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Original Article

The Peak Expiratory Flow Rates of Petrol Station Attendants in Nnewi Using a Wright Peak Flow Meter

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ABSTRACT

This is a study on peak expiratory flow rates (PEFR) of petrol station attendants using a Wright peak flow metre, conducted on 30 petrol station attendants within Nnewi town, Anambra State and 20 control (students of college of health sciences, Nnamdi Azikiwe University, Nnewi Campus) based on inclusion/exclusion criterion. The objective of this study is to investigate the effect of petroleum on the peak expiratory flow rate (PEFR) of petrol station attendants and also check if this effect increases or decreases with exposure time and correlate the effect with lifestyle parameters of the petrol attendants. 30 questionnaires were distributed with a 1005 return rate. Peak flow meter, weighing scale, standiometer were used for preliminary measurements. Subjects were instructed to expire maximally into the peak flow meter after the procedure was demonstrated to them. The breathing manoeuvre was carried out three times and then the peak flow reading recorded. The study revealed that mean PEFR of the test group was 379.83 (P-value 0.091) and PEFR of control was 416.00. This study shows a statistically insignificant P-value (P>0.05), although it shows there was a change in the mean PEFR of test group and control. This study is contrary to earlier reports on PEFR of petrol station attendants, though this difference can be attributed to the small sample population use for this experiment. This study shows a statistically insignificant P-value (P>0.05), although it shows there was a change in the mean PEFR of test group and control. Suggestions for further studies and recommendation is geared towards conducting a follow up research on a larger sample population to assess level of significance of findings in this experiment.

Key words: Peak Expiratory Flow Rate, Petrol Station Attendants, sample population, standiometer, scale.

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1. INTRODUCTION

Premium motor spirit (PMS) popularly called petrol in this part of the world is a complex mixture of

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hydrocarbons, produced by mixing fractions obtained from the distillation of crude oil with brand specific additives to improve performance. PMS is transparent petroleum derived oil that is used primarily as a fuel in combustion engines. It consists mostly of organic compounds obtained by the fractional distillation of petroleum and enhanced with a variety of additives [1].

PMS is mainly used as a fuel for light road vehicles e.g. cars, motorbikes, and small van, and also small appliances like lawnmowers, generators, cement mixers, etc. In small engines, petrol is mixed with oil to produce a fuel mixture that reduces engine wear. [1]

The lung is the essential respiration organ in many air breathing animals, including most tetrapods, a few fishes and some snails.In mammals, the lungs are located near the backbone on either side of the heart. Their principal function is to transport oxygen from the atmosphere into the bloodstream and to release CO_2 from the bloodstream into the atmosphere. [2] The lungs of mammals have a soft, sponge like texture and are honeycombed with epithelium having a much larger surface area than the outer surface area of the lungs itself.

Breathing is driven by the muscular diaphragm at the bottom of the thorax. Contraction of the thorax pulls the bottom of the cavity in which the lung is enclosed downward, increasing volume and thus decreasing pressure causing air flow into the airways.Air enters through the oral and nasal cavities, flows through the pharynx then the larynx and into the trachea which branches out into the main bronchi and then subsequent divisions. [2]

2. SUBJECTS, MATERIALS AND METHOD

2.1 Area of Study

This research project was carried out in Nnewi, Anambra state. The data was obtained from petrol station attendants living in Nnewi town (as subjects) and students of College of Health Sciences Nnamdi Azikiwe University in Okofia village; a rural area of Nnewi North Local Government Area in Anambra state (as control).

2.2 Duration of Study

The testing of subjects using PEAK FLOW METER lasted for 1 week.

2.3 Sample Size

A rural community (Okofia Otolo, Nnewi) was selected by sampling. A sample of 30 male/female subjects (PSA'S) that are between the ages of 18-40 years and 20 controlswere used for this study.

2.4 Exclusion criteria

Subjects with ailments such as, haemoptysis, pneumothorax, recent heart attack, unstable angina, aneurysm and thrombotic conditions were excluded from this research. Also subjects that are very young, unresponsive and physically impaired were also excluded from this study.

2.5 Materials

The following materials were used, Peak flow metre, Weighing scale, Standiometre, Questionnaire, Recording tool, Cotton wool and Methylated spirit.

2.6 Method

The subject's age, gender, and race are recorded and height and weight are measured before the procedure begins. Also, smoking habits and history as well as patients lifestyle was thoroughly documented. Subjects were advised not to eat heavily within three hours of the test. Subjects were advised to wear loose fitting clothing over the chest and abdominal area. Breathing maneuvers was explained and demonstrated for the subjects. Subjects were then made to practise breathing into the mouthpiece until they can duplicate the maneuvers successfully on three consecutive attempts. [1]

2.7 Questionnaire

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Questionnaires were shared to both subjects and control.

2.8 Treatment

The subjects were divided into two groups (A and B) by random selection. Group A comprises of 30 subjects, while group B would comprises of 20 subjects. Group A served as the test group (petrol station attendants), while group B served as control (randomly selected students of College of Health Sciences).

