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Body mass index and its effect on rate of hospital visits of staff of Kwame Nkrumah University of Science and Technology, Kumasi

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ABSTRACT

Body mass index (BMI) still remains an important tool in the determination of health risks associated with weight especially overweight and obesity. The continuous increase in the incidence of overweight and obesity has become a global worry due to the health risks associated with them especially hypertension and type II diabetes. Recent studies have shown correlation between BMI and number of hospital visits of outpatients. The aim of this study was to find such a correlation (if any) among the staff of Kwame Nkrumah University of Science and Technology (KNUST), Kumasi-Ghana. A total of 206 subjects gave their consent and were included in the study. Demographic information and BMI of each subject were recorded as well as self-reported clinical information and number of hospital visits made in the past six months. Most subjects were male and majority were within the age category 41-50. The mean BMI was 26.08 ± 3.557 and the incidence of overweight and obesity was recorded as 47.6% and 12.1% respectively. Among the overweight subjects (n=98), 7.8% were hypertensive and 2.4% were diabetic. Out of the 25 obese subjects, the incidence of hypertension and diabetes was 2.4% and 1.9% respectively. Most subjects had visited the hospital once or more in the past six months. There was a significant weak positive correlation between the BMI of subjects and number of hospital visits made in the past six months (P=0.009 and R^2=0.033). This could indicate that, overweight and obese individuals are more likely to increase pressure on health care systems.

Key words: Obesity, Body mass index, hypertension, Diabetes

INTRODUCTION

Body mass index (BMI) is an adequate proxy measure for monitoring the underlying increase in health risk due to abnormal weight at population level. According to the National Heart Foundation, to date, BMI still remains one of the common ways of determining whether an individual's weight is above or below the normal healthy weight hence gives the clinician a step closer in determining who is at a greater risk of experiencing health problems. The profound significance of BMI lies on the fact that it is convenient to use in identifying prevalence of underweight, overweight and obesity in a population.

Obesity can be general or abdominal. Abdominal obesity results from the accumulation of fat in the abdomen whilst the fat may be deposited all over the body in people who are generally obese. In Ghana and other countries, obesity is known to be genetic or acquired. It may be acquired through the intake of high caloric foods, inactive or sedentary

lifestyles and the use of certain drugs. Hormonal malfunctions, age and pregnancy are also known to significantly affect weight gain [1].

In most developed countries a substantial minority, and in some countries the majority, of older people are overweight according to standard body weight criteria because about 70% of obese adolescents grow up to become obese adults [2]. In West Africa, overweight and obesity continues to be on the rise in the 21st century with an increased prevalence over the last two decades. A review by Abubakari *et al*. [3] shows a significant increase of 10% in adult obesity in West Africa between 2000 and 2004. In a current cross- sectional analysis of 574 adult Ghanaians between age 18 and 65, 2% were found to be obese and 14% had abdominal obesity [4].

The prevalence of overweight and obesity in adults is increasing dramatically and is associated with chronic diseases such as type 2 diabetes, cardiovascular disease (CVD), hypertension, osteoarthritis, gallbladder disease, and some cancers. However, several speculations have been made about the possible reasons for this global pandemic, but they are certainly related to the profound changes associated with modern lifestyle that results in the alteration of energy balance [5].Among the aforementioned health risks, the most common of them in Ghana and most sub-Saharan African countries are type 2 diabetes and hypertension. According to Bosu[6], the prevalence of hypertension in Ghana between 1970 and 2009 was within the range 19% to 48% and continues to be on the rise till date. From the annual report of the Greater Accra Regional Health Directorate [7], in most parts of Ghana, hypertension moved from fourth to become second to malaria as the leading cause of outpatient morbidity in 2007.

Several surveys conducted all across the world has shown positive correlation between obesity and the pressure on medical care, which includes the use of drugs and the number of hospital visits or use of health care services.Research conducted in Spain showed that 69.1% of men and 72.9% of women who were overweight or obese reported a visit of at least once every 2 to 3 months to the primary care physician [8]. Large surveys conducted in Ghana have shown similar correlations. However, most of the surveys in Ghana have involved outpatients in hospitals but the occurrence of such correlations among other individuals or groups (not outpatients) is still unknown. This research was therefore aimed at finding the effect of BMI on number of hospital visits amongstaff (academic and administrative) of the Kwame Nkrumah University of Science and Technology, Kumasi-Ghana.

MATERIALS AND METHODS

Sampling and Data Collection

A cross-sectional survey was conducted on KNUST campus in Kumasi, Ghana. Subjects included academic and administrative staff of the university and were selected randomly at convenience from the various colleges and the two administration centres. The survey was conducted within the period of January to March, 2013. With the exclusion of pregnant women, 206 subjects gave their consent to be included in the study.

