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The Correlation between the Overweight and Obesity as Predisposing Risk Indicators to Cardiometabolic Disorders among Adults in Kisumu County Nyanza Region of Kenya

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ABSTRACT

BACKGROUND

Lifestyle is broadly defined as the way or manner by which a person or a group of people lives. However, lifestyle can be influenced by a complex set of factors that are intertwined and can affect the quality of living and health [1].The socioeconomic position (SEP) stands out among these factors because it has a direct impact on the quality of nutrition and the living environment, including access to adequate physical activity facilities and education. Consequently, a comprehensive view must be adopted whenever addressing this topic but a majority of studies tend to focus in this area in a fragmented manner.

Aim: To find out correlation between the overweight and obesity as predisposing risk indicators to cardio metabolic disorders among adults in Kisumu County Nyanza region of Kenya.

Methodology: This was a cross-sectional quantitative study among Western Kenya population, where the participants were randomly selected from type II diabetic adult patients 18 years and above attending diabetes clinic in selected district hospitals in Western Kenya. Pretested Questionnaire was used to collect the data. Blood pressures, anthropometric measurements, height, weight, waist circumference were taken.

Results: The sample size was 202. Most of the participants (48%) were aged 36-50 years, 129(64%) were females, most (55.4%) of the participants were Obese while 26.7% had a healthy weight. The females who had a waist-to-hip Ratio of over 0.8 were classified as centrally obese (55%) while 49% of the males had a waist-to-hip Ratio of 0.9, which was also classified as central obese. Most of the participants were hypertensive (60%) while 9% had hypertensive emergencies.

Conclusions: The participants had mostly two indicators of cardio metabolic disorders present and obese among the study population in this study, our results point to the need for measures to prevent and treat obesity in this and other high-risk groups.

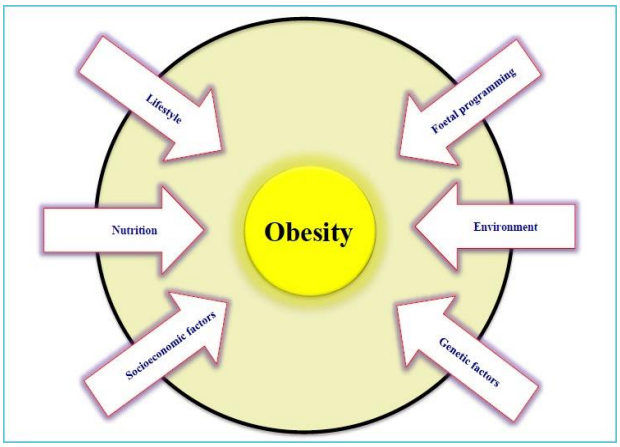
Keywords: Overweight, Obesity, Cardiometabolic Risk Markers, Correlation

INTRODUCTION

The prevalence of obesity is known to vary significantly across the world. It is therefore important to design region-specific public health policies; this requires the collection of epidemiological data relating to obesity from different geographical areas. Although previous observations have reported the prevalence of obesity in Kenyan urban areas like Kisumu city in Kisumu County is on rise, the criteria used to define obesity in these previous articles might not be appropriate for the Kenyan population[2].Moreover, these previous articles described the prevalence of general obesity (general obesity only + combined obesity) and central obesity (central obesity only + combined obesity) but did not focus upon the prevalence of combined obesity. Consequently, these previous studies were unable to define the overall obesity rate. Based on a large sample size, the present study provides a recent and representative depiction of obesity in the urban Kenyan population, including prevalence and associated factors, and it clarifies the influence of different types of obesity upon different comorbidities[3]. Despite the poor prognosis of dieting in obesity management, which often results in repeated attempts at weight loss and hence weight cycling, the prevalence of dieting has increased continuously in the past decades in parallel to the steadily increasing prevalence of obesity [4].However, dieting and weight cycling are not limited to those who are obese or overweight as substantial proportions of the various population groups with normal body weight also attempt to lose weight [5].These include young and older adults as well as children and adolescents who perceive themselves as too fat (due to media, parental and social pressures), athletes in weight-sensitive competitive sports (i.e. mandatory weight categories, gravitational and aesthetic sports) or among performers for whom a slim image is professionally an advantage [6].Of particular concern is the emergence of evidence that some of the potentially negative health consequences of repeated dieting and weight cycling are more readily seen in people of normal body weight rather than in those who are overweight

