



Cardio Respiratory Efficiency Parameter Between the Smokers and Non-Smokers: A Comparative Study

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KEYWORDS

Smokers, Non-Smokers, Resting Respiratory Rate (RRR), Exercise Respiratory Rate (ERR), Peak Expiratory Flow Rate (PEFR) and VO2 max

ABSTRACT:

Introduction: Smoking is regarded as the world largest preventable cause of death and a major risk factor for cardiovascular morbidity and mortality. According to WHO estimates, the increases the chance of developing non-communicable diseases likes high blood pressure, cancer, and heart disease, all of which are associated to smoking. Each year, tobacco use kills 8.7 million people and causes 10 million more to suffer from diseases that could have been prevented (WHO 2021).

Objects: The study goal was to examine selected cardio-respiratory efficiency characteristics between smokers and non-smokers in men.

Methods: In this study Fifty (n=50) male subjects are selected (25 male smokers and 25 male non-smokers) they are from Jadavpur University, Kolkata, W.B, (India). And they had age limits of 18–25 years. To test the selected cardio-respiratory efficiency parameters, i.e., Manually measured by resting respiratory rate test for RRR, Manually measured by Exercise Respiratory Rate test for ERR, Peak Flow test measured for Peak Expiratory Flow Rate PEFR, Modified Queens College Step Test measured by VO2 max was selected for this study respectively. Descriptive statistics mean Standard Deviation and t-test were applied to assess and compare the selected cardio-respiratory efficiency parameter between male smokers and non-smokers groups, and the Level of significance was set at 0.05.

Result: The result of the study explicated statistically that there was significant difference in selected cardio-respiratory efficiency parameters, i.e., RRR, ERR and PEFR of male smokers and non-smokers group. But VO2 max cardio-respiratory efficiency parameter was no significant difference between the selected male smokers and non-smokers group. Thus, the Researcher concluded that in the non-smokers group, selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, PEFR, and VO2 max are better than the smokers group.

Conclusion: So researcher concludes that smoking is very bad effect for human respiratory function. Smoking decreases the lung and cardio-respiratory function of human body.

1. Introduction

Smoking is regarded as the world largest preventable cause of death and a major risk factor for cardiovascular morbidity and mortality.

According to WHO estimates, the increases the chance of developing non-communicable diseases likes high blood pressure, cancer, and heart disease, all of which are associated to smoking.



Each year, tobacco use kills 8.7 million people and causes 10 million more to suffer from diseases that could have been prevented (WHO 2021). Consuming cigarettes or bidis increases the chance of addiction, disease, or death (Andresa Thier de Borba et al., 2014). Cigarette and bidis smoking has lengthy linked to decreased lung function as well as increased mortality from chronic bronchitis and emphysema (Royal College of Physicians, 1962; Berridge, V. 2007). It has been recommended that the increase in airway resistance is due to the irritant action of smoke particles on bronchial tree receptors (Sterling, 1967). Some studies have shown that the airway resistance of Bronchitis (including those with only minor abnormalities) was higher than that of those with no respiratory symptoms. In bronchitis, airway resistance varied from day to day. This could be due to the unequal distribution of inhaled tobacco smoke in the lungs of people with airway obstruction, as described for inhaled aerosols. This would result in an abnormally high concentration of tobacco smoke constituents in already compromised areas of the intrapulmonary airways (McDermott and Collins, 1965). Furthermore, smokers have a lower aerobic capacity. The maximum capacity of oxygen absorption, transportation, and consumption is represented by VO_{2max} . VO_{2max} is the most important and influential parameter of a person's overall physical fitness, as well as an independent and objective measure of cardiovascular disease prognosis prognosis (Andresa Thier de Borba & Renan Trevisan Jost, et al., 2014). Cigarette and bidis smoking has immediate bad impacts on pulmonary and cardiovascular function; inhaling cigarette smoke has the immediate respiratory effect of increased airway resistance. Furthermore, after smoking rise in carbon monoxide levels in the blood. Both of these modifications reduce the amount of oxygen absorbed by the body. Several studies have found that cigarette and bidis smoking reduces exercise

respiratory rate, maximal oxygen consumption (VO_{2max}), and anaerobic threshold substantially (Chen, C. L & Tang, J. S et al., 2015). And cigarette and bidis tobacco smoke decreased the Peak expiratory flow rate (Awotedu, A. A & Higenbottam, T 1984).

2. Purpose

The purpose of the study was to compare the selected cardio respiratory efficiency parameters, i.e., RRR, ERR, PEFR and VO_{2max} between male smokers and non-smokers groups of Jadavpur University students, Kolkata, and W.B, (India).

3. Methodology

3.1 Selection of the Subjects

This study includes a total of fifty (50) male subjects. Smokers group (n-25 subjects was selected) and non-smokers group (n-25 subjects was selected). One group consisted of light smokers, whereas the other group consisted of non-smokers.