However, for both groups, age, gender, race, height, weight, lifestyle habits and diet were thoroughly assessed and documented.

3. RESULTS

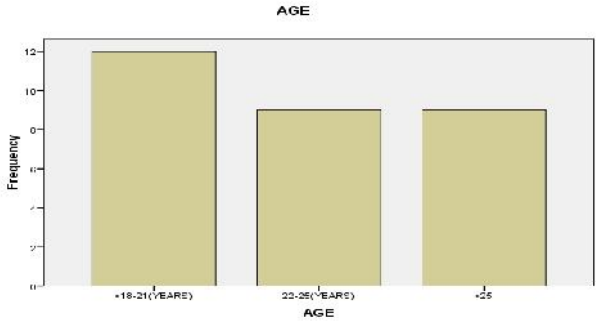

Fig 3.1: Showing the ages of the subjects used in the experiment and their frequencies

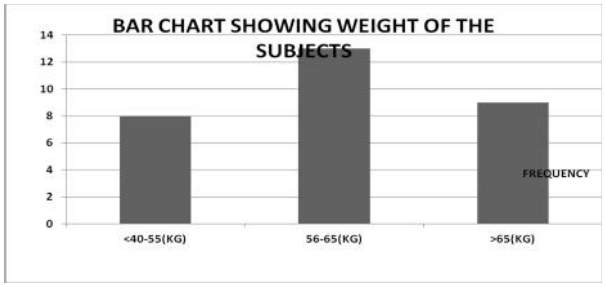

Fig 3.2: Represents the weight distribution of subjects used in the experiment

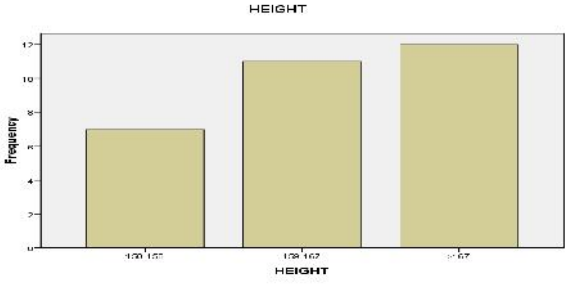

Fig 3.3: Represents the height distribution of subjects used in the experiment

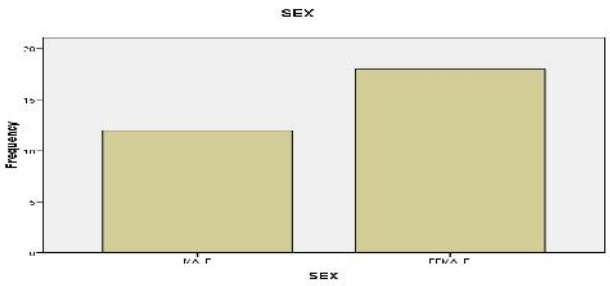

Fig 3.4:Represents the gender distribution of subjects used in the experiment

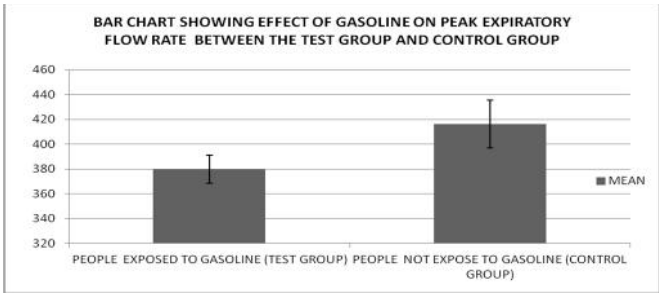

Fig 3.5: Effect of gasoline on peak expiratory flow rate between the test group and control group

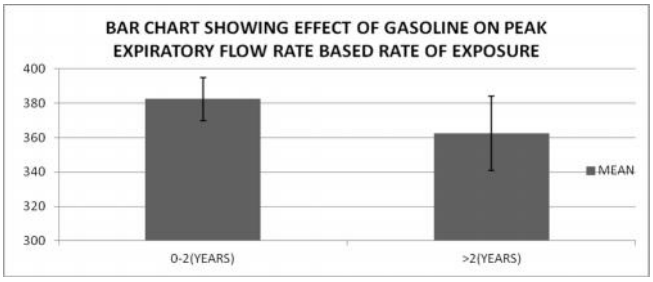

Figure 3.6: Effect of gasoline on peak expiratory flow rate based rate of exposure

Figure 3.5 shows a comparison of the peak expiratory flow rates (PEFR) of people exposed to gasoline (TEST GROUP) and people not exposed to gasoline (CONTROL). From the figure, it can be seen that the mean PEFR of the test group is 379.83 while the mean PEFR of control is 416.00. The result shows that statistically there was a change in the PEFR of the test group when compared with the control group. However, the change is statistically insignificant (P-value >0.05).