or obese[7]. In particular, several metabolic and cardiovascular risk factors associated with weight cycling in normal-weight individuals have been identified from cross-sectional and prospective studies as well as from studies of experimentally induced weight cycling [8].In addition, findings from studies of experimental weight cycling have reinforced the notion that fluctuations of cardiovascular risk variables (such as blood pressure, heart rate, sympathetic activity, blood glucose, lipids and insulin) with probable repeated overshoots above normal values during periods of weight regain put an additional stress on the cardiovascular system [9].As the prevalence of diet-induced weight cycling is increasing due to the opposing forces of an 'obesigenic' environment and the media pressure for a slim figure (that even targets children), dieting and weight cycling is likely to become an increasingly serious public health issue[10].

The prevalence of adult obesity is rapidly increasing and presents a major public health concern in developed and developing countries, and assessment of obesity is of utmost importance to adults [11].However, there are varying definitions of obesity in children and adolescents, then adulthood along with ethnic-specific variations in body fat content and distribution, which complicate this undertaking. Moreover, these divergences may explain prevalence dissimilarities associated with cardio metabolic diseases (CMD) (e.g. insulin resistance, hypertension, dyslipidemia and diabetes) in adulthood [12].In the context of epidemiological studies, body mass index (BMI, weight/height2) in adults is currently considered as a diagnostic test (separator variable) which is able to identify overweight (25 kg/m2) and obese (30 kg/m2) individuals and may predispose to increased CMD risk, morbidity and mortality [13].However, no similar definite values can be used in childhood and adolescence because of the substantial changes in BMI, which occur naturally from birth to adulthood, and because of the limited data in youth that relate BMI trajectory to cardiovascular events later in life [14].Age- and sex-specific BMI cut-offs were developed to define overweight and obese using different nationally representative age- and sex-specific data sets, following recommendations from the International Obesity Task Force. Secular trends demonstrate that the prevalence has plateaued in some countries or even decreased, but has continued to rise in others, independent of how overweight and obesity are defined in childhood. The apparent contradiction could partially depend on the span of the retrospective studies and on the years included. Nevertheless, the present high number of young adults with the stigmata of the metabolic syndrome (MetS), and the related non-alcoholic fatty liver disease (NAFLD) justifies that it be considered a major world public health issue [15].



In addition to the risk factors previously dis-cussed, genetic background and foetal pro-gramming through epigenetic modifications are equally important in the development of obesity and related diseases. There is also increasing evidence suggesting synergetic effects between gene variant loci involved in metabolic traits and dietary or lifestyle factors [16],compiled data from more than 25,000 twin pairs and 50,000 biological and adoptive family members and reported that genetic components contribute 40-70% to the obesity and cardio metabolic disorders: risk factors and biomarkers inter-individual variability in common obesity. Another study showed that parental obesity doubled the risk of adult obesity among both obese and non-obese children less than 10 years of age. Few studies have investigated the gene-environment interactions related to sedentary behaviour using large cohorts. To date, genome wide association studies (GWAS) have provided evidence for a number of gene variants associated with the development of obesity in, Cardio metabolic associated risk indicators is now a worldwide epidemic, with an estimated 57.8% of adults worldwide expected to be exposed to the risk indicators by 2030 according to figures released by the World Health Organization (WHO) 2022. Obesity which is characterized by an excessive accumulation of body fat that gives rise to significant cardio metabolic associated risk indicator, others includes diabetes, hypertension, dyslipidemia, cardiovascular disease, and many cancers. Therefore, obesity is invariably referred to as the main cardio-metabolic associated risk indicator and a crucial public health problem that requires urgent attention in order to prevent cardio- metabolic disorders.

METHODS AND MATERIALS

Study design

This was a cross-sectional quantitative study on the correlation between the overweight and obesity as predisposing risk indicators to cardio metabolic disorders among adults in Kisumu county nyanza region of Kenya. It involved the determination of four indicators of cardio metabolic disorders, which included; general obesity (BMI), central obesity (waist: hip ratio), blood pressure (SBP and DBP), and from these, the correlation between overweight, obesity and cardio metabolic disorders was determined.

Study area

The study area was selected sub county hospitals in Kisumu County in nyanza region in Kenya.

Study Population

The participants were selected from Sub county hospitals within Kisumu county patients 18 years and above seeking health care services.

Sample size

A sample size was determined using Slovin's statistical formula (1960) method in which the sample size is given by the expression:

$$n = \frac{N}{N+N(e)2}$$

n = desired sample size

N = target population, i.e. the total number of participants seeking health care services within sub county hospitals.

e= Margin of error at 95 % confidence level (0.05).

