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COMPARISON OF FORCE EXPIRATORY VOLUME IN ONE MUNITE (FEV1) BETWEEN SMOKERS AND NON-SMOKERS IN PORT HARCOURT

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ABSTRACT

This study investigated the FEV_1 (Forced Expiratory Volume in one Second) of smokers and non-smokers in Port Harcourt Metropolis. Survey research design was adopted for the study. The population for this study is composed of 100 subjects (that is, 60 male and 40 female) randomly selected from various ethnic background within the age range of 17-38 years in Port Harcourt. The FEV_1 (Forced Expiratory Volume in one Second) and BMI (Body Mass Index) of the subjects were measured using instruments such as spirometer as well as portable height and weight scales. The mean and standard deviation scores were computed and used to answer the eight (8) research questions. To determine the extent of significant difference existing between the FEV_1 and BMI of smokers and non-smokers at ∞ 0.05 levels, t-test statistics was employed to analyze the data and to test the validity of the hypotheses. The results of the study revealed that there is a decrease in FEV1 with increasing age and drastic decrease in people who smokes (male non-smokers 3.73 ± 0.16, male smokers 3.19 ± 0.56, female non-smokers 2.99 ± 0.13 and female smokers 2.53 ± 0.50). The result also shows that the smokers are easily prone to lung diseases due to their decrease lung functions. The result further indicate that there is much difference in the BMI of the smokers and non-smokers as related to their FEV1, though there was no significance difference in aged smokers and smokers that just begin smoking. However there was a decrease or loss of weight for the smokers of the same age when correlated with the non-smokers (male non-smokers 66.76 ± 5.76, male smokers 58.40 ± 4.01, female non-smokers 62.00 ± 6.17 and female smokers 51.03 ± 7.83). It is thus important for every hospital or clinic to provide or recommend a regular Spiro metric measurement for their patients and also provide therapeutic measures for improving their patients' lung function so as to limit the incidence of lung diseases.

Keywords: Force; Expiratory Volume; One Second; Smoker; Non-smokers.

Introduction

Usage of tobacco particularly the aspect of smoking causes a range of adverse health effects. It is directly implicated in a number of serious diseases and can increase adverse effects of other chemical, physical and biological agents (Aslm, et al, 2010). Chemicals and other agents in workplaces can cause disease in capacity and early death, if not controlled. At the workplaces, it is clear

that the adverse effects can be produced by the synergistic interaction of tobacco smoking and other hazards. They, further revealed that the majority of interactions of harmful tobacco smoke constituents with toxic chemicals occur when the latter are airborne, through interactions of smoking with ingested and/or absorbed harmful agents.

Tobacco usage is widespread throughout the world. Even, in countries with low income economies to the most affluent industrialized nations, men and women, children and adult and millions of people are involuntarily subjected to the smoking of tobacco. There are numerous explanations for tobacco habit but the main reason for its ubiquity is the addictive drug nicotine present in all forms of tobacco leaf and delivery in varying amounts to the user by the various methods of tobacco use. The advent of the cigarette, mass produced, easily obtainable, relatively cheap and light in weight, so it can be held in the mouth leaving the hands free, has had a major impact on smoking habits, in general and in workplaces. In Nigeria, tobacco smoking has been recognized as a serious health hazard and a major contributing factor to deaths through a number of common diseases. Despite the health warning legislation, the rate of consumption of tobacco seem to be slow. Even, measures put in place to control its consumption through taxation and campaign with the use of media education programs, which have always been carried out on the dangers of smoking as well as the benefits to be gained from not smoking or avoiding smoking seem to achieve very little.

Effects of tobacco smoking on lung deposition of inspired particles which depend on their physicochemical properties, airway structure and geometry. Mathematical models describing the deposition of particles in the various airway sections show that to compromised airways, as in the case of patients suffering from asthma and chronic obstructive lung diseases, particle deposition is enhanced several-fold (ICRP, 1994). It can be an indirect cause of enhanced deposition of inspirable particles. In addition, during tobacco smoking the breathing for long-term is changed to more frequent and deeper inhalation, especially in the case of low-nicotine cigarettes, which can result in an increased inhaled dose and dose rate of inspirable dose and dose rate of inspirable compounds (IARC, 1990).