3.2 Sampling technique

For this study, fifty (50) male subjects were selected in a simple random sampling technique. Twenty-five male (25) smokers and twenty five male (25) non-smokers subjects were taken from of Jadavpur University students, Kolkata-32, W.B., (India). All Smokers subjects are mild smokers, they are 10 or less than 10 cigarettes or bidis smock per day. And the age range of the subject is 18-25 years, average subject's age range near about 22 to 24 years.

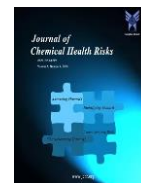
3.3 Selection of variables

Dependent variables:

Selected Cardio-respiratory efficiency parameters, i.e., Resting Respiratory Rate (RRR), Exercise Respiratory Rate (ERR), Peak Expiratory Flow Rate (PEFR) and VO_{2max} .

Independent variables:

Selected groups are male Smokers and non-smokers.



3.4 Selected parameters & measuring tools

TABLE I

Parameters	Test item	Instrument	Scoring /unit
1. RRR	Manually Resting respiratory rate test	Stopwatch	Breaths/minute
2. ERR	Manually Exercise respiratory rate test	Metronome, Stopwatch	Breaths/minute
3. PEFR	Peak Flow test	Peak Flow Meter	(Litre/ Minute)
4. VO ₂ Max	Modified Queens College Step Test	Metronome, Stopwatch	ml/kg/min

3.5 Data collection procedure

1. Measure the Resting Respiratory Rate

Manually RRR counted in fully resting position, according to the (McArdle-Katch procedure) in a lying resting position.

2. Measure the Exercise Respiratory Rate

This ERR test maintains the McArdle-Katch Bench stepping test procedure. Their 10 seconds counted as the raise of the thoracic cavity after the 3-minute exercise.

3. Measure the Peak Expiratory Flow Rate

PEFR was measured using the peak flow meter. Peak expiratory counted by forcefully excel throw the Peak Flow meter after the deep in hell. Take the Peak Expiratory Flow Rate 3 times and calculated the average Peak Expiratory Flow Rate

by adding the three numbers together and divide by 3.

4. Measure the VO₂ max

Determine the estimated aerobic capacity or VO₂ max (ml/kg/min). Only the zero time point (0:00) was used to estimate as part of the McArdle-Katch test. Was Use the following equation, where HR= Heart Rate at the 0:00 time point converted to BPM.

Males: VO₂ max = 111.33- (0.42 × HR).

3.6 Statistical analysis

The descriptive statistics and t- test was applied for the compared selected cardio-respiratory efficiency parameters with the male smokers group and non-smokers group. The Level of significance was set at the 0.05 levels.

TABLE II

Analysis of selected cardio-respiratory efficiency parameter between smokers and non-smokers

Parameter	Smokers		Non-smokers		t-ratio
	Mean	±S.D.	Mean	±S.D.	
RRR	21.24	± 2.77	17.36	±2.14	5.54
ERR	37.36	± 3.45	27.36	±4.72	8.56
PEFR	481.67	±63.47	553.20	±56.60	4.20
VO ₂ Max	57.94	±6.58	61.90	±8.70	1.82

N-50

0.05 level of significance (2, 48) = 2.01

The above Table-2 Shows the Mean and Standard Deviation of the RRR of smokers group was 21.24, ±2.77, and the Mean and Standard Deviation of the RRR of non-smoker group was 17.36, ±2.14. The ERR Mean and Standard Deviation of smokers group was 37.36, ±3.45, and the Mean and Standard Deviation of ERR of non-smokers group was 27.36, ±4.72. PEFR the Mean and Standard Deviation of smokers group was

481.67, ±63.47, and the Mean and Standard Deviation of PEFR of non-smokers group was 553.20, ±56.60. VO₂ Max the Mean and Standard Deviation of smokers group was 57.94, ±6.58, and the Mean and Standard Deviation of VO₂ Max of non-smokers group was 61.90, ±8.70.

The analysis of the t-test of selected cardio-respiratory efficiency parameters of male smokers and non-smokers is presented in table no



-2. The obtained t-value of RRR is 5.54, ERR is 8.56, PEFR is 4.20, and VO₂ Max 1.82, was greater than the tabulated value 2.011, without VO₂ Max 1.82. At was 0.05 level confidences.

So can say that the calculated value of selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, and PEFR of 5.54, 8.56, and 4.20, greater than the tabulated value of t- 2.011, Except for the calculated value of VO₂ max, The VO₂ max calculated value is 1.82 lesser than the tabulated value t- 2.011. That means there was significant difference between the selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, and PEFR of smokers and non-smokers group. Lastly, I may conclude that the non-smokers group better selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, PEFR and VO₂ Max than the smokers group.

Further, the Mean and S.D. Graphical Representation of selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, PEFR and VO₂ Max of smokers and non-smokers group are shows in figure no.1, 2, 3, and 4 respectively.

