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# EFFECT OF PEAK EXPIRATORY FLOW RATE AND BLOOD PRESSURE ON OBESITY AMONGST THE POPULACE IN OKRIKA

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## ABSTRACT
Effect of peak expiratory flow rate and blood pressure on obesity has increased across the globe and care must be taken to reduce the trend. Results shows that 72.7% of the male and 70.0% of the female had normal blood pressure (BP) while 27.3% of the male and 30.0% of the female had abnormal (increased BP) blood pressure. Peak expiratory flow rate for obesed subjects had mean 351.60±26.25 and 427.22±43.73 for non-obesed. The obesed subjects had systolic BP mean 137.37±12.06 and non obesed 115.41±10.71 and diastolic BP 82.84±9.23 for obesed and 77.15±8.15 for non-obesed. The body mass index (BMI) of obesed subjects had mean 35.28±4.72 and 22.64±3.05 for non-obesed. Also, the study shows that the mean age for obesed subjects is 39.68±9.86 and 37.85±12.02 for non-obesed subjects. The study shows that 52 subjects were engaged and 37 of them had normal BP and 15 had abnormal BP. 13 out of the 15 subjects that had abnormal BP were obesed and 2 were non-obesed.

**KEYWORDS:** Effect, Peak Expiratory Flow Rate, Blood Pressure, Okrika.

## INTRODUCTION
Obesity is a major concern among people in developed, developing and under-developed countries across the globe and predisposing people to several disease conditions which could lead to complications and sometime death may ensued.

Overweight and obesity are significantly linked with health conditions like occupational injuries, attention deficit, asthma, hypertension, diabetes mellitus, coronary artery disease and breast cancer, (He et al. 2014). Obesity may be understood as an accumulation of excessive fat overtime, thus constituting severe health problems (Niehues et al. 2014; Rossouw et al. 2012). Several African nations are passing, technological, nutritional and economic transitions, which have led to marked lifestyle changes characterised by physical inactivity, overweight and obesity (Pangani et al. 2016). It is also known that antecedents of obesity originate from childhood and progress into adulthood (Musa et al. 2012), which suggest the need for immediate prevention and management of the disease (Pangani et al. 2016).

Studies done shows that there is decline in the teaching of Physical Education in several countries (UNESCO 2013; Kohl III and Cook 2013; Ng and Popkin 2012). This declined in teaching Physical Education in Schools could seriously hinder children's opportunity to be physically active as spent most times in school.

Body mass index (BMI) was classified as follows: overweight, BMI of 25–29.9 kg/m$^2$; and obesity, BMI of ≥30 kg/m$^2$ (WHO, 1995).

Peak expiratory flow rate is an important parameter in pulmonary function investigation that has evolved as a clinical tool for diagnosis, management and follow up of respiratory diseases (Bandyopadhyay et al, 2007; Bandyopadhyay et al, 2013; Bandyopadhyay 2011).

Adult's weight gain seems to be an important risk factor for the development of hypertension (Goldstein 1992; Pi-Sunyer 1993; and Bosello et al, 1997). Many studies have linked an increase in body weight with increased tendency to develop cardiovascular disease (Friedman et al, 1988; Yong et al, 1990 and Huang et al, 1998).

## MATERIALS AND METHOD
A total of 52 subjects were engaged for the study that lasted for 4 weeks in Okrika communities. The aim of

the study is to investigate the effect of peak expiratory flow rate and blood pressure on obessed. The subjects were told to sit down comfortably to avoid error before taking the readings. Data analysis were done using SPSS and $p < 0.05$ was significant.

Blood pressure monitor was used for the measurement of blood pressure. The subjects were told to rest for 30 minutes and to obtain resting blood pressure (Ibu et al, 2006). The armlet was wrapped around the arm (above the elbow) ensuring that the cuff covers the medial side of the brachial artery and thereafter, the hand bulb of the monitor was compressed to inflates the pressure cuff up to a pressure 180-200 mmHg to ensure that the brachial artery was compressed and occluded. The cuff pressures were then gradually reduced and the systolic, diastolic and the pulse rate were separately indicated on the digital indicator (screen) and thereafter, recorded on the questionnaire.