For each subject, demographic information on age and gender was recorded. Anthropometric data of height (in meters) and weight (in kilogram) was measured. Their heights were measured using a 5m measuring tape and their respective weights was also measured using an analogue personal bathroom scale (accuracy; 0-65kg±1.2 and >65kg±2.0). The values obtained were used to calculate the respective BMI using the formula;

$$\text{BMI} = \frac{weight\ (kg)}{Height^2\ (m^2)}$$

Subjects were interviewed and self-reported clinical information on their number of hospital visits in the past six months as well as any history of hypertension and/or type 2 diabetes was recorded.

Data Analysis

The data obtained from the anthropometric measurements and the number of hospital visits was analyzed using the statistical tool, SPSS version 16for Windows and the results expressed as mean±SEM. Linear regression was used to find the correlation between the variables using the mean values obtained from SPSS analysis.

RESULTS AND DISCUSSION

Within the period of January to March, 2013, 206 subjects gave their consent and were included in the study. There were males (67%) and 68 females (33%).Most of the subjects (56.3%) were adults within the age category 40-49. Since all subjects were adults (at least 30 years and above), their BMI classifications could be appropriately accessed using the WHO cut-offs for adults.

A total of 98 (47.6%) and 25 (12.1%) respondents were recorded as overweight and obese respectively and 122 (59.2%) out of the 206 subjects had visited the hospital once or more in the past 6 months. Some of the subjects had been diagnosed of diabetes (7.3%)and hypertension (14.1%). The details of these results obtained are shown in the Tables 1 below;

Table 1: BMI Distribution with age categories of respondents

Age Range	Inference from BMI (kg/m^2)			Total	
	Normal (BMI 18.5-24.9)	Overweight (BMI 25-30)	Obese (BMI > 30)		
30-39	15 (60%)	9 (36%)	1 (4%)	**25**	
40-49	44 (37.9%)	56 (48.3%)	16 (13.8%)	**116**	
50-59	24 (36.9%)	33 (50.8%)	8 (12.3%)	**65**	
Total	**83 (40.3%)**	**98 (47.6%)**	**25 (12.1%)**	**206**	***p*=0.127**

From the table, most of the subjects were overweight (47.6%, n=98) with a mean BMI of 26.08 ± 3.557. This incidence of overweight was higher than that which was recorded in a cross-sectional study among adults in Accra-Ghana involving 6300 adults aged 25 and older [9]. The overall prevalence of overweight was 23.4%; prevalence of obesity was 14.1%. Rates of overweight were markedly higher in females than males (27.1% vs. 17.5%), as were rates of obesity (20.2% vs. 4.6%). Other factors contributing to increased overweight and obesity included being from an urban high-class community, having a tertiary education, and being employed in a sedentary job. The comparatively higher incidence of overweight recorded in this study (47.6%) could be due to the high sedentary lifestyles (less physical activity) of the study group (university lecturers and especially the administration workers). The sample size (206) which is relatively small as compared to Amoah[9] may also contribute to such difference in the incidences and so more inferences cannot be made based on this difference in the incidence rates.

The incidence of overweight slightly increased with increasing age (36%, 48.3% and 50.8% in that order) (Table 1). This was expected as it shows some form of consistency with the work of Adams *et al*. [10]. In their large survey, they concluded that the prevalence of old aged with BMI>25 increases with increasing age especially above the age of 65. However, the linearity in this trend was not statistically significant (p=0.127 and r=0.107) probably due to the relatively small sample size and also the fact that most subjects were not aged above 65.

Table 2: BMI and number of hospital visits among respondents

No. of visits in past 6 months	Inference			Total n (%)
	Normal n (%)	Overweight n (%)	Obesity n (%)	
0	38 (45.24%)	39 (46.43%)	7 (8.33%)	**84 (40.78%)**
1	24 (50.0%)	18 (37.5%)	6 (12.5%)	**48 (23.30%)**
2	7 (26.92%)	15 (57.70%)	4 (15.38%)	**26 (12.62%)**
3	6 (35.29%)	11 64.71%)	0 (0)	**17 (8.25%)**
4	0 (0)	5 (83.33%)	1 (16.67%)	**6 (2.91%)**
5	2 (50.0%)	1 (25.0%)	1 (25.0%)	**4 (1.94%)**
≥6	6 (28.57%)	9 (42.86%)	6 (28.57%)	**21 (10.20%)**
Total	**83**	**98**	**25**	**206**

The incidence of obesity was quite lower (12.1%). This is attributed to the fact that, due to the high educational background of the subjects, those who are overweight get alarmed by their weight and so put in appropriate measures to regularly check their rate of weight gain. So such trends as seen for overweight is not seen in the case of obesity as most of the overweight victims do not enter the obesity range.

The mean number of hospital visits made by the study group within the past six months is 1.62 ± 2.094. A total number of 84 (40.78%) of the subjects had not visited the hospital at all in the past six months. The result obtained in Table 2 was not consistent with the work done by Luz *et al*. [8]. In their survey, they observed that 69.1% of men and 72.9% of women who are overweight or obese visiting a primary care physician at least once every 2 to 3 months. With reference to their findings, most subjects who were overweight or obese were expected to have made at least 2 or 3 hospital visits in six months. However, the result from Table 2 showed that, most of the overweight (n=39) and obese (n=7) had not visited the hospital at all in the past 6 months and quite a number of them (18 and 6 respectively) made only one visit within this period. From this, it could be deduced that, most subjects do not visit the hospital often but may probably rely on other health care units like pharmaceutical shops or the possibility that most of the hospital visits made by the university workers was not due to a weight-related disease.