Given N = 410 participants seeking health care services within sub county hospitals in Kisumu county per month. By Substitution in the formula we get:

N= 410/1+410(0.05) 2

n = 202 participants.

Inclusion Criteria

All adult (18 years and above) participants were included in the study who were seeking medical care services within sub county hospital.

Exclusion criteria

Participants who met the inclusion criteria but women who were pregnant or nursing. Participants with a history of gastrointestinal, renal, or liver disease; and participants with any history of psychiatric illness. The participants, who declined to consent and non member of the study community was also excluded.

Sampling procedure and sampling methods

Participants were selected by random sampling technique to represent the entire population under the study. Participants seeking medical and health care services at the sub county hospitals within Kisumu County hospitals present within the time frame of the study, who met the inclusion criteria and were willing to participate. They were requested to complete the questionnaires and subjected to the research study procedures after detailed explanation in the language they understood well. They were requested to sign a consent form as a sign of willingness and they were interviewed and requested to / assisted to fill the questionnaires. Anthropometric measurements were taken and the results recorded accordingly.

Data Collection, Presentation and Analysis

Data Collection Tools

The data was collected through Questionnaires concerning ethnicity, age, dietary intake, smoking and drinking history, level of exercise, and physical activities was formulated to collect information from respondents. The data from Anthropometric measurements, including height, weight, waist circumference, and hip circumference, was taken. Blood pressure readings were obtained using a calibrated sphygmomanometer.

Data Quality Control

The questionnaires were pre-tested by giving some students/staffs in the faculty of health sciences at Uzima university to assess the suitability and acceptability of the data collection tool, to the participants and the necessary adjustments were made to ensure adequate data quality.

PROCEDURE

The participants were weighed on a platform-type balance weighing machine with a capacity of up to 160 kgs, with the help of two qualified registered nurses in sub county hospitals, who explained the procedure to the participants. The weight measurements was made with the participant wearing light clothes and without shoes, standing upright at the centre of the balance, with their arms extended down the sides of the body and the head positioned perpendicular to the floor. The height measurement was taken using a graduated scale (in centimeters) attached to a wooden set square with a lock, fixed against the wall and the reading was recorded in centimeters and afterwards converted into meters. The body mass index (BMI) was expressed in kg/m2. (BMI was calculated as the weight of the individual in kilogram divided by the square of the height in meters). Waist and hip circumference was determined using a graduated tape measure with respondents wearing light cloths and the waist to hip ratios calculated from the measurements.

The Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) was determined by measuring two times the arterial blood pressure in the right arm using a mercury sphygmomanometer, before the filling of the questionnaire and after filling the questionnaire with the participant in a seated position. The first and fifth Korotkoff sounds were used to represent SBP and DBP respectively and then the average of the two measurements was used.

Data Presentation

The data collected from the study area was presented in form of tables and figures after calculations of means and standard errors of the means.

Statistical Analysis

Results were expressed as percentages, frequencies and mean □ SD. The data was analyzed using IBM SPSS Statistics software version 20 and excel. Pearson's correlation coefficients were obtained for each of the metabolic syndrome components and the respective indicators of metabolic syndrome.

Ethical Considerations

Ethical approval was obtained from the Institutional Research and Ethics Committee (IREC) that's Hospital Ethical committee, before the commencement of the research. Participants signed an informed consent form for their participation after a thorough explanation of the procedure and importance of the study to them. Every participant had the right to refuse to participate by not signing the consent form or was to withdraw from the study if they felt uncomfortable at some stage. For the purpose of confidentiality, questionnaires were used with identification codes and not names. Two qualified nurses were recruited from the department of Internal medicine who assisted in taking anthropometric measurements and Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) recording.

LIMITATIONS AND DELIMITATION

The limitations included lack of honesty and accuracy of participants in terms of self-reporting since the questionnaires were open ended questions especially questions on lifestyle, food eaten by the patients and familial diseases if applicable. I overcame the limitation by consulting the information in medical records of the participants.

