

LUNG FUNCTION: A COMPARATIVE STUDY OF FORCED VITAL CAPACITY (FVC) AND BODY MASS INDEX IN YOUNG ADULT MALES

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ABSTRACT: Obesity is becoming a serious public health issue and is related to lung dysfunction. This study was planned to assess the correlation between the pulmonary function like FVC and increasing BMI in young adult males. This study was undertaken in normal weight and overweight young adult males of Balagangadaranatha nagara. The study and control groups were comprised of 120 male subjects between the age group 18-24 years randomly selected from the population of Balagangadaranatha nagara. Anthropometric measurements and spirometry was performed in all subjects. FVC was used as a measure of lung function. There was significant differences in FVC in the study group and there was inverse relationship between FVC and increase in BMI.

KEYWORDS: FVC, BMI.

INTRODUCTION: Overweight and obesity has become a global epidemic. They are the major health issues nowadays in the developing and developed countries. It is a medical condition in which excess of body fat has accumulated to the extent that it may have an adverse effect on the health leading to reduced life expectancy and increased health problems. Obesity has become a global epidemic and it is still increasing in both industrialized and developing countries.¹

At least 1 billion people worldwide are thought to be overweight and at least 300 million people are thought to be obese.² Obesity can profoundly affect the physiology of breathing. It can lead to pulmonary compromise in a number of ways. The objective of the study is to record the forced vital capacity (FVC) in normal weight and overweight young adult males and to compare the effect of increase in body mass index on pulmonary function test.

MATERIALS AND METHODS: The present study included a total of 120 subjects, out of which 60 subjects were normal and 60 subjects were overweight. The subjects were young adult males whose age were between 18-24 years. These subjects were selected by a simple random sampling method from a general population of Balagangadaranatha nagara, Mandya district. The selected group of subjects were categorized into normal weight and overweight based on the chart provided by WHO for body mass index.

BMI was calculated based on Quetelet's index.³

$BMI = \text{weight (in kgs)} / \text{height}^2 \text{ (in meters)}$.

BMI SCALE:

BM1 (Kg/m2)	Status
< 18.5	Underweight
18.5-24.99	Normal weight
25-29.99	Overweight
30 and above	Obese

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Descriptive and inferential statistical analysis has been carried out in the present study.

Student “t” test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (inter group analysis) on metric parameters.

The statistical software, SPSS 15.0 is used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS: Table of Mean and Standard Deviation of Forced Vital Capacity with Normal and Overweight in the subjects.

PFT Variables	Normal BMI	Over weight	P value
FVC (In lts)	2.93±0.46	2.71±0.39	0.006**

Fig. 1

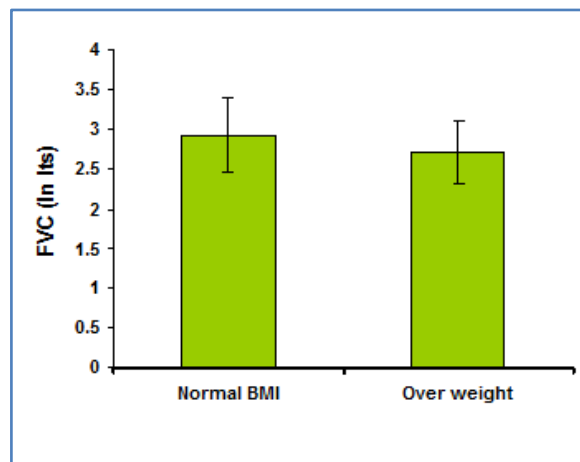


Fig. 2

The Mean and SD for FVC in the normal weight group is 2.93±0.46 and it is 2.71±0.39 in the overweight group and it is statistically significant (p=0.006).

DISCUSSION: The present study showed that the FVC was significantly decreased in overweight subjects when compared to the normal weight subjects (Table 03). The result of the present study was consistent with the study done by chen⁴ et al, on the residents of a town in Canada who were in the age group 18-79 yrs, wherein Waist circumference and BMI as a measure of obesity were compared with pulmonary function in normal weight, overweight and obese subjects.

They have observed that there was negative association between BMI and FVC in overweight and obese subjects when compared to the normal weight subjects. They further state that obesity was likely the cause of pulmonary function decline and respiratory function was determined by the interaction of lungs, chest wall and muscles.

Intra-abdominal pressure had a mechanical effect on the diaphragm which was suspected of being a major reason for the association of obesity with lung dysfunction. The result of the present study was also consistent with the study done by Anuradha R. Joshi et al,⁵ on 132 student volunteers in the age group 18-21 years, where BMI, Waist-to-Hip ratio and Body fat % (BF%) were used as a measure of overweight and obesity.

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They have found that the FVC was inversely correlated with Body fat%. They further elaborate that the amount of body fat and a central pattern of fat distribution might be related to lung function via several mechanisms, such as mechanical effects on the diaphragm (impeding descent into the abdominal cavity) and on the chest wall primarily due to the changes in compliance and in the work of breathing and the elastic recoil.

