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Emotional and Social Disorders among Overweight and Obese Children in Enugu, Nigeria: An Evolving Menace

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Authors' contributions

This work was carried out in collaboration between all authors. Authors NDU and ECA designed the study. Authors NDU, ECA, LNI and CCO wrote the protocol and authors NDU and CNO wrote the first draft of the manuscript. Authors NDU and SON managed the literature searches. Author ECA performed data analysis. All authors read and approved the final manuscript.

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ABSTRACT

Background: Obesity results mainly from changes in diet and physical activity and currently being regarded as a global epidemic. It comes at a cost, affecting physical, social and psychological health and having deleterious impact on psychological development, academic and social performance of an affected child. The aim is to determine the burden of psychosocial disorders among the overweight and obese children in our environment.

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Methods: A descriptive cross sectional study carried out among secondary school children aged 10-18 years in Enugu metropolis. Sampling involved stratified and multi-staged methods. The height and weight of selected subjects were measured and their BMI calculated. An adapted, semi-structured, self-administered questionnaire was used. Information sought included socio-demographics and psychometric measurements. Data was analyzed using SPSS version 19. Analytical test of significance was done using Chi square test at *p* value of ≤ 0.05.
Results: Of 200 students studied, 136 (68%) were females and 64 (32%) were males. Most (157) were in the age range of 10-14 years old. Sixty seven were overweight while 133 were obese with most of the children's parents belonging to the upper socioeconomic class. One hundred and nineteen of them had one emotional and/or social problem of depression, anxiety, low self-esteem, discrimination and stigma, giving a prevalence rate of 59.5%. Thirty five (54.7%) males and 81 (61.8%) females had at least one emotional and/or social problem ($\chi^2 = 0.905$, $p = 0.342$). Between the children aged 10-14 and 15-18 years, 56.1% and 72.1% respectively experienced at least one psychosocial disorder ($\chi^2 = 3.605$, $p = 0.058$). Emotional and social disorders was commoner among the upper class and difference was statistically significant ($\chi^2 = 6.375$, $p = 0.041$).
Conclusion: The burden of emotional disorders among overweight and obese children in Enugu metropolis is high. Socioeconomic class is associated with emotional disorders.

Keywords: Overweight; obesity; adolescents; emotional disorders; social problems.

1. BACKGROUND

Obesity, which is a state of excess body fat, mainly, is a result of changes in diet and physical activity [1-4]. It is now being considered a global epidemic, a major public health problem and one of the most important cause of morbidity and consequent mortality in both developed and developing world [5-8]. Obesity is known to contribute about 2.6 million deaths annually worldwide [9].

Its prevalence has been rising over the last two decades in the developing world, having reached pandemic levels in the developed countries [10]. Paradoxically though, in developing countries, overweight and obesity coexist with under-nutrition [3,10]. Unfortunately, the problem affects virtually all ages, sex, ethnicity and socioeconomic groups [3,9]. Globally, about 155 million children and adolescents are overweight and around 30-45 million have obesity [11,12]. Overweight children are at least twice as likely as normal-weight children to be overweight during adulthood, and 24% to 90% of obese adolescents become overweight/obese adults [13]. The WHO estimated that by 2015, more than 700 million children and adolescents would have been obese [14].

In the tropics, the concept of 'food' may have been changing over time from a means of nourishment to a marker of lifestyle, a source of pleasure and show of affluence [1]. Hence the increasing prevalence of overweight and obesity due to changes in diet and sedentary life style referred to as the 'nutrition transition' [3,15].

In developed countries, children with low socioeconomic status are more affected than their rich counterparts. The reverse is the case in developing countries where children of the upper socioeconomic class are more likely than the indigent children to be obese [9]. This was the trend in the middle ages; during the ancient East Asian civilization and during the Renaissance of Europe when it was regarded as a mark of affluence [16].

However, childhood obesity comes at a cost. It is associated with a higher chance of premature death and disability in adulthood [14]. These being a result of the health and psychosocial consequences of overweight and obesity. Physical health consequences of obesity are protean including non-communicable disorders such as hyperlipidemia and hypertension, coronary heart diseases, stroke, diabetes mellitus (NIDDM), polycystic ovary syndrome, infertility, asthma, osteoarthritis, cancers, gastroesophageal reflux disorder (GERD) and gallbladder disease [6,17-19]. Overweight and obesity also has considerable psychological and social impact on children and adolescents. These are usually associated with deleterious impact on the psychological development, quality of life, academic and social performance of the overweight child [5,20,21].

