age group ranging from 17 to 25 years and 17 to 22 years respectively were the subjects for the present study. All the subjects were non-smokers having no respiratory disease. These subjects were divided into five groups on the basis of age and sex. Group I consisted of forty males with an age range of 17 to 19 years; group II of forty-three males had an age range of 20 to 22 years; while group III of twenty-one males belonged to the age group of 23 to 25 years; group IV was comprised of thirty-eight females having an age range of 17 to 19 years, and V of females consisted of fourteen subjects having an age range between 20-22 years.

All these subjects were investigated for physical parameters followed by pulmonary function tests. The pulmonary function tests, viz., ERV, IC, VC, FEV<sub>1</sub>% and MEFR (FEF<sub>200-1200</sub> ml) were recorded with a spirometer (Expirograph-Toshniwal & Co.) in a sitting position with nose clipped by a nasal clip. The timed vital capacity and maximum expiratory flow rate were measured by using 1200 mm/min paper speed, whereas remaining lung volumes and capacities by using 60 mm/min paper speed. Three tracings were recorded in all the subjects and the best of the three was taken. All the calculated volumes and capacities were converted and expressed at body temperature pressure, saturated with water vapour (B.T.P.S.).

The weight index was calculated by using Goyal and Garge (8) formula,

$$\text{Weight Index} = \frac{\text{Weight in kgs}}{(\text{Height})^2 \text{ in Sq. metres}}$$

in order to correlate with vital capacity. The body surface area was calculated by using nomogram (9). The data were analysed statistically.

## RESULTS

The details of physical parameters are shown in Table I. The various pulmonary function tests are depicted in Table II. It is evident from Table II that ERV, IC, VC, MVV and MEFR values are higher in males when compared to females and the difference is highly significant ( $P < 0.001$ ). The mean values of FEV<sub>1</sub>% seems to be higher in females, but the difference is insignificant ( $P > 0.05$ ).

TABLE I : Physical characteristics of the subjects.

	Male			Female	
	Group I (40)* Mean $\pm$ SD	Group II (53) Mean $\pm$ SD	Group III (21) Mean $\pm$ SD	Group IV (38) Mean $\pm$ SD	Group V (14) Mean $\pm$ SD
Height (cm)	166.18 $\pm$ 5.22	164.87 $\pm$ 5.14	165.42 $\pm$ 4.87	151.87 $\pm$ 5.91	149.91 $\pm$ 3.67
Weight (kgs)	50.32 $\pm$ 5.29	51.52 $\pm$ 5.38	52.64 $\pm$ 8.89	47.53 $\pm$ 5.96	50.50 $\pm$ 4.28
B.S.A. (m <sup>2</sup> )	1.547 $\pm$ 0.092	1.549 $\pm$ 0.104	1.567 $\pm$ 0.125	1.413 $\pm$ 0.098	1.438 $\pm$ 0.070

\*Numbers within the parenthesis indicate total number subjects studied in each group.

TABLE II : Showing values of Pulmonary Function Tests.

L.F.T.	Group I Mean $\pm$ SD	Group II Mean $\pm$ SD	Group III Mean $\pm$ SD	Group IV Mean $\pm$ SD	Group V Mean $\pm$ SD	Gr. I Vs Gr. II	Gr. II Vs Gr. III	Gr. I Vs Gr. IV	Gr. II Vs Gr. V	Gr. IV, Vs Gr. V
E.R.V. (L)	1.004 $\pm$ 0.337	1.141 $\pm$ 0.344	0.867 $\pm$ 0.239	0.688 $\pm$ 0.255	0.780 $\pm$ 0.243	N.S.	P<0.001	P<0.001	P<0.001	N.S.
I.C. (L)	1.999 $\pm$ 0.281	2.065 $\pm$ 0.302	2.027 $\pm$ 0.336	1.324 $\pm$ 0.262	1.407 $\pm$ 0.261	N.S.	N.S.	P<0.001	P<0.001	N.S.
VC (L)	3.002 $\pm$ 0.324	3.193 $\pm$ 0.438	2.894 $\pm$ 0.242	2.015 $\pm$ 0.328	2.188 $\pm$ 0.310	P<0.05	P<0.001	P<0.001	P<0.001	N.S.
FEV <sub>1</sub> %	81.32 $\pm$ 1.017	80.69 $\pm$ 1.260	79.05 $\pm$ 1.50	82.21 $\pm$ 1.70	85.64 $\pm$ 1.192	N.S.	N.S.	N.S.	N.S.	N.S.
MEFR (L/min)	163.80 $\pm$ 4.65	194.2 $\pm$ 6.94	191.2 $\pm$ 7.00	120.5 $\pm$ 3.88	162.5 $\pm$ 5.72	P<0.05	N.S.	P<0.001	N.S.	P<0.05
MVV (L/min)	93.23 $\pm$ 1.575	98.07 $\pm$ 2.47	99.35 $\pm$ 2.77	54.64 $\pm$ 8.70	58.22 $\pm$ 1.49	N.S.	N.S.	P<0.001	P<0.001	P<0.001

The mean values of VC in group II are higher than those of group I and group III the differences are highly significant ( $P < 0.05$ ,  $P < 0.001$  respectively). The difference of VC in group IV and group V is not significant (Table II). Mean values of MEFR in group II of males and group V of females are significantly higher ( $P < 0.05$ ) when compared with group I and group IV respectively.

Table III indicates that the vital capacity does not seem to depend on weight index as the correlation is insignificant in all the male groups.

TABLE III : Showing correlation of VC with weight index.

Groups	VC $\pm$ SD	Weight Index $\pm$ SD	Correlation coefficient
Group I	3.002 $\pm 0.324$	18.383 $\pm 1.60$	+ 0.183
Group II	3.193 $\pm 0.438$	19.117 $\pm 1.89$	- 0.360
Group III	2.894 $\pm 0.242$	19.33 $\pm 2.89$	+ 0.525

## DISCUSSION

Our VC results are lower than those reported in Western subjects (1, 2, 3, 22, 28), but compared to Indian subjects, the values are higher than those of Gupta *et al.* (7) and quite comparable with Krishnan and Vareed (25), Reddy and Shastry (24), Bhargava *et al.* (3) and Mazumdar *et al.* (19). However, our observed values are lower than those reported by Kasliwal *et al.* (13), Singh and Prabhakaran (25), Mahajan *et al.* (17), Talsania *et al.* (27) and predicted values of Jain and Ramaiah (10, 11).

While comparing FEV<sub>1</sub> % of VC values with western subjects, our values are higher than those of Bass (2), Wright *et al.* (28), and agreeable with Morris *et al.* (20), and less than those of Peter *et al.* (22) subjects. Amongst Indians, our findings are quite agreeable with those of Gupta *et al.* (7), Mahajan *et al.* (17), Kasliwal *et al.* (13), Singh and Prabhakaran (25) and Jain and Ramaiah (10, 11).

The MVV values are observed to be lower compared with Indian (3, 6, 7, 13, 23, 26, 27) as well as western subjects (2, 28). The lower values might be due to lack of motivation and attitude of subjects in performing the act as reported by Gupta *et al.* (6).

Studies on MEFR values show that they are quite comparable with the findings of Gupta *et al.* (6, 7) and to be lower than the predicted values of Jain and Ramaiah (10, 11) in Indian subjects.

It is observed that the ERV values are more in agreement with the values of Indian (3, 6, 7) and western (12) subjects, while the IC values are lower than the predicted values of Jain and Ramaiah (10, 11) and quite agreeable to those of Gupta *et al.* (7) values. However, IC values in females are higher than those of Gupta *et al.* (7) female subjects.

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