Clearance of particles deposited in the lung is a complex physiological process involving relatively rapid tracheobronchial clearance, in which mucus is moved upwards by culinary action to the pharynx and swallowed and slower deep-lung clearance, in which phagocytic cells remove inhaled particles. The processes are balanced by the solubility of the inhaled particles, with relatively insoluble particles having a longer residence time in the alveolar portions of the lungs. A longer residence time in the lung would be accompanied by a greater possibility that harmful effects could occur. Both rapid and slow clearance phases are reduced by smoking, although probably by different mechanisms. Cigarette smoke contains significant concentrations of cilia-like toxic agents such as hydrogen cyanide, formaldehyde, acetaldehyde, acrolein and

nitrogen oxides which greatly contribute to retarded clearance of inhaled particles by inhibiting lung clearance mechanisms (Routbi, et al (2015). Retardation of clearance has been seen for airway-deposited particles, in which decreased mucus transport velocities slow this normally relatively rapid phase clearance (Luffi, 2017).

Statement of the Problem

The measurement of FEV_1 and the diseases that affect the smokers when the FEV_1 is less than the expected normal value which is mainly seen in smokers has been of serious concerns to medical and para-medical experts as well as physiologists. Several medical authorities have identified that smoking of cigarette leads to many lung diseases and some of the effects can be found in non-smokers (Behera, 2013).This could probably result in the fluctuation of the rate of FEV_1, of the smokers to be at the high or low.

This has made people assume that the level of FEV_1 of smokers may differ from that of the non-smoker the rate at which smokers are prone to lung diseases may differ from that of the non-smokers, the death rate of smokers with lung diseases may differ from that of the non-smokers with lung diseases and that the rate at which smokers with lung diseases respond to treatment may differ from that of the non-smokers.

From the foregoing therefore it could be assumed that the FEV_1 of smokers may not be the same with that of the non-smokers, although some research findings outside Nigeria have shown that the $FEV_1$of smokers is always low but here in Nigeria, little or no research study has been focused on the comparison of the FEV_1 of the smokers and non-smokers. That being so therefore, there seems to be a research-based knowledge gap that exists, which this study intends to fill empirically.

Research Questions

The following research questions will guide the study:

1. To what extent does the FEV_1 of male smokers differ from that of the male non-smokers?
2. To what extent does the FEV_1, of female smokers differ from that of the female non-smokers?
3. To what extent does the BMI of male smokers differ from that of the BMI of male non-smokers?
4. To what extent does the BMI of female non-smokers differ from that of the BMI of female smokers?
5. To what extent does the FEV_1, of male non-smokers of the ages 17-25 differ from that of the male smokers 26-38?
6. To what extent does the FEV_1, of female non-smokers of the ages 17-25 differ from that of the female smokers 26-38?
7. To what extent does the weight of male smokers differ from that of the male non-smokers weight?
8. To what extent does the weight of female smokers differ from that of the female non-smokers weight?
9. To what extent does the FEV_1, of male non-smokers of the ages 17-25 differ from that of the male smokers 26-38?
10. To what extent does the FEV_1, of female non-smokers of the ages 17-25 differ from that of the female smokers 26-38?

Hypotheses

The following hypotheses were generated and will be tested at 5% significant level:

Level:

1. There is no significant difference between the FEV_1 of male smokers and non-smokers.
2. There is no significant difference between the FEV_1 of female smokers and that of female non-

Smokers

3. There is no significant difference between the BMI of male smokers and non-smokers.
4. There is no significant different between the BMI of female non-smokers and that of female smokers.

Smokers.

5. There is no significant difference in the FEV_1 of male smokers between ages 17-25 and 26-38.
6. There is no significant difference in the FEV_1, of female smokers between ages 17-25 and 26-38.
7. There is no significant difference between the Weights of the male smokers and that of male non-smokers.
8. There is no significant difference between Weights of female non-smokers and that of smokers.
9. There is no significant difference in the Weight of male smokers between ages 17-29 and that of 30-38.
10. There is no significant in the Weight of female smokers between ages 17-29 and that of 30-38.