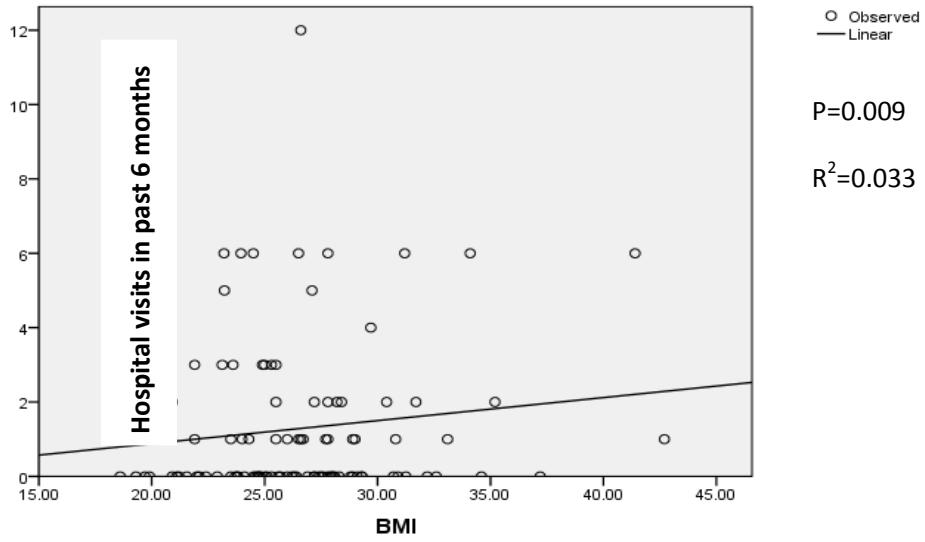

Fig.1: Correlation between BMI and hospital visits

From Figure1 above, there was a significant positive correlation between the BMI obtained for all the categories (normal, overweight and obesity) and the respective number of hospitals within six months (P=0.009, R^2=0.033). This result somehow conforms to the work done in Australia [11]. In their study, a positive correlation was observed between BMI and number of out-patient clinic visits for women only. They concluded that people who fall outside the healthy weight range are more likely to use a range of medical services. The contradiction with the information on Table 2 could be due to the fact that most of the hospital visits made by this study group was not as a result of a weight-related disorder because those who were neither obese nor overweight (those with normal weights) comparatively, made an appreciable number of hospital visits in the past six months. It was probable that most of their hospital visits may be due to other factors such as regular hospital checkups, malaria and some stress-related disorders that are common in Ghana.

According to Svetkey [12], some recent studies have revealed that overweight and obesity are the main risk factors for prehypertension and hypertension. From Table 3, the incidence of hypertension among subjects who were overweight and obese respondents were 7.8% and 2.4% respectively. This suggests that most of the overweight and obese subjects included in the study did not suffer from hypertension though the major risk factor (obesity) is present.From Table 3 also, the incidences of type II diabetes among the overweight and obese individuals were 2.4% and 1.9% respectively. This result was not consistent with the findings of Svetkey [12] where 884 cases of type 2 diabetes were studied and realized that for individuals with BMI values above 25.0, the incidence of type 2 diabetes was 78.9%. This inconsistency can be as a result of the distinctive difference in the sample size. Another crucial reason for the inconsistencies in the incidents of diabetes and hypertension may be due to the fact that, though

overweight and obesity are major risk factors, other factors such as eating habits, lifestyles, genetics and even level of education may also serve as contributing factors. These factors may have also contributed to the unexpected incidence of diabetes and hypertension.

Table 3: Inference (from BMI) and health parameters

Inference	HYPERTENSIVE		DIABETIC	
	No	Yes	No	Yes
Normal	75 (36.4%)	8 (3.9%)	77 (37.4%)	6 (2.9%)
Overweight	82 (39.8%)	16 (7.8%)	93 (45.1%)	5 (2.4%)
Obese	20 (9.7%)	5 (2.4%)	21 (10.2%)	4 (1.9%)
Total	**177 (85.9%)**	**29 (14.1%)**	**191 (92.7%)**	**15 (7.3%)**

CONCLUSION

The incidence of overweight and obesity among the study group on campus was 47.6% and 12.1%respectively. There was a weak positive correlation between their BMI values and number of hospital visits made (p=0.009 and R^2=0.033). This means that, an increase in the BMI of any subject of the study group (staff of KNUST) is likely to cause an increase the number of times that subject reports to the hospital which would turn to put pressure on healthcare systems therefore appropriate measures should be implemented to help check weight gain.

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