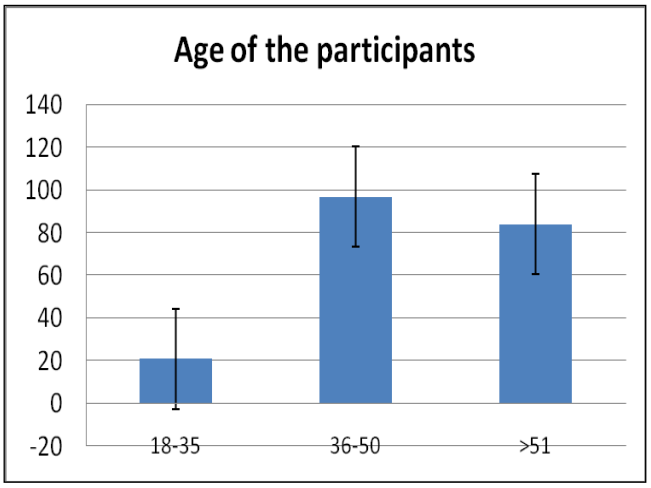
RESULTS

In this study, the correlation between overweight, obesity and cardio metabolic disorders was determined by measuring the blood pressure, body mass index, waist hip ratio and blood pressure among respondents. Respondents were regarded to have predisposed to cardio metabolic associated disorders if they had increased above the normal values of BMI, WHR and hypertension, Blood pressure: ≥ 130/90 mmHg (systolic blood pressure: ≥130mmhg, and diastolic blood pressure: ≥ 90mmhg. Central obesity: waist: hip ratio > 0.90 (male); > 0.85 (female), or body mass index > 30 kg/m2. Normal weight, overweight, and obesity were defined as a BMI less than 25, 25 to 27, and >27, respectively. The results obtained are presented below.

Demographic data of participants

Age of the participants

Figure 1: Age of the participants



Most of the participants (48%) were aged 36-50 years, followed by those over 51 years (41.6%) and the least were aged 18-35 years (10.4%).

Sex of the participants

Figure 2: Sex of participants.

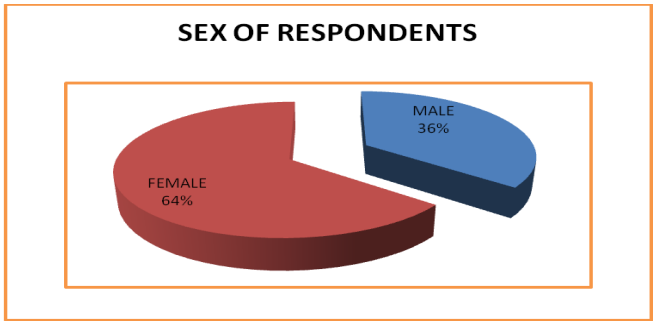


Figure 2 above shows that most of the respondents 129(64%) were females and 73(36%) were males.

BMI, Waist-Hip ratio and Blood Pressure

Body Mass Index (BMI)

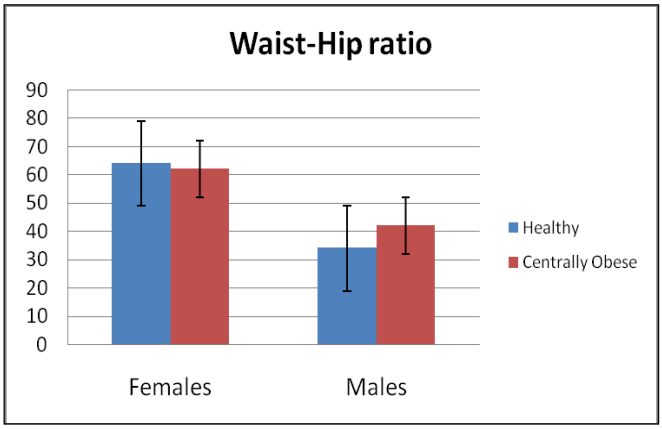
Table 1: BMI of the participants

BMI	Category	Frequency	%
18.00 - 25.00	Healthy weight	54	26.7
25.10 - 30	Overweight	36	17.8
>30.00	Obese	112	55.4
Total		202	100

Most (55.4%) of the participants were Obese while 26.7% had a healthy weight as shown in the **(Table 1)** above.

Waist-Hip ratio

Figure 3: Waist-Hip ratio of the participants



The females who had a Waist hip ratio of over 0.8 were classified as centrally obese (55%) while 49% of the males had a waist hip ratio of 0.9, which was also classified as central obese.

Blood pressure

Table 2: Blood Pressure of the participants

Blood pressure	Category	Freq	%
90/60-130/90	Healthy	62	31
131/91-179/109	Hypertensive	121	60
>180/110	Hypertensive emergency	19	9

Most of the participants were hypertensive (60%) while 9% had hypertensive emergencies.