The peak expiratory flow rate was measured with Wright peak expiratory flow meter. The mouthpiece of the peak flow meter was cleaned with cotton wool soaked in methylated spirit. Thereafter, the subjects were required to sit down and hold the flowmeter by the handle. The subjects were informed to place the mouthpiece of the flowmeter in his or her mouth, sealing its circumference with the lips and inhaled deeply, and thereafter, exhale as forceful as possible. Readings were taken as shown on the calibrated scale in litres per minute. Two trials were allowed before the final readings were taken and recorded on the questionnaire.

The subjects body mass index (BMI) were estimated using the formula BMI =

$$\frac{\text{Weight (kg)}}{\text{Height}^2\ (\text{m}^2)}$$

**RESULTS**

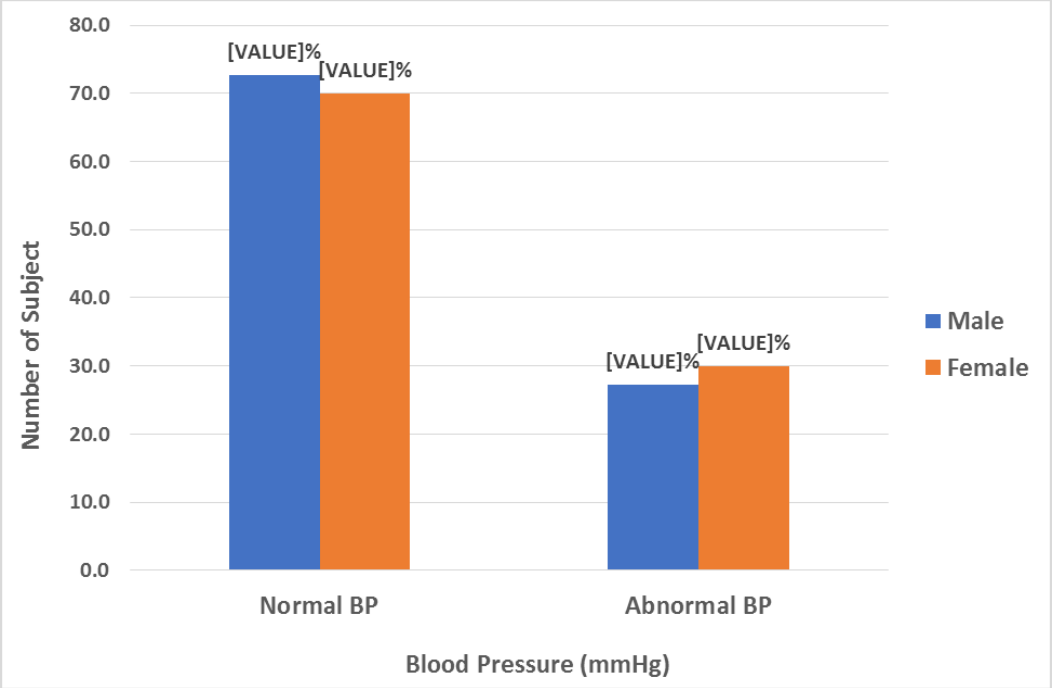


**Figure 1: Distribution of subjects according to blood pressure**

**Table 1: Descriptive statistics of the measured parameters.**

| Variables | MALE [N = 22] | | | FEMALE [N = 30] | | | TOTAL [N = 52] | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean±SD | Min | Max | Mean±SD | Min | Max | Mean±SD | Min | Max |
| Age (years) | 40.68±10.86 | 22.00 | 56.00 | 37.30±11.00 | 22.00 | 56.00 | 38.73±10.96 | 22.00 | 56.00 |
| SBP (mmHg) | 126.95±16.55 | 100.00 | 162.00 | 125.23±15.47 | 100.00 | 152.00 | 125.96±15.80 | 100.00 | 162.00 |
| DBP (mmHg) | 77.55±10.76 | 56.00 | 96.00 | 81.60±7.31 | 60.00 | 96.00 | 79.88±9.07 | 56.00 | 96.00 |
| PEFR | 394.32±55.98 | 300.00 | 480.00 | 388.33±50.59 | 300.00 | 460.00 | 390.87±52.48 | 300.00 | 480.00 |
| BMI (kg/m$^2$) | 28.58±8.58 | 16.22 | 44.15 | 28.82±6.71 | 18.37 | 44.06 | 28.72±7.48 | 16.22 | 44.15 |

***SBP** = Systolic Blood Pressure, **DBP** = Diastolic Blood Pressure, **BMI** = Body Mass Index, **PEFR** = Peak Expiratory Flow Rate, **N** = Number of Subjects, **Min** = Minimum, **Max** = Maximum, **SD** = Standard Deviation.*

**Table 2: Descriptive statistics of the measured parameters according to blood pressure.**

| Variables | Blood Pressure (mmHg) | N | Mean | SD | T-test | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Df | t-value | p-value | Inference |