Significance of the Study

The desire of any health organization is to provide good health care for the citizens or members of the society. The physician, physiologist etc. cannot see people suffering from lung disease without providing necessary measures to reduce the effects of this lung disease, and so the result is of this study will be very significant to the health organizations and smokers living in Port Harcourt. The data gotten through this study will provide relevant information in exposing differences that exist in FEV1 measurements of smokers and non-smokers in Port Harcourt and possible methods to stabilize the FEV1 (decreased) of the smokers to normal FEV1, values will be proposed based on the results of this study. The findings from this study will be beneficial to the pharmacists as they can be used to invent some relevant drugs for the treatment of cases of reducing FEV1 effects like asthma etc. without adverse effects on the lungs.

Generally, the results of this study will be significant to the government as they will provide insight on the amount or prevalent rate of smokers in Port Harcourt, thus enabling the establishment of vibrant rehabilitation centers for smokers so as to reduce the prevalent rate of lung disease that result from the FEV1, (decreased). The results of this study would also enlighten non-smokers on the benefits of not taking cigarette. Finally, the finding of this study would be able to encourage non-smokers to continue to stay away from cigarette smoking.

Materials and Method

The population of this study consisted of smokers and non-smokers in Port Harcourt metropolis. Simple random sampling procedure was used to draw a sample size of hundred (100) subjects (that is 60 males and

40 females). This sample size is made up of 50 non-smokers and 50 smokers. The smokers were selected based on their medical history available to the researcher. In selecting the respondents mainly the smokers used in this study, this researcher ensured that the conditions such as hemoptysis of unknown origin, pneumothorax, unstable cardiovascular status, recent myocardial infarction or pulmonary embolus; thoracic, abdominal, or cerebral aneurysms, recent eye surgery e.g., cataract, recent surgery of thorax or abdomen, presence of an acute disease process that might interfere with test performance e.g. nausea, vomiting were avoided, This was so because if the subjects are used in this study, they may likely be aggravated by the effects of this research study.

The respondents or subjects that quit smoking were separated and the heavy smoker where selected from the light ones via amount of cigarette smoke taken per day and the period of smoking thus less than 10 sticks where classified as light smokers while more than 10 where seen as heavy smokers, the non-smokers include 30 males and 20 females which are from various ethnic background and socio-economic status between the ages of 17- 38. Their weights, heights and history of known respiratory illnesses of the subjects used in this study were taken. The following apparatus was relevant for the study;

- Portable Height and Weight Scale.
- Spirometer.
- Cigarette Sticks.

Research Method

The heights of the subjects were measured with the subjects standing fully erect with eyes looking straight ahead and measured with the feet together without shoes. Subjects who cannot stand or who have a spinal deformity (e.g., kyphoscoliosis) or does that preferred sitting, were measured with the arm span from finger-tip to finger-tip with arms stretched in opposite directions were used as an estimate of height. The weight of the subjects were determined and recorded as they put on their indoor clothes without shoes.

Before using the spirometer, it was calibrated and done twice with more than one Spiro metric estimation carried out in a day. The room where the calibration was done was also kept at normal room temperature. In the calibration of the spirometer, the room air through the calibration syringe and the spirometer was calculated, then the syringe to the flow head are simply pump through a flow liter. The calibration routine of the spirometer was entered with the spirometer level by pressing the arrow button and the blue 'on' button at the same time, then release both buttons, the equipment number displayed followed by the message 'zeroing sensor', then 'please wait'.

The message pump air is then displayed, the syringe handle is fully extended connected to the syringe to the blow head with the handle of the spirometer pointing upwards and Pumping-in the volume of air from the syringe in a smooth swift stroke, taking approximately 1 second to do so. It is important that the air is pumped in smoothly

and swiftly in this way, Precaution was taken so as not to occlude the outlet of the spirometer with hands.

After five blows, the record of the subject was taken in the standing or sitting position but mostly carried out in the standing position. The tight clothing of the subjects was loosened, the subjects were asked to wear dentures except for those that dentures fit so badly so that the airflow is not obstructed. The aim of the test is explained to the subjects telling them that it is to find out how much air they can blow out and how quickly it is blown out and that they must try to blow out as much air as possible as hard and as fast and as completely as they can.