Overweight and obesity therefore pose a serious physical, emotional and behavioral health

challenge especially in third world countries. In Nigeria, much of the work that have been done among overweight and obese children have been on prevalence of obesity and overweight. We are not aware of any study in Africa about the emotional disorders associated with overweight and obesity. It is therefore pertinent that such a data be obtained to highlight the burden of psychosocial disorders among the overweight and obese children in our environment. Such information will be of value in health policy making, help in the comprehensive management and prevention of obesity, ultimately reducing the burden of both conditions. The aim of this study is then to determine the prevalence of emotional disorders among overweight and obese children in Enugu metropolis.

2. METHODS

2.1 Study Design

This was a descriptive cross sectional study carried out among secondary school children aged 10-18 years in Enugu metropolis from April to June 2015.

2.2 Study Setting

Enugu metropolis is the state capital of Enugu State, Southeast of Nigeria. The metropolis is made up of the three local government areas (Enugu North, Enugu East and Enugu South). There are 123 registered secondary schools in Enugu local government areas comprising of 39 public (government) and 84 private secondary schools (based on information from Enugu state ministry of education).

2.3 Ethical Consideration

Ethical clearance for the proposal was approved by the University of Nigeria Teaching Hospital Ethics and Research Committee. Also approval was obtained from the State Ministry of Education, Chairman of private schools, Principals and teachers of the respondents. Informed consent – both verbal and written were obtained from the child's parents/guardian, after they were duly educated on the need for, and benefits of the study, the measurements to be collected and how it was to be collected.

2.4 Study Population

Those included were all overweight/obese children aged 10-18 years who assented to the study and whose parent(s)/guardian had given informed consent. All underweight or normal weight children, all overweight and obese children who did not assent, those whose parent did not consent to participate and those on drugs with effect on weight and psychotherapy were excluded.

2.5 Sample Size

Sample size was determined using the formula: [22]

$$N = Z^2P (1-P) /d^2,$$

Where N is minimum sample size, Z is 95% level of significance taken as 1.96 for 2 sided, P is Prevalence of overweight children in Enugu taken as 7.5%, [15] d is Error margin or precision taken as 5%. Therefore, $N = (1.96)^2 \times (0.075) \times (1 - 0.075) / (0.05)^2 = 106.6$ Adding attrition rate of 15%, we have 125.4. However, a total of 200 overweight/obese children were studied.

2.6 Sampling Technique

Sampling followed stratified and multi-staged method. A list of all the secondary schools in Enugu North, South and East LGAs was obtained from the Enugu state Ministry of Education. All the secondary schools were stratified into public and private. There were 10 public and 40 private secondary schools in Enugu East LGA giving a ratio of 1:4, while in Enugu North LGA; there were 9 public and 20 private secondary schools with ratio of 1:2.2. Enugu South LGA has 22 private and 20 public secondary schools with a ratio of public to private secondary schools of 1:1.1. The number as well as the ratio of public to private schools in the different local government areas was used to determine the number of students selected in the area. Selection was done by simple random sampling (balloting) without replacement. In Enugu East, 2 public and 8 private schools were selected, 2 private and 3 public schools in Enugu South while in Enugu North, 2 public and 5 private schools were be selected. In all 22 secondary schools were selected. Thereafter, the number of subjects selected from each school was determined using the Neymann allocation formula [23] for stratified sampling as follows:

> Allotted sample size = Total population of the index school X Total sample size / Sum of the population of the 22 selected schools.

In each school selected, the allocated sample size was divided proportionately amongst each section (junior and senior), and the total number of students in each section constituted the sampling frame in that section. In each section, the participants were selected by simple random sampling using a statistical table of random numbers and where the selected participant's calculated BMI is either in the range of normal or underweight, after measurement of the weight and height; he/she was excluded from the research. The height of the subject was measured to the nearest centimeter (sensitivity of 0.5 cm) using the Seca stadiometer with subject on barefoot or a pair of socks. The weight was also measured using electronic weighing scale with a sensitivity of 0.1 kg. Both the height and weight were measured two times and if there was a disparity, a third measurement was done and an average of the three measurements taken as the value. The BMI was determined based on age and sex, using the Centre for Disease Control (CDC) BMI calculator for children and teens [24]. Overweight was defined as BMI between 85^{th}-94^{th} percentiles while obesity was defined as BMI ≥ 95^{th} percentile.