| Age (years) | Normal BP | 37 | 37.27 | 11.22 | 50.00 | -1.53 | 0.13 | Not Significant |
| | Abnormal BP | 15 | 42.33 | 9.73 | | | | |
| SBP (mmHg) | Normal BP | 37 | 118.05 | 10.66 | 41.20 | -11.20 | **0.00** | **Significant** |
| | Abnormal BP | 15 | 145.47 | 6.62 | | | | |
| DBP (mmHg) | Normal BP | 37 | 76.11 | 7.35 | 50.00 | -6.22 | **0.00** | **Significant** |
| | Abnormal BP | 15 | 89.20 | 5.45 | | | | |
| PEFR | Normal BP | 37 | 405.81 | 50.35 | 50.00 | 3.58 | **0.00** | **Significant** |
| | Abnormal BP | 15 | 354.00 | 38.32 | | | | |
| BMI (kg/m$^2$) | Normal BP | 37 | 26.68 | 7.36 | 50.00 | -3.39 | **0.00** | **Significant** |
| | Abnormal BP | 15 | 33.74 | 5.14 | | | | |

***SBP*** *= Systolic Blood Pressure,* ***DBP*** *= Diastolic Blood Pressure,* ***BMI*** *= Body Mass Index,* ***PEFR*** *= Peak Expiratory Flow Rate,* ***N*** *= Number of Subjects,* ***MD*** *= Mean Difference,* ***SEMD*** *= Standard Error of Mean Difference,* ***df*** *= degree of freedom.*

**Table 3: Descriptive statistics of the measured parameters according to body mass index (BMI).**

| variables | BMI (kg/m$^2$) | N | Mean | SD | T-test | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Df | t-value | p-value | Inference |
| Age (years) | Non-Obese | 27 | 37.85 | 12.02 | 49.31 | -0.60 | 0.55 | Not Significant |
| | Obese | 25 | 39.68 | 9.86 | | | | |
| SBP (mmHg) | Non-Obese | 27 | 115.41 | 10.71 | 50.00 | -6.95 | **0.00** | **Significant** |
| | Obese | 25 | 137.36 | 12.06 | | | | |
| DBP (mmHg) | Non-Obese | 27 | 77.15 | 8.15 | 50.00 | -2.36 | **0.02** | **Significant** |
| | Obese | 25 | 82.84 | 9.23 | | | | |
| PEFR | Non-Obese | 27 | 427.22 | 43.73 | 50.00 | 7.48 | **0.00** | **Significant** |
| | Obese | 25 | 351.60 | 26.25 | | | | |
| BMI (kg/m$^2$) | Non-Obese | 27 | 22.64 | 3.05 | 40.61 | -11.38 | **0.00** | **Significant** |
| | Obese | 25 | 35.28 | 4.72 | | | | |