The demonstration of the correct technique was first done by using a mouthpiece unconnected to the spirometer with explanations showing that the mouthpiece should be held in place by the lips rather than the teeth and the lips should be wrapped firmly around it, and then followed by demonstration of a blow. after the demonstration, a clean disposable mouthpiece was attached to the flow head so as to commence the taking of values of the various subject, the subjects were instructed to take as deep a breath as possible and then to hold the mouthpiece with their tips, holding the spirometer with the handle downwards, the subjects were encourage to blow, they were observed closely during the blow so that the blow can be technically satisfactory and advise given to them to do better in the subsequent blows Five (5) technically satisfactory blows were obtained though there were some subjects with suspected severe lung disease who are unable to complete five attempts mostly the old subjects. The blows were technically assessed, it was done to know whether a blow is technically satisfactory of which it was beneficial for subjects with poor result as it means that they have a poor lung function and it is not simply that they have been unable to use the equipment or get the right blowing technique though unsatisfactory blow cannot be based on result alone. The technically unsatisfactory blow was observed in some of the following ways,

- In unsatisfactory start, e.g. excessive hesitating or a 'false start', mainly when FEV1 is seen on either side of the spirometer thus showing that it is an excessively slow start.
- Laughing or coughing especially during the first second of the blow. Seen in subjects that cough a little towards the end of their effort but this is acceptable.
- Holding the breath in (in cases when valsalva manoeuvre is carried-out).
- A leak in the system or around the mouthpiece is seen in cases where the mouthpiece is not firmly held by the lips.
- An obstructed mouthpiece, as in cases where the tongue is in front of the mouthpiece or false teeth obstructing the mouthpiece.
- Results that show values of 0.00 on an FEV_1, were rejected because it means that the test was not carried out properly.

Data Analysis Technique

In order to determine the level of FEV_1, in the smokers and non-smokers used as subjects in this study, the mean scores below 3.50 for males represent abnormal FEV_1 while mean

scores Of 3.50 and above represent normal FEV_1. The data generated and presented in tables to show frequencies and computed means of the categories of subjects. The frequencies and mean scores were extracted and presented in appropriate tables to answer the Eight (8) research questions. To determine the extent of significant difference existing between the FEV_1 of different categories of subjects, at 0.05 significant level, the researcher employed t-test statistics to analyze the data and test the validity of the ten (10) hypothesis.

Results Presentation and Analysis

Response to Research Questions

The data collected were analyzed and the results are systematically presented with respect to formulated eight (8) research questions in table 1.

Research Question 1: To what extent does the FEV1 of male smokers differ from that of the male non-smokers?

In order to answer this research question, FEV1 measurements of sixty (60) (that is, 30 male smokers and 30 male non-smokers) subjects were taken and the mean computation is represented in table 1.

Table 1

	Variable	N	Mean/SD	Remarks
FEV_1	Male non-smokers	30	3.73 ± 0.16	Normal FEV_1
	Male smoker	30	3.19 ± 0.56	Decreased FEV_1
	Female non-smokers	20	2.99 ± 0.13	Normal FEV_1
	Female smokers	20	2.53 ± 0.50	Decreased FEV_1
	Male smokers (17-25yrs)	18	3.59 ± 0.17	Decreased FEV_1
	Male smokers (26-38yrs)	12	2.57 ± 0.38	Abnormal FEV_1
	Female smokers (17-25yrs)	13	2.87 ± 0.16	Normal FEV_1
	Female smokers (26-38yrs)	7	1.90 ± 0.26	Abnormal FEV_1
BMI	Male non-smokers	30	23.17 ± 1.76	Normal BMI
	Male smoker	30	20.48 ± 2.07	Normal BMI
	Female non-smokers	20	23.55 ± 1.99	Normal BMI
	Female smokers	20	19.99 ± 1.43	Decreased BMI
Weight	Male non-smokers	30	66.76 ± 5.96	High Weight
	Male smoker	30	58.40 ± 4.01	Weight loss
	Female non-smokers	20	62.00 ± 6.17	Normal Weight
	Female smokers	20	51.03 ± 7.83	Decreased Weight

The mean and standard deviation scores of FEV_1 for male smoker's stands at 3.19 and 0.56 respectively while that of the male non-smokers are 3.73 and 0.16 respectively.