2.7 Study Tools/Procedure

A pretested, self-administered questionnaire was given to the selected students after obtaining informed assent/consent, due explanation and education on the content, purpose and benefits of the study. Some of the information sought included the biodata, socioeconomic class and psychometric measurements. Socioeconomic class was obtained using the method proposed by Oyedeji, [25] while the psychometric scales used included Becks depression inventory II (BDI II), Revised Children Manifest Anxiety Scale (RCMAS), Rosenberg Self-Esteem Scale, and Internalized Stigma of Mental Illness Scale (ISMI). Both the BDI II and RCMAS has been validated in Nigeria using adolescents aged 13-18 years and primary school children respectively [26,27]. The BDI II correlates positively (r = .71) with Hamilton Depression scale and has a high one week test retest reliability (r = .93) [28]. It's internal consistency is high (α = .91) with a sensitivity of .91 and specificity of .97, a positive predictive value of .88 and a negative predictive value of 0.98 [29]. The RCMAS has an internal consistency coefficient, r = .8, a test retest reliability of .6-.88 and in terms of convergent validity, correlates to Screening for Children with Anxiety Related and Emotional Disorder (SCARED), r = .85 and to State Trait Anxiety Inventory for Children (STAIC), r = .85, p = 0.05 [30-33]. The ISMI has an internal consistency of reliability coefficient of alpha, α = .90, with a test retest reliability, r = .92, p = 0.05 [34]. The Rosenberg Self-Esteem Scale also has an adequate internal consistency of alpha, α = .87, and is highly reliable [34,35].

2.8 Data Analysis

Data from 200 students were analyzed using SPSS version 19. Mean and standard deviation was used to summarize quantitative variable like age while qualitative variables like sex and social class were summarized using percentages. Chi square test was used to ascertain associations between socio-demographics and BMI with emotional disorder. Level of significance was at $p \leq 0.05$.

3. RESULTS

The mean age of the students was 12.88±1.78. Majority of the respondents were females, 136 (68.0%), while 64 (32.0%) were males, giving a male to female ratio of 1:2. The age range of most of the students (157) was between 10-14 years while 43 were between the ages of 15-18 years. Sixty seven (33.5%) of them were overweight and 133 (66.5%) were obese. The socioeconomic status revealed that majority of the respondent's parent, 84.5%, belonged to the upper class while 12.5% and 3% belonged to the middle and lower classes respectively Table 1.

Table 1. Sex and BMI distribution of respondents

Socio-demographics	Frequency (N)	Percent (%)
Age range (years)		
10-14	157	78.5
15-19	43	21.5
Mean age ± SD	12.8±1.78	
Sex		
Male	64	32
Female	136	68
Social class		
Upper	169	84.5
Middle	25	12.5
Lower	6	3.0
BMI		
Overweight	67	33.5
Obese	133	66.5

Of the 200 children studied, 119 had at least one emotional and/or social problem of depression,

anxiety, low self-esteem, discrimination or stigma; giving a prevalence rate of 59.5%.

Among the participants, 35 (54.7%) males and 84 (61.8%) females had at least one emotional and/or social problem. The difference though was not statistically significant (χ^2 = 0.905 p = 0.34). Thirty nine (58.2%) of the overweight and 80 (60.2%) of the obese children had at least one or more psychosocial disorder. The difference was not statistically significant ($\chi 2$ = 0.076, p = 0.792). While 56.1% of the overweight and obese children aged between 10-14 years experienced at least one emotional and/or social problem, 72.1% of those aged 15-18 years also experienced at least one psychosocial disorder. The differences were not statistically significant ($\chi 2$ = 3.605, p = 0.058). The overweight and obese children of lower socioeconomic class had the least emotional or social disturbance (33.3%) while it was most prevalent among the middle class (80%). The prevalence of emotional and social disorders among the upper class was 57.4%. The differences were statistically significant ($\chi 2$ = 6.375, p = 0.041) Table 2.

4. DISCUSSION

The need for the identification of emotional and social problems among overweight and obese children in our environment cannot be overemphasized. The reasons include the rising incidence of overweight and obesity among children of upper and middle class in our society, the need for comprehensive management of the conditions by both pediatrician and clinical psychologist/psychiatrist as there may be a bidirectional cause, the implications of social and psychological distress caused by weight related stigma and discrimination and the need for policy making.

