



A STUDY TO COMPARE THE PULMONARY FUNCTION TESTS IN COLLEGE STUDENTS FROM DIFFERENT COUNTRIES: A CROSS SECTIONAL OBSERVATIONAL STUDY

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ABSTRACT

Background: PFTs are essential for determining lung health and identifying respiratory conditions. The environment, lifestyle, and genetics of different nations can affect students' PFT results.

Objective: This study aimed to compare pulmonary function test results among students from different countries.

Methods: 80 students, ages 18 - 25 years old, from different nations participated in a cross-sectional study that gathered information on their environment, lifestyle, and pulmonary function by spirometry and lung volume measurements.

Result: There were no discernible variations in the PFT findings for the 18–25 age range, suggesting normal pulmonary function in this demographic.

The values are :-

1. Forced Vital Capacity (FVC): 0.056
2. Forced Expiratory Volume in 1 second (FEV1): 0.054
3. Peak Expiratory Flow Rate (PEFR): 0.141
4. FEV1/FVC ratio: 0.430

Conclusion: The findings demonstrate that there are no notable variations or respiratory anomalies, and the PFT readings are normal for the age group.

INTRODUCTION:

Pulmonary Function Test :

Measuring lung volume, capacity, flow rates, and gas exchange, pulmonary function tests (PFTs) are noninvasive examinations of lung function. Disorders impacting airflow come into two categories:

Obstructive: Limited airflow as a result of difficulty exhaling due to airway resistance.

Restrictive: Limited lung expansion; decreased lung volumes as a result of issues with the muscles of the chest or lung tissue.

There are two methods to execute PFTs:

1. Spirometry: utilizes an electrical equipment that detects airflow through a mouthpiece-equipped device.
2. Plethysmography: includes standing or sitting inside an airtight container in order assess lung function.

Based on what the healthcare provider requires, both approaches may be utilized.

PFT measures:

- Tidal Volume (TV): Air expelled or inhaled normally during breathing.
- Minute Volume (MV): The total amount of air expelled in a minute.
- Vital Capacity (VC): Maximum air exhaled following a complete inhale.
- Residual Functional Capacity: Air in the lungs following a typical exhale.
- Residual Volume: The amount of air in the lungs following complete exhale.
- Total Lung Capacity: Maximum volume of the lungs when fully expanded.
- Forced Vital Capacity (FVC): Air exhaled vigorously upon complete inhalation.
- (Forced Expiratory Volume/FEV): Air expired during the first, second, and third seconds of FVC
- Forced Expiratory Flow (FEF): Mean flow rate in the FVC's middle half.
- Peak Expiratory Flow Rate (PEFR): The fastest rate at which forced air is expelled from the lungs.

REVIEW OF LITERATURE

This review studies variations in lung function through examining pulmonary function tests (PFTs) in young adults from various races, ages 18 to 25. It highlights significant findings on demographic variations in lung health and includes studies on students and standardized PFT tests.

1. Anuradha R Joshi, Ratan Singh, AR Joshi (2008) researched on Correlation of pulmonary function tests with body fat percentage in young individuals and concluded that increase in percentage of body fat and central pattern of fat distribution may affect the pulmonary function tests.
2. Sandip Meghnad Hulke et al (2011), researched on Effect of endurance training on lung function: a longitudinal study and concluded that physical activity does improve some of lung function and also there is no deterioration in lung function with 12 weeks of exercise but we recommend multiple longitudinal study.
3. Sheetal Panwar, Ashutosh Chourishi, Jayant Makwana et al (2012), researched on Effect of pranayama (yoga) on pulmonary function test of young healthy students and concluded that Pranayama seems to be beneficial for the pulmonary functions. Further studies are needed to confirm the possible mechanism(s) responsible for such an effect.
4. Vinayak P Doijad, Anil D Surdi et al (2012), researched on Effect of short term yoga practice on pulmonary function tests and concluded that yoga practice can be advocated to improve respiratory efficiency for healthy individuals as well as an alternative therapy or as adjunct to conventional therapy in respiratory diseases.

METHODOLOGY

Study design- A cross sectional observational study

Sampling Technique: Purposive Sampling

Setting: Marwadi University Campus Outpatient Department (OPD), Rajkot –

Data Source: OPD at Marwadi University

Sample Size: 80 participants

Criteria for Inclusion:

- 1. Age: between 18 - 25**
- 2. Both males and females**

Exclusion criteria:

1. Cardiovascular conditions that are unstable (such as uncontrolled hypertension or heart failure).
2. Behavioral conditions.
3. Severe anemia, malnutrition, malignancy, or liver or renal disease.
4. Corticosteroids or immunosuppressants use lately.
5. Acute discomfort of pneumonia or COPD during the prior weeks.
6. Other chronic lung conditions (such as asthma or bronchiectasis) or severe lung procedures.
7. Pulmonary tuberculosis which is active.
8. Prior radiation to the chest or pulmonary rehabilitation.