Prevalence of cardio metabolic risk indicators

Table 4: prevalence of Metabolic Syndrome present in the participants

Indicators	indicator	Frequency	%
1	overweight	39	19.4%
2	obese	89	44%
3	Systemic hypertension	44	21.8%
4	Diastolic hypertension	30	14.9%
Total		202	100%

The participants had mostly two indicators of cardio metabolic risk indicators present. A total of 36.7% of the participants had 3 and 4 indicators and thus fit the classification of cardio metabolic disorders or risk indicators.

DISCUSSION, CONCLUSIONS AND RECOMMANDATIONS

DISCUSSION

Cardio Metabolic disorders are believed to be a result of a complex interaction between genetics, metabolic disorders and environmental factors. All the participants in the present study in one way or another had cardio

metabolic risk associated indicators, whose incidence peaks in at the age of 30 years and above. Majority of the participants were aged above 35 years. This agrees with studies carried out in other populations that showed that cardio metabolic disorders have an age dependency.

According to the study finding, it shows that 64% of respondents were females compared to 36% who were males. Genetics and menopause in females may be a contributing factor for this increase. Gender differences in the prevalence of the cardio metabolic risk indicators after age 50 may be related to the higher prevalence of abdominal obesity and prominent weight gain associated with ageing in women compared with men in study area in nyanza region of Kenya.

Most of the respondent had their BMI more than 30kg/m2 and were classified as having general obesity. Our results are much higher than those reported in other studies worldwide that predict obesity to be 9.1% worldwide by the 2030. Another study has shown obesity as one of the major contributors to the prevalence of cardio metabolic disorders due to its pathophysiological link to other cardiovascular risks such as hypertension and diabetes.

Findings on waist hip ratio shows that most of the respondent had their waist to hip ratio more than 0.85 in females and 0.90 in males respectively and were classified as having central obesity.

One explanation for the increased incidence of cardio metabolic disorders among respondents in nyanza region Kisumu County may be due to the high prevalence of central obesity in this community. The importance of waist circumference as a measure of central adiposity has recently been emphasized as one of the major components of cardio metabolic disorders. Moreover, visceral adiposity has been shown to be significantly associated with all components of cardio metabolic disorders, including insulin resistance and abnormal inflammatory responses, which are both related to cardio metabolic disorders Grandly.

The findings slightly differ from other studies, which have shown central obesity to be the most common component of cardio metabolic disorders while in ours it is the second.

This study revealed that most of the participants were hypertensive, that is; diastolic pressure above 90mmHg and systolic pressure above 130mmHg. This could be due to the overweight and obese that has a pathogenomic hallmac in cardio metabolic disorders. Hypertension was the most common indicator of cardio metabolic disorders in the participants. This is however higher than the findings in Botswana where hypertension was a second indicator for cardio metabolic disorders.

A healthy diet, regular exercise and sometimes medication can go a long way toward reducing high blood pressure. The prevalence of indicators of cardio metabolic disorders shows that hypertension was the highest in the study population while central obese, overweight and general obesity were also common among the participants.

CONCLUSIONS

The participants had mostly two cardio metabolic risk indicators 36.7% of the participants had 3 and 4 indicators and thus fit the classification of cardio metabolic associated risk indicators. This was highly prevalent

at 36.7% among participants in Kisumu country in nyanza region of Kenya above 18 years of age. Hypertension was the highest among the participants. General obesity, abdominal obesity, present in the study population and was important risk factors for the cardio metabolic disorders. The study identified distinct modifiable cardio metabolic associated risk indicators that threaten the health status of these communities, namely general obesity, abdominal obesity, hypertension, and physical inactivity.

RECOMMENDATIONS

Since we found a greater preponderance of risk factors of cardio metabolic associate risk indicators in overweight and obese among the study population in this study, our results point to the need for measures to prevent and treat obesity in this and other high-risk groups. Interventions for cardio metabolic associated risk indicators can be both behavioral and medical. Behavioral interventions include changes in dietary and lifestyle habits including regulated carbohydrate and fat intake as well as having physical exercise, while medical interventions include use of antihypertensive, hypoglycemic and hypolipidaemic agents. Weight reduction deserves first priority in individuals with abdominal obesity and the cardio metabolic disorders, which should be practiced in Kisumu County in nyanza region of Kenyan communities. Achieving the recommended amount of weight loss will reduce the severity of most or all of the metabolic risk factors.

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