Research Question 2: To what extent does the FEV_1 of female non-smokers differ from that of the female smokers?

To answer this research question, FEV_1 measurements of forty (40) (that is, 20 male smokers and 20 male non-smokers) subjects

were taken and the mean computation is represented in table 1.
The mean and the standard deviation scores of FEV_1 for female smokers stand at 2.53 and 0.50 respectively.

Research Question 3: To what extent does the BMI of male smokers differ from that of the male non-smokers?
BMI measurement of sixty (60) (that is, 30 male smokers and 30 male non-smokers) subjects were taken in order to answer this research question and the mean computation is presented in table 1.
The mean and standard deviation scores of BMI for male smokers stand at 20.48 and 2.07 respectively while that of the male non-smokers are 23.17 and 1.76 respectively.

Research Question 4: To what extent does the BMI of female non-smokers differ from that of the female smokers?
BMI calculation of forty (40) (that is, 20 male smokers and 20 male nonsmokers) subjects were taken so as to answer this research question and the mean computation in presented in table 1.
The mean and standard deviation scores of BMI for female's smoker's stand at 19.99 and 1.43 respectively while that of the female non-smokers are 23.55 and 1.99 respectively.

Research Question 5: To what extent does the FEV of male Non-smokers of the ages 17-25 differ from that of the male smokers 26-38?

Research Question 6: To what extent dos the FEV of female non-smokers of the ages 17-25 differ from that of the female smokers 26-38?

Research Question 7: To what extent does the weight of male non-smokers differ from that of the male smokers?

In order to answer this research question, weight measurement of sixty (60) (that is, 30 male smokers and 30 non-smokers) subjects were taken and the mean computation is presented in table 1.
The mean and standard deviation scores of weight for male smokers stand at 58.40 and 4.01 respectively while that of the male non-smokers are 66.76 and 5.96 respectively.

Research Question 8: To what extent does the weight of female non-smokers differ from that of the female smokers?
In order to answer this research question, weight measurement of forty (40) (that is, 20 male smokers and 20 non-smokers) subjects were taken and the mean computation is presented in table 1.
The mean and standard deviation scores of weight for female smokers stand at 51.03 and 7.83 respectively while that of the female non-smokers are 62.00 and 6.17 respectively.

Research Question 9: To what extent does the FEV_1 of male smokers between the ages 17-25 differ from that of the male smokers of 26-38?
In order to answer this research question, FEV_1 measurement of thirty (30) (that is, 18 male smokers 0f 17-25yrs and 12 male smokers of 26-38yrs) subjects were taken and the mean computation is presented in table 1.

The mean and standard deviation scores of FEV_1 for male smokers between the ages of 17-25 stands at 3.59 and 0.17 respectively while that of the male smokers between the ages of 26-38 is 2.57 and 0.38 respectively.

Research Question 10: To what extent does the FEV_1 of female smokers between the ages 17-25 differ from that of the female smokers of 26-38?

The FEV_1 measurement of twenty (20) (that is, 13 female smokers and 7 female smokers) subjects were taken in order to answer this research question and the mean computation is presented in table 1.

The mean and standard deviation scores of FEV_1 for female smokers' stands at 2.87 and 0.16 respectively while that of the female smokers (26-38) is 1.90 and 0.26 respectively.

Testing of Hypotheses

The data collected are analyzed and the results are systematically presented with respect to generated and tested fourteen (14) null hypotheses in tables 2-5.

Hypothesis 1: There is no significance difference between the FEV_1 of male non-smokers and smokers.

To test this hypothesis, FEV_1 measurements taken on the 30 male smokers and 30 male non-smokers provide the data required. The data was analyzed and the result is represented in table 2.