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LIST OF SUBJECTS WHO ARE HAVING NORMAL BMI:

Sl. No.	AGE (in years)	SEX	HEIGHT (in cms)	WEIGHT (in kgs)	B M I	FVC (In lts)
1	19	M	176	60	19.36	2.918
2	19	M	165	50	18.81	2.786
3	19	M	178	62	19.56	2.866
4	19	M	172	62	20.95	2.892
5	19	M	170	55	19.03	2.905
6	19	M	172	56	18.92	3.208
7	19	M	182	63	19.02	2.958
8	19	M	168	57	20.19	2.184
9	19	M	160	49	19.14	3.181
10	20	M	160	63	24.60	2.235
11	19	M	168	68	24.09	2.524
12	19	M	177	63	20.11	3.315
13	19	M	168	54	19.13	2.379
14	19	M	170	66	22.83	2.603
15	19	M	174	58	19.15	2.985
16	19	M	168	53	18.77	2.682
17	20	M	176	66	21.31	3.878
18	19	M	169	64	22.41	2.748
19	24	M	170	58	20.06	2.445
20	22	M	177	70	22.34	3.471

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21	23	M	171	63	21.54	3.103
22	22	M	181	70	21.36	3.05
23	22	M	177	63	20.11	2.59
24	21	M	176	74	23.88	2.55
25	20	M	179	75	23.41	3.234
26	19	M	155	50	20.81	2.314
27	19	M	168	56	19.84	3.628
28	19	M	168	56	19.84	2.524
29	20	M	161	50	19.28	2.761
30	20	M	180	63	19.44	3.602
31	20	M	170	56	19.37	2.656
32	20	M	173	56	18.71	2.761
33	20	M	160	55	21.48	2.117
34	19	M	172	57	19.26	2.353
35	20	M	171	67	22.91	3.326
36	19	M	172	58	19.60	2.09
37	20	M	169	70	24.50	3.024
38	19	M	161	58	22.37	2.734
39	20	M	164	60	22.31	2.669
40	19	M	166	62	22.49	2.682
41	19	M	172	62	20.95	2.866
42	19	M	175	65	21.22	2.958
43	20	M	181	66	20.14	4.062
44	20	M	180	68	20.98	4.338
45	19	M	170	55	19.03	3.273
46	19	M	171	56	19.15	3.827
47	20	M	182	63	19.01	3.497
48	20	M	175	60	19.59	3.457
49	21	M	175	59	19.26	2.866
50	21	M	173	62	20.71	3.05
51	21	M	170	70	24.22	2.997
52	22	M	169	69	19.11	2.984
53	22	M	165	68	24.97	2.918
54	21	M	171	72	24.62	3.024
55	21	M	164	68	24.09	2.892
56	21	M	174	75	24.77	2.971
57	22	M	178	77	24.30	3.129
58	23	M	178	78	24.62	2.812
59	21	M	173	74	24.72	2.564
60	21	M	172	71	23.99	2.706

(BMI between 18.5-24.99)

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LIST OF SUBJECTS WHO COME UNDER OVERWEIGHT:

Sl. no.	AGE (in years)	SEX	HEIGHT (in cms)	WEIGHT (in kgs)	B M I	FVC (In lts)
1	19	M	171	76	25.99	2.866
2	19	M	168	80	28.344	2.669
3	19	M	162	77	29.34	2.366
4	20	M	169	79	27.66	2.84
5	21	M	182	89	26.868	3.536
6	23	M	163	71	26.722	2.235
7	19	M	173	75	25.059	2.8
8	19	M	172	74	25.013	2.971
9	19	M	174	76	25.102	2.774
10	20	M	173	77	25.727	2.84
11	19	M	175	80	26.122	3.379
12	20	M	174	79	26.093	3.444
13	20	M	170	74	25.605	2.511
14	21	M	170	76	26.297	2.379
15	20	M	168	76	26.927	2.472
16	20	M	169	72	25.209	2.774
17	20	M	168	74	26.218	2.761
18	21	M	169	76	26.609	2.866
19	20	M	189	92	25.755	4.299
20	20	M	185	94	27.465	4.075
21	19	M	162	76	28.959	2.169
22	19	M	161	76	29.319	2.143
23	20	M	169	78	27.309	3.024
24	20	M	167	79	28.32	2.918
25	19	M	171	75	25.64	2.327
26	20	M	172	77	26.027	2.379
27	19	M	173	79	26.395	2.669
28	20	M	165	73	26.813	2.537
29	19	M	169	72	25.209	2.498
30	20	M	166	74	26.854	2.734
31	20	M	162	69	26.291	2.748
32	19	M	163	67	25.21	2.458
33	20	M	164	68	25.282	2.59
34	20	M	158	65	26.037	2.445
35	22	M	171	80	27.358	3.103
36	23	M	171	85	29.068	2.656
37	22	M	174	80	26.42	2.524
38	21	M	175	81	26.448	2.366

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39	22	M	174	82	27.084	2.55
40	23	M	175	83	27.102	2.55
41	22	M	173	84	28.066	2.892
42	23	M	174	87	28.735	2.853
43	22	M	172	81	27.379	2.853
44	21	M	174	83	27.414	2.274
45	24	M	175	84	27.428	2.748
46	22	M	173	80	26.729	2.879
47	21	M	176	82	26.472	2.787
48	23	M	179	84	26.216	2.774
49	24	M	174	81	26.753	2.195
50	22	M	173	83	27.732	2.472
51	23	M	174	84	27.744	2.748
52	21	M	180	83	25.617	2.511
53	20	M	177	85	27.131	2.642
54	21	M	176	86	27.763	2.537
55	22	M	165	79	29.017	2.564
56	21	M	160	75	29.296	2.682
57	22	M	176	86	27.763	2.748
58	22	M	162	72	27.434	2.577
59	23	M	175	88	28.734	2.445
60	23	M	163	77	28.981	2.432
BMI (BMI between 25.0-29.99)						

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