***SBP*** *= Systolic Blood Pressure,* ***DBP*** *= Diastolic Blood Pressure,* ***BMI*** *= Body Mass Index,* ***PEFR*** *= Peak Expiratory Flow Rate,* ***N*** *= Number of Subjects,* ***SD*** *= Standard Deviation,* ***df*** *= degree of freedom.*

**Table 4: Test of association between blood pressure (BP) and body mass index (BMI)**

| Blood Pressure (mmHg) | BMI (kg/m$^2$) | | | Chi-square analysis | | | |
|---|---|---|---|---|---|---|---|
| | Non-Obese (%) | Obese (%) | N (%) | Df | $X^2$ | p-value | Inference |
| Normal BP | 25 (67.6) | 12 (32.4) | 37 (100) | 1 | 12.58 | **0.001** | **Significant** |
| Abnormal BP | 2 (13.3) | 13 (86.7) | 15 (100) | | | | |
| Total | 27 (51.9) | 25 (48.1) | 52 (100) | | | | |

***BP*** *= Blood Pressure,* ***BMI*** *= Body Mass Index,* ***N*** *= Number of Subjects,* $X^2$ *= Chi-square,* ***df*** *= degree of freedom.*

## DISCUSSION

Obesity is a phenomenon that cut across virtually every ethnic groups across the world and could results from factors like racial, genetic, drug, alcohol, education and socio-economic.

The study shows that there is an increase in the mean value of both the systolic and diastolic blood pressure of obese subjects as compare to the non-obese subjects (Table 3). Our study revealed that 52 subjects participated, and 37 subjects had normal blood pressure and 15 had abnormal blood pressure (increase in blood pressure). 86.7% of the subjects that have increased in blood pressure (abnormal BP) are obese and 13.3% of the subjects are non-obese (Table 4). Also, the study revealed that 32.4% of the subjects with normal blood pressure are obese and 67.6% of the subjects are non-obese (Table 4). This study agreed with studies by (Behjati et al. 2015; Dua et al. 2014; Aliyu et al. 2014; Souza et al. 2010) that body mass index is significantly correlated with systolic blood pressure and diastolic blood pressure.

Again, our study shows that the mean value 351.60 for peak expiratory flow rate for obese subjects decreased and the mean value 427.22 for peak expiratory flow rate for non-obese increased (Table 3). This agrees with study by Gonen et al (1987) peak expiratory flow rates are decreased in obese subjects without any evidence of obstructive airway disease and according to study by Zerah et al (1998), it could be increased pulmonary blood volume in obese persons resulting to congestion of bronchial vessels in the airway submucosa, thickening of airway wall and decrease in airway size.

The study also revealed that the mean value 354.00 of peak expiratory flow rate for subjects with abnormal blood pressure decreased and mean value 405.81 of peak expiratory flow rate for subjects with normal blood pressure increased (Table 2). Also, the mean value 33.74 of the body mass index of subjects with abnormal blood pressure increased and the mean value 26.68 of the body mass index of subjects with normal blood pressure decreased (Table 2).

Also, the mean value 35.28 of the body mass index (BMI) of obese subjects increased and the mean value 22.64 of the body mass index of non-obese subjects decreased (Table 3).

This study revealed that the peak expiratory flow rate of the non-obese subjects increased and the peak expiratory flow rate of the obese subjects decreased.

Also, the study shows that the blood pressure (systolic and diastolic) of the obese subjects increased and that of their non-obese counterparts decreased. Also, the peak expiratory flow rate of subjects with normal blood pressure increased and the peak expiratory flow rate of subjects with abnormal blood pressure decreased.

## CONCLUSION

Obesity is a phenomenon that affect virtually every ethnic groups across the world and this study revealed that peak expiratory flow rate (PEFR) and blood pressure (BP) affect people that are obese as peak expiratory flow rate in obese subjects decreased and blood pressure of obese subjects increased respectively.

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