Method :

Participants: Based on predefined inclusion and exclusion criteria, 80 participants, aged 18 - 25, from 10 different countries were included in the study. After summarizing the goal and details of the study, informed consent was obtained.

Procedure: To ensure , each subject was led through the steps. For reference, significant measurements including age, weight, and height were recorded.

Pre-Test Preparation: A few hours prior testing, subjects were told not to eat large meals, smoke, or do strenuous exercise.

Spirometry: Spirometry was utilized to measure vital capacity, forced vital capacity, forced expiratory volume in one second (FEV1), and peak expiratory flow rate (PEFR) in order to assess lung function.

Diffusion capacity quantifies the effectiveness of gas exchange, and lung volumes are measured at various respiratory stages. Students' projected values based on height, weight, age, and gender are compared with conventional reference values in data interpretation.

STATISTICAL ANALYSIS AND RESULTS:

Table 4.1 Age Distribution

| Age (Years) | No. Of People |
|----------------|---------------|
| 18 | 4 |
| 19 | 4 |
| 20 | 12 |
| 21 | 11 |
| 22 | 16 |
| 23 | 13 |
| 24 | 14 |
| 25 | 6 |
| Total | 80 |

Table 4.2: Gender Distribution

| Gender Distribution | |
|---------------------|--------|
| Male | Female |
| 57 | 23 |

| FVC | N | Mean | Std. Deviation | Magazine for Physiotherapy |
|-----|--------|--------|----------------|---|
| 80 | 3.3069 | .83800 | | advancing therapy Through Research & Innovation |

Table 4.4: ANOVA Analysis for FVC

| ANOVA | | | | | |
|----------------|----------------|----|-------------|-------|------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 11.204 | 9 | 1.245 | 1.968 | .056 |
| Within Groups | 44.273 | | .632 | | |
| Total | 55.478 | | | | |

Table 4.5: Mean and standard deviation for FEV1

| FEV1 |
|------|
|------|

| N | Mean | Std. Deviation |
|----|--------|----------------|
| 80 | 3.0618 | .7229 |

Table 4.6: ANOVA Analysis of FEV1

| ANOVA | | | | | |
|----------------|----------------|----|-------------|-------|------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 8.399 | 9 | .933 | 1.986 | .054 |
| Within Groups | 32.894 | 70 | .470 | | |
| Total | 41.294 | 79 | | | |

Table 4.7: Mean and standard deviation for PEFR

| PEFR | | |
|------|--------|----------------|
| N | Mean | Std. Deviation |
| 80 | 5.4253 | 1.60058 |

Table 4.8: ANOVA Analysis for PEFR

| ANOVA | | | | | |
|----------------|----------------|----|-------------|-------|------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 34.034 | 9 | 3.782 | 1.572 | .141 |
| Within Groups | 168.354 | 70 | 2.405 | | |
| Total | 202.388 | 79 | | | |

Table 4.9: Mean and standard deviation for FEV1/FVC

| FEV1/FVC | | |
|-----------------|----------------|-----------------------|
| N | Mean | Std. Deviation |
| 80 | 92.9453 | 7.31650 |

Table 4.10: ANOVA Analysis for FEV1/FVC

| ANOVA | | | | | |
|-----------------------|-----------------------|-----------|--------------------|--------------|-------------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 491.971 | 9 | 54.663 | 1.024 | .430 |
| Within Groups | 3736.994 | 70 | 53.386 | | |
| Total | 4228.965 | 79 | | | |

DISCUSSION

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The study compares PFT Among different countries students, which involves 80 participants aged 18-25. Hence, results showed no significant difference in PFT among the participants.

Theoretical reasoning:

1. Fitness and academic performance : it highlights the relationship between academic success and physical fitness
2. assessment improvement: contribution of research, standardizing metrics (cross population comparisons) and refining fitness assessment tools.
3. influence on educational policies: it informs policy and strategies to improve a healthier and more active body.

The study provides a significance of health trends in students and impact on academic performance and well-being.

CONCLUSION

To conclude , our investigation revealed no appreciable variations in PFT outcomes between the groups. Even though the results exceeded our expectations, these findings will be significant for further respiratory health study.

REFERENCES

1. Anatomy and physiology of lungs by alaska community action on toxics.
2. Human lungs by Vedantu.
3. Respiratory tract by national cancer institute SEER Training modules.
4. What are the biomechanics behind breathing by quora.
5. gas exchange in the lung, acidosis pathology by britannica.
6. Pulmonary function test by johns hopkins medicine.
7. Average lung volumes and capacities in pulmonary function measurement by clinicalgate.