Table 2: T-test Computation Summary of the Difference between Male and Female Non-smoker's and Smokers' FEV_1

	N	Mean/SD	Df	t-test cal	t-test crit	Remarks
Male non-smokers	30	3.73 ± 0.16	58	4.93	± 2.00	Significant P
Male smokers	30	3.19 ± 0.56				< 0.05
Female non-smokers	20	2.99 ± 0.13	38	3.89	± 2.021	Significant P
Female smokers	20	2.53 ± 0.50				< 0.05
Male smokers (17-25)	18	3.59 ± 0.17	28	9.53	± 2.042	Significant P
Male smokers (26-38)	12	2.57 ± 0.38				< 0.05
Female smokers (17-25)	13	2.87 ± 0.16	18	9.91	± 2.086	Significant P
Female smokers (26-38)	7	1.90 ± 0.26				< 0.05

The mean and standard deviation scores of male FEV_1 smokers and male non-smokers are represented in table 2. With N = 60, df = 58 and P < 0.05, the calculated t-ratio was 4.93 and the critical value of t-ratio was ± 2.00. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio.

The hypothesis (HO_1) is thus not accepted and the conclusion is that there is significant difference between the FEV_1 of male non-smokers and male smokers.

Hypothesis 2: There is no significance difference between FEV_1 of female smokers and non-smokers.

In order to test this hypothesis, FEV_1 measurements taken on the 20 female smokers and 20 female non-smokers provide

the data required. The data was analyzed and the result is represented in table 2.
The mean and standard deviation scored of female FEV_1 of smokers and female non-smokers are presented in table 2. With N = 40, df =38 and $P < 0.05$, the calculated t-ratio is statistically significant at 0.05 since it is greater than critical value of t-ratio. The hypothesis (HO2) is thus not accepted and the conclusion is that there is a significant difference between the FEV_1 of female smokers and female non-smokers.

Hypothesis 3: There is no significance difference between the FEV_1 of smokers of the age 17-25 and 26-38.
To test this hypothesis, FEV_1 measurements taken on the 12 male smokers of 17-25yrs and 18 male smokers of 26-28yrs provide the data required. The data was analyzed and the result is represented in table 2.
The mean and standard deviation scores of male FEV_1 of smokers (17-25yrs) and male smokers (26-38yrs) are presented in table 2. With N = 30, df =28 and $P < 0.05$, the calculated t-ratio was 9.53 and the critical value of t-ratio was ± 2.042. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio. The hypothesis (HO_3) is thus not accepted and the conclusion is that there is a significant difference between the FEV_1 of male smokers 17-25yrs and male smokers of 26-38yrs.

Hypothesis 4: There is no significance difference between the FEV_1 of female smokers of the age 17-25 and female smokers 26-38.
To test this hypothesis, FEV_1 measurements taken on the 13 female smokers of 17-25yrs and 7 female smokers of 26-28yrs provide the data required. The data was analyzed and the result is represented in table 2.
The mean and standard deviation scores of female FEV_1 of smokers (17-25yrs) and female non-smokers (26-38yrs) are presented in table 2. With N = 20, df =18 and $P < 0.05$, the calculated t-ratio was 9.91 and the critical value of t-ratio was ± 2.086. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio. The hypothesis (HO_4) is thus not accepted and the conclusion is that there is a significant difference between the FEV_1 of female smokers and female non-smokers.

Hypothesis 5: There is no significance difference between the BMI of male non-smokers and smokers.
To test this hypothesis, BMI calculation taken on the 30 male smokers and 30 male non-smokers provide the data required. The data was analysed and the result is represented in table 3.

Table 3: T-test Computation Summary of the Difference between Male and Female Smoker and Non-smokers BMI

	N	Mean/SD	df	t-test cal	t-test crit	Remarks
Male non-smokers	30	23.17 ± 1.76				Significant
Male smokers	30	20.48 ± 2.07	58	5.33	± 2.00	P < 0.05
Female non-smokers	20	23.55 ± 1.99				Significant
Female smokers	20	19.99 ± 1.43	38	5.87	± 2.021	P < 0.05
Male smokers (17-29)	21	21.90 ± 2.34				Significant
Male smokers (30-38)	9	19.33 ± 0.89	28	3.10	± 2.042	P < 0.05
Female smokers (17-29)	14	19.77 ± 1.26				Not Significant
Female smokers (30-38)	6	20.50 ± 1.56	18	1.04	± 2.086	P < 0.05

The mean and standard deviation scores of male BMI of non-smokers and male smokers are presented in table 3. With N = 60, df =58 and P < 0.05, the calculated t-ratio was 5.33 and the critical value of t-ratio was ± 2.00. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio. The hypothesis (HO_5) is thus not accepted and the conclusion is that there is a significant difference between the BMI of male smokers and male non-smokers.