Figure - 1

Graphical Representation of Mean and S.D for RRR of Smokers and Non- Smokers

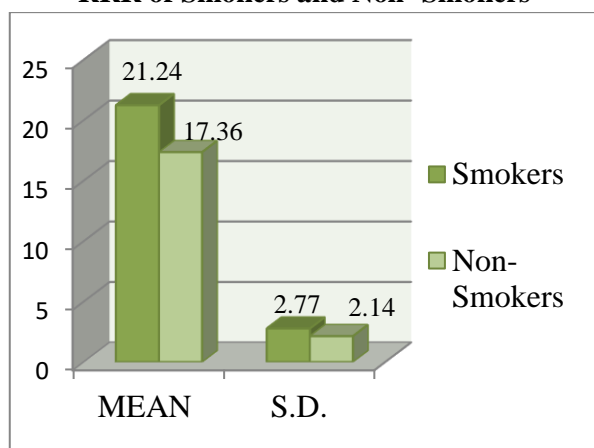


Figure - 2

Graphical Representation of Mean and S.D for ERR of Smokers and Non- Smokers

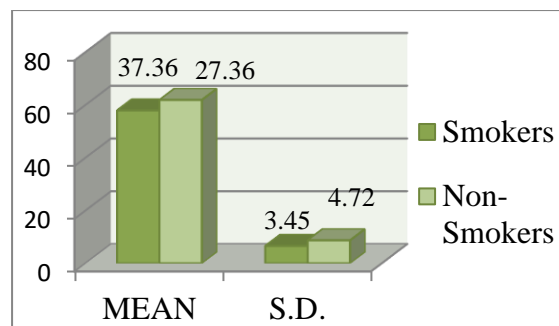


Figure - 3

Graphical Representation of Mean and S.D for PEFR of Smokers and Non- Smokers

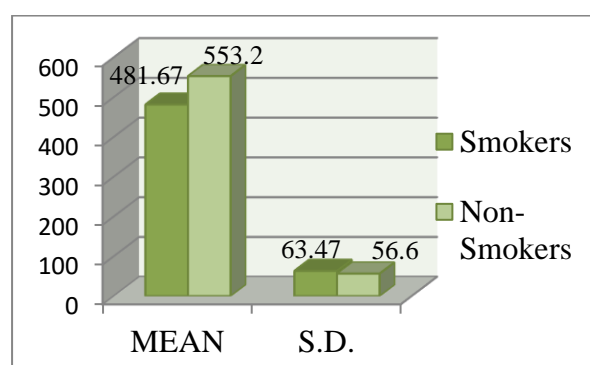
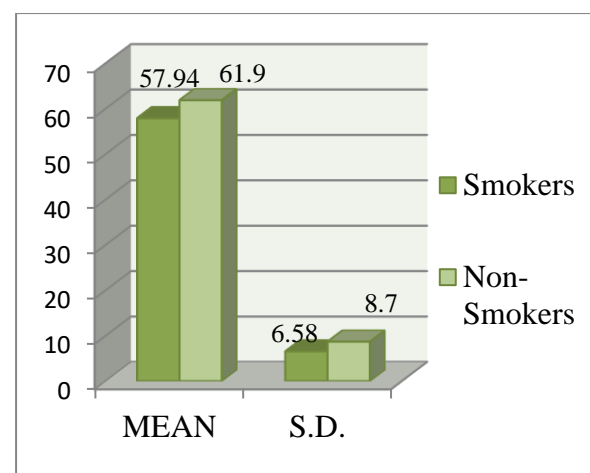


Figure - 4

Graphical Representation of Mean and S.D for VO₂ max of Smokers and Non- Smokers





4. Discussion of the findings

The study was to compare the selected cardio-respiratory efficiency parameters between the mild male smokers and non-smokers group. The findings of descriptive statistics from table no-2 were indicated Mean and Standard Deviation of smokers and non-smokers group. To compare the selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, PEFR and VO2 Max of male smokers and non smokers group. Selected non-smokers group are better to the selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, PEFR and VO2 Max than the other smokers group. Further, the statistical analysis t-test revealed that there was significant difference between the selected cardio-respiratory efficiency parameters, i.e., RRR, ERR, and PEFR of smokers and non-smokers group, respectively at 0.05 levels significance from sows that table no-2. But, VO2 Max cardio-respiratory efficiency parameter there was no significant difference among the male smoker and non-smoker group at 0.05 levels significance. And smokers and non-smokers group VO2 Max Mean values are different, and non-smokers group VO2 Max Mean values are better than the smokers group.

The comparison of non-smokers and smokers group in selected cardio respiratory efficiency parameters significant differences were found in three parameters RRR, ERR and PEFR, Except for the VO2 max.

5. Conclusion

This study aimed to identify the cardio-respiratory efficiency between male smokers and non-smokers, and Significant differences were found in selected cardio-respiratory parameters, i.e., RRR, ERR and PEFR between male smokers and non-smokers. Nevertheless, we found no difference between VO2 max in male smokers and non-smokers. But other studies found significant difference between VO2 max in male smokers and non-smokers.

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