This study has revealed an emotional and social disorder prevalence rate of 59.5% among overweight and obese children in Enugu metropolis. This is higher than the 26% reported by Seyedamini et al. in Tabriz, Iran [36]. This may be due to inability of their subjects to express themselves, considering that they sampled children 7-12 years of age. The lower prevalence may also be as a result of the fact that boys were excluded from the research and that some psychological disorders like depression tends to manifest from adolescence. The higher prevalence may also be as a result of the fact that more emotional disorders were studied in this current study compared with the Iranian study. However, this high burden is worrisome as these emotional and social disorders will escalate the morbidity due to mental health in our environment. It has been documented that these disorders especially depression and anxiety which usually emerge during adolescence persist into adulthood. [37,38] Together with overweight and obesity, these disorders will stretch to the limits the already fragile health system in low income economies like Nigeria. The economic impact in a populous country like Nigeria will be too enormous: as the direct medical cost will be too high for the individual and government (National Health Insurance Scheme) to cope with, increased productivity cost through absenteeism, increased disability payment, premature deaths, and presenteeism whereby overweight and obese individuals are less productive while present at workplace due to emotional, social and/or physical health conditions associated with obese workers. There is also the issue of impaired human capital development and associated cost [35,39-41]. All these portends a marked impediment in Nigerian work force. The burden of this problem is even made worse by the limited efficacy of current treatment for obesity and the emotional disorders [7,11]. The social impact of these psychosocial disorders on the overweight children may also have a far reaching effect on their psychological development. These disorders perpetuating one another including impaired quality of life, loneliness, isolation and withdrawal [42].

The social and emotional disorders are commoner among the obese compared with the overweight though not statistically significant. The reason may be due to more gross body dissatisfaction, shape and weight teasing and weight-based victimization and isolation by peers, with the dissatisfaction increasing with increasing BMI. It's been documented that levels of obesity is an independent risk factor for common psychological disorders [43]. The evidence abound that the risk of psychological disorders is commoner the more obese the individual [44].

Emotional and social problems are also commoner among the girls compared with the boys. This higher prevalence may be because girls seem to be more concerned about their shape, self-worth than overweight and obesity boys, reflecting the societal pressure on them to conform to a thin and sleek physique. Gortmaker, et al. [35] observed that the overweight girls were

Table 2. Sociodemographic and BMI distribution of emotional disorders

	Emotional disorders		χ^2	P value
	Present N (%)	Absent N (%)		
Age range (years)				
10-14	88 (56.1)	69 (43.9)	3.605	0.058
15-18	31 (72.1)	12 (27.9)		
Sex				
Male	35 (54.7)	29 (45.3)	0.905	0.342
Female	84 (61.8)	52 (38.2)		
Social class				
Upper	97 (57.4)	72 (42.6)		
Middle	20 (80.0)	5 (20.0)	6.375	0.041
Lower	2 (33.3)	4 (66.7)		
BMI				
Overweight	39 (58.2)	28 (41.8)	0.076	0.792
Obese	80 (60.2)	53 (39.8)		

less likely to marry compared with the normal weight girls. The thought of marriage and relationships may have contributed to these observed social problems and emotional disorders as in our environment; relationships and marriages are conceived during adolescence. However, it is known that disorders such as depression, anxiety, somatic complaints and low self-esteem are commoner in females than in males. The literatures have consistently shown association between overweight/obesity and self-esteem for instance, according to sex and pubertal status – suggesting lower self-esteem among pubertal females compared with males. Again, such disorders as unipolar depression are also known to be twice as common in women as in men. Among the adolescents, depression is twice as often in females as in males [45,46].

In this study, the social and emotional disorders are commoner among the age range 15-18 years, though not statistically significant. It has been documented that the impact of weight on children increases with age. Hence, overweight and obesity may have little impact in choosing friends during early adolescence. But during late adolescence, as age increases, the children become more aware of their body and shape. It is at this stage that body dissatisfaction, weight-based teasing, isolation, exclusion based on weight come into effect ultimately ushering in psychological problems like low self-esteem, depression, anxiety etc.

The emotional and social problems recorded in this study are commonest among the middle class (80%) with the lower class (33%) being the least affected. The difference was statistically significant, though the reason may be unclear. However, studies have shown that among obese people, high socioeconomic status may increase the risk of depression and other emotional disorders [43,47]. In fact, socioeconomic status has been shown to be a potential risk factors for psychological disorders [37]. In developed countries, obesity is common among the lower socioeconomic status. But in the underdeveloped countries like Nigeria, the reverse is the case. The similarity between the two classes may be the consumption of more refined sugars. It then stands to reason that those factors affecting the lower socioeconomic class with respect to obesity and mental health disorders in developed world will also exert similar effects in developing world. For example in a study in 2010, the negative effect of obesity on health-related quality of life was greatest among the lower socioeconomic status in developed countries. This still occurs among the obese and overweight in underdeveloped countries [48].

5. CONCLUSION

The burden of emotional disorders among overweight and obese children in Enugu metropolis is high just as in other studies. Socioeconomic class is associated with emotional disorders.

6. RECOMMENDATION

Pediatrician managing overweight or obese child for any condition should make time to assess for psychological disorders among these children and refer appropriately.

7. LIMITATIONS OF THIS STUDY

The low prevalence of Overweight/obesity documented in our environment. There may also be inability of the younger children to interpret and understand the contents of the psychometric measurements.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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