Hypothesis 6: There is no significance difference between the BMI of female smokers and non-smokers.
To test this hypothesis, BMI calculation taken on the 20 female smokers and 20 male non-smokers provide the data required. The data was analysed and the result is represented in table 3.
The mean and standard deviation scores of female BMI of smokers and female non-smokers are presented in table 3. With N = 60, df =58 and P < 0.05, the calculated t-ratio was 5.87 and the critical value of t-ratio was ± 2.021. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio. The hypothesis (HO_6) is thus not accepted and the conclusion is that there is a significant difference between the BMI of female smokers and female non-smokers.

Hypothesis 7: There is no significance difference between the BMI of male smokers (17-29yrs) and smokers (30-38yrs).
To test this hypothesis, BMI calculation taken on the 21 male smokers (17-29yrs) and 9 male smokers (30-38yrs) provide the data required. The data was analysed and the result is represented in table 3. The mean and standard deviation scores of male BMI of smokers (17-29yrs) and male smokers (30-38yrs) are presented in table 3. With N = 30, df =28 and P < 0.05, the calculated t-ratio was 3.10 and the critical value of t-ratio was ± 2.042. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio. The hypothesis (HO_6) is thus not accepted and the conclusion is that there is a significant difference between the BMI of male smokers (17-29yrs) and male smokers (30-38yrs).

Hypothesis 8: There is no significance difference between the BMI of female smokers (17-29yrs) and smokers (30-38yrs).

To test this hypothesis, BMI calculation taken on the 14 female smokers (17-29yrs) and 6 female smokers (30-38yrs) provide the data required. The data was analysed and the result is represented in table 3.

The mean and standard deviation scores of female BMI of smokers (17-29yrs) and female smokers (30-38yrs) are presented in table 3. With N = 20, df =18 and P < 0.05, the calculated t-ratio was 1.04 and the critical value of t-ratio was ± 2.086. The calculated t-ratio is statistically not significant at 0.05 since it is less than the critical value of t-ratio. The hypothesis (HO_8) is thus accepted and the conclusion is that there is no significant difference between the BMI of female smokers (17-29yrs) and female smokers (30-38yrs).

Hypothesis 9: There is no significance difference between the weight of male non-smokers and smokers.
To test this hypothesis, weight measurement taken on the 30 male smokers and 30 male non-smokers provide the data required. The data was analysed and the result is represented in table 4.

Table 4: t-test Computation Summary of the Difference between Male and Female Smoker and Non-smokers Weight

	N	Mean/SD	Df	t-test cal	t-test crit	Remarks
Male non-smokers	30	66.76 ± 5.96	58	6.26	± 2.00	Significant
Male smokers	30	58.40 ± 4.01				P < 0.05
Female non-smokers	20	62.00 ± 6.17	38			Significant
Female smokers	20	51.03 ± 7.83	28	4.80	± 2.021	P < 0.05
Male smokers (17-29)	21	59.22 ± 4.45	18			Not Significant P
Male smokers (30-38)	9	58.36± 2.36		0.53	± 2.042	< 0.05
Female smokers (17-29)	14	59.23 ± 5.31				Not Significant
Female smokers (30-38)	6	55.87 ± 5.64		1.21	± 2.086	P < 0.05

The mean and standard deviation scores of male weight of non-smokers and male smokers are presented in table 4. With N = 60, df =58 and P < 0.05, the calculated t-ratio was 6.26 and the critical value of t-ratio was ± 2.00. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio. The hypothesis (HO_9) is thus not accepted and the conclusion is that there is a significant difference between the weight of male smokers and male non-smokers.

Hypothesis 10: There is no significance difference between the weight of female non-smokers and smokers.

To test this hypothesis, weight measurement taken on the 20 female smokers and 20 female non-smokers provide the data required. The data was analyzed and the result is represented in table 4.

The mean and standard deviation scores of female weight of non-smokers and male smokers are presented in table 4. With N =

40, df =38 and P < 0.05, the calculated t-ratio was 4.80 and the critical value of t-ratio was ± 2.021. The calculated t-ratio is statistically significant at 0.05 since it is greater than the critical value of t-ratio. The hypothesis (HO_{10}) is thus not accepted and the conclusion is that there is a significant difference between the weight of female smokers and female non-smokers.