Figure 3.6: Shows the effect of gasoline on the PEFR of the test group based on their years of exposure. From the experiment, the years of exposure of the petrol station attendants (PSA'S) was between (0-2yrs) and (>2yrs). From this figure, it can be seen that the

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mean PEFR of subjects who were exposed to gasoline between (0-2yrs) was 382.50, while those who were exposed to gasoline for more than 2yrs (>2yrs) had a mean PEFR of 362.50. This also shows that there was a change in the mean PEFR of the subjects based on their years of exposure, but the change this time was also insignificant (P-value >0.05).

4. DISCUSSION

4.1 Effect of petroleum on the peak expiratory flow rates of petrol station attendants (test group) and control group

From this research finding, there was a slight change in the mean peak expiratory flow rates of the test group and the control group (379.83 and 416.00) respectively. However, the change was statistically insignificant (P-value 0.091). This is contrary to a research conducted to assess the effect of petroleum on the peak expiratory flow rates of depot workers, petrol station attendants and control group. [3] The difference between this research and the report could be due to the sample size used for this experiment, as though there was a change in the PEFR of the control group and the test group but an insignificant change.

4.2 Effect of petroleum on the peak expiratory flow rates of the petrol station attendants (test group) based on years of exposure to petroleum

From the result of this research, there was also a change in the mean PEFR of the test group based on their years of exposure. The mean PEFR was shown to decrease with increased years of exposure. However, this change was also statistically insignificant (P-value 0.552). This is also contrary to the report by sofoola*et al.*,(2005) and Akor-Dewu*et al.*,(2008)[3, 4] who carried a research to assess pulmonary function tests amongst adult male petrol station attendants. The difference between this research and earlier reports could also be partly due to the sample size used, as indeed there was a change showing an inverse relationship between PEFR and years of exposure amongst the petrol station attendants, but the change was also insignificant (P-value >0.05).

4.3 Effect of lifestyle parameters on the PEFR of the test group (petrol station attendants)

4.3.1 PEFR versus smoking

From the result of this research, when the PEFR of petrol station attendants (test group) was correlated with smoking, it showed a negative/inverse relationship. This shows that increased smoking would lead to a decrease in the peak expiratory flow rate. However, the relationship was a weak negative coefficient of correlation (r=-0.124) and therefore was statistically insignificant (P- value 0.514). This also can be attributed to the sample population that was used for this experiment.

4.3.2 PEFR versus alcohol consumption

When the PEFR was correlated with alcohol consumption, it also showed an inverse relationship. This shows that increased consumption of alcohol would lead to a progressive decrease in the PEFR and vice versa. However, the relationship was also a weak negative relationship, with correlation coefficient(r -0.276) and therefore was statistically insignificant also (P-value 0.139).

4.3.3 PEFR versus exercise

From this research also, when the PEFR was correlated with whether the subjects were exercising, it showed a positive relationship. This shows or means that increase in exercise would also lead to an increase in PEFR. The relationship was however a weak positive relationship (r 0.195) and a P-value (0.301) showing that the relationship was also statistically insignificant. This also can be attributed to the small sample size used for this experiment, as though a positive relationship was seen, it was however a weak positive relationship.

4.3.4 PEFR versus BMI

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From this experiment, when BMI was correlated with PEFR of the test group an inverse relationship was observed. This means that an increase in one would lead to a decrease in the other and vice versa. Thus, increase in BMI would result to a decreased PEFR and vice versa. From the result however, the relationship observed or seen was a weak negative relationship (r= -0.332) and P-value >0.05 (0.073) showing it to be statistically insignificant. Again, this could be due to the sample size used for this experiment.

4.3.5 PEFR versus years of exposure

Results from this experiment showed that PEFR when correlated with years of exposure to petroleum has an inverse relationship. This means that an increase in the years or time of exposure to petroleum would contribute to a decrease in the PEFR. This is in accordance with earlier reports by Okoro*et al.*,(2006), Udonwa*et al.*,(2009) and Sofoola*et al.*,(2005)[5, 6, 3]. However, this experiment shows a weak negative inverse relationship, with correlation coefficient (r -0.113) and an insignificant P-value (0.552), contrary to earlier reports by researchers. This difference in statistical significance can be attributed therefore to the small sample size used for this experiment compared to the sample sizes used in other experiments.

5. CONCLUSION

In conclusion, this study suggests that the PEFR of petrol station attendants is lower than the PEFR of the normal population (control group). Though statistically insignificant, a follow up study is needed to test the level of significance using a larger sample population.

Also, the study suggests that the PEFR of petrol station attendants would decrease with increase in years of exposure to petroleum. Likewise, the study suggests that life style habits like smoking and alcohol consumption would lead to a decrease in the PEFR of petrol station attendants.

Conversely, the study suggests that exercise has a positive relationship with PEFR, thus an increase in frequency of exercise would lead to increase in PEFR.

Lastly, the research also shows that the PEFR of petrol station attendants would decrease with increase in the years of exposure to petroleum.

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