Discussion and Conclusion

In the course of the study, the researcher measured the FEV_1 of smokers and non-smokers with relation to their Weight and BMI. The findings of this study with respect to the answered research questions and tested hypothesis are discussed as follows:

The nature of FEV_1 values of the smokers and non-smokers

Since the mean scores of male smoker's FEV_1 is 0.31 less than the proposed minimal 3.50 normal FEV_1 average point and that of the male non-smoker is higher by 0.23 of the normal 3.50 FEV_1 average point for males, this researcher therefore concludes that male smokers have abnormal FEV_1 while male non-smokers have normal FEV_1. Again, since the mean score of female smokers FEV_1 is 0.46 less than the non-smokers and that of the non-smokers is equal to the proposed 3.00 value of female FEV_1 this researcher therefore concludes that female smokers have abnormal FEV_1 while female non-smokers have normal FEV_1.

Based on these results, the researcher discovered that the FEV_1 value of the smokers and non-smokers determine whether they are easily prone to lung disease or not. It was also discovered that there is a significant difference in the stated FEV_1 values of the smokers and the non-smokers. This research is in line with the research carried out by the Scottish health survey (1998) and Baralajah et al (1985). The Scottish health survey revealed that there is a tendency for the FEV_1 to decrease progressively from those who never regularly smoked to those who currently smoked 20 or more cigarette a day which according to the research, prevalent in both sexes with marked difference for those aged 45-74 than in younger people.

According to Bohadana, et al (2005), individuals exposed both to cigarette smoke and respiratory pollutants at work incurred a greater risk of development of airway.

REFERENCES

Anthonisen N.R, Skeans M.A., Wise R.A, Manfreda J, Kanner R.E, Conet J.E (2005). The Effects of a Smoking Cessation intervention on 14.5-Year MortaIity. A Randomized CIinical triaI for the Lung Health Study Research Group.

Aslm, K. et al (2010). Comparism of forced expiratory volume in one second among asymptomatic smokers and nonsmokers. J Pak med Assoc. 28´127. Vol 23.

Behara J.K et al (2013). Heart rate variability and its correlation with pulmonary function test of smokers. PIMD: 23580921.

Bohadana A.B, Nilsson F, Westin A, Martinet N, Martinet Y (2005). Smoking Cessation-But not Smoking

Reduction-improves the Annual Decline in FEV1 in Occupationally Exposed Workers, Faculty of Medicine, Services of Pheumology (France).

Chinn S, Jarvis D, Melotti R, Luczynska C, Ackemann-Liebrich U, Anto JM, Cerveri l, de Marco R, Gislason T, Heinrich J, Janson C, Kunzli N, Leynaert B, Neukirch F, Schouten J, Sunyer J, Svanes C, Vermeire P, Wjst M, Burney P. (2005). Smoking Cessation, Lung Function, and Weight Gain: A Follow-Up Study, Department of Public Health Sciences, King's College London, London UK.

Dales R.E, Vandemheen K.L, Clinch J, Aaron SD. (2005). Spirometry in the Primary Care Setting infIuence on Clinical Diagnosis and Management of Airflow Obstruction, Department of Medicine, University of Ottawa, Ottawa, ON, Canada.

Luffi, M.F (2017). Physiological significance of lung volume measurement. Multidisciplinary Medicine .12:3

Thomas L.P (2005). Importance of Spirometer Tests; The Journal for Respiratory Care Practitioners, Faculty of Health, Center for Health Sciences Education, University of Colorado School of Medicine, Denver.

Torres A, Utell M.J, Morow P.E, Voter K.Z, Whitin J.C, Cox C, Looney R.J, Speers D, Tsai Y, Frampton W.M (1997). Airway Inflammation in Smokers and Nonsmokers with Varying Responsiveness to Ozone, Departments of Medicine, Environmental Medicine, Pediatrics, and Biostatistics, University of Rochester School of Medicine, Rochester, New York.

Routbi S, et al (2015). Smoking and lung function I elderly men and women. The cardiovascular Health Study. Tunis Med PMiD.2675750.