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THE ASSOCIATION BETWEEN OBESITY AND THE OCCURRENCE OF DEPRESSION ACCORDING TO THE BIRLESON SCALE IN CHILDREN AGED 8-12 YEARS

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ABSTRACT

Background: Childhood obesity is one of the most important public health challenges of the current century. Childhood obesity, which may cause chronic diseases including diabetes, cardiovascular disease, fatty liver disease, cancer, and psychiatric diseases such as anxiety and depression, deserves more attention. However, there are few studies that shed light on the relationship between childhood obesity and psychiatric diseases. In the present study, we aimed to evaluate depression in obese children. **Methods:** One hundred and forty-one obese children (BMI > 95%) and 193 normal weight children (BMI 5th–85th %) aged 8–12 years were enrolled in this case-control study. To assess depression levels: Birleson Depression Inventory for Children was administered to both the obese and control groups. **Results:** There were no significant differences between the two study groups regarding age (1.3±10.57 years in the obese group, 1.5±10.17 years in the control group) (P=0.06) or gender (male/female ratio: 65/76 in the obese group vs. 85/108 in the control group) (P=0.7). A significant difference was clearly found in the BMI standard score (2.6±96.55 in the obese group vs. 21.1±57.55 in the control group) (P=0.0001). Obese subjects showed a significantly higher level of depressive symptoms (total Birleson score) (9.60±6.1 vs.7.11± 5.04) (P=0.0001) compared to the control group. Furthermore, Pearson correlation analysis showed a significantly positive relationship between increasing BMI and increasing Birleson Depression Inventory scores (Pearson correlation coefficient = 0.25) **Conclusions:** Our results indicate that obese children may suffer from depression more than their peers with normal weight, but not at a high rate because children in our society are exposed to many pressures and crises such as displacement and poverty, which makes it difficult to rely on obesity as the only and main factor in the occurrence of depression, especially since depression is a multifactorial disease. Therefore, it is necessary to investigate the mediating factors in the relationship between obesity and depression in children.

KEYWORDS: Birleson scale; body mass index (BMI); childhood obesity; depression.

INTRODUCTION

Obesity is a global health problem affecting individuals of all ages and in both developing and developed countries.[1]

The World Health Organization reported in 2016 that more than 340 million children and adolescents aged 5-19 years are overweight or obese.[2]

The prevalence of obesity and overweight among children in developing countries is about 30% higher than in developed countries.[3] Childhood obesity negatively affects all body systems and often has serious consequences such as high blood pressure, dyslipidemia, insulin resistance, fatty liver disease, dysglycemia and cancer the effects of obesity impose a huge financial burden on healthcare systems.[4]

In addition to increasing the risk of chronic diseases, childhood obesity carries the risk of serious psychological disorders in childhood and adulthood, such as depression, anxiety, low self-esteem, body image distortion, and attention deficit hyperactivity disorder (ADHD).[5]

Mental health risks in obese children are becoming more common and worrying[6] 80 % of obese adolescents will become obese adults and will suffer from physical and psychological disorders.[7]

Within past few decades, scientific interest has increased in the relationship between obesity and mental illness in children, especially depression, due to its serious consequences for public health. The primary aim of this study was to investigate whether obesity, independently of other risk factors, increases the risk of depression in children.

MATERIALS AND METHODS

The study population consisted of 141 obese individuals (BMI > 95th percentile) (76 males and 65 females, mean age 1.3 ± 10.57 years) attending the endocrinology clinic at Tishreen University Hospital in Lattakia and 193 normal weight children attending the general clinic aged 8–12 years. Weight and height were assessed and body mass index (BMI) was calculated by dividing the individual's weight in kilograms by the square of his/her height and cutoff points were adjusted for sex and age; according to the Centers for Disease Control and Prevention (CDC) guidelines.[8]

In order to assess depression levels, the Arabic version of the Birleson Depression Inventory was applied. Some words in the questionnaire were modified and words were used that were clearer and more understandable to the child and had the same meaning, after a pretest of about 10 children of different ages.

Exclusion criteria were: endocrine problems such as diabetes, hypothyroidism, and pituitary lesions, genetic syndromes such as Bernard-Willi, Down syndrome, Sturge-Weber syndrome, and neurofibromatosis, neurological syndromes such as epilepsy and cerebral palsy, hearing and speech problems, behavioral problems (hyperactivity, attention deficit, and mental retardation), sleep disorders, nocturnal enuresis, and treatment with anticonvulsants or psychotropic medications. Informed consent was obtained from all participants and their parents. The investigation was conducted according to the principles of the Declaration of Helsinki. The Ethics Committee of Tishreen University Faculty of Medicine approved the study.

Statistical analysis

In order to compare characteristics (age, sex, and BMI) and the results of the Birleson test between obese children and study controls, the chi-square test and the unpaired t-test were applied, where appropriate. Then, to explore the relationship between BMI and the Birleson scale, the Pearson correlation test was applied. For all statistical analyses, p-values > 0.05 were considered statistically significant.

RESULTS

No significant differences were found between the two study groups regarding age (10.57±1.3 years in the obese sample and 10.17±1.5 years in the control group) (p=0.06) or gender (male/female ratio: 76/65 in the obese group versus 85/108 in the control group) (p=0.7). Significant differences were clearly found in the BMI standard score (96.55±2.6 in the obese group versus 57.51±21.1 in the control group) (p=0.0001).

Obese subjects showed a slightly higher level of depressive symptoms (Birleson total score) (9.60±6.1 versus 7.11±5.04) in the control group with (p=0.0001). In the obese group, no statistically significant differences were found between males and females in depression levels. Moreover, Pearson correlation analysis showed a weak positive relationship between BMI standard score and the Birleson scale (r=0.25; P= 0.001).

Table 1: Socio-demographic characteristics of study and control groups.

Characteristics	Obese Group(n=141)	Control Group (n=193)	P. Value
Male (n=184) Female (n=150)	76 (53.9%) 65 (46.1%)	108 (56%) 85 (44%)	0.7
Age, Years	10.57 ± 1.3	10.17 ± 1.5	0.06
BMI, Percentile	96.55 ± 2.6	57.51 ± 21.1	<0.001

BMI, Body mass index. Values were given as n (%) or mean ± SD, p<0.05 was considered significant.

Table 2: The relationship between the degree of depression and the mother's work in a sample of 334 children visiting Tishreen University Hospital in Lattakia 2023-2024.

BMI	Positive	High risk	Negative
Normal	17 (41.5%)	23 (46%)	153 (63%)
Obesity	20 (48.8%)	26 (52%)	85 (35%)
Severe Obesity	4 (9.8%)	1 (2%)	5 (2.19%)

DISCUSSION

The aim of the study was to compare depression scale scores in obese and normal weight children. The results showed higher levels of depression in the obese group and statistically significant association between BMI and depression scores according to Pearson's correlation coefficient.

For a long time, it was thought that any relationship between obesity and depression was merely coincidental, but a meta-analysis by ***Luppino et al.***[10] showed that obesity has an effect on the development of depression in children and suggested a biological link between overweight, obesity, and depression. However, the results of studies remain conflicting regarding the relationship between obesity and depression.Obesity is associated with depression through a combination of shared environmental, physiological and/or genetic factors. Obesity is associated with systemic subclinical inflammation and oxidative stress, which are important risk factors for depression.[11] Furthermore, certain genotypes, such as the FTO gene (a gene associated with fat mass and obesity), are associated with risk for both obesity and depression.[12] There are several potential

factors that may influence the association between obesity and depression, such as lack of physical activity, unhealthy diet, and sleep disturbances.[13] In addition, children with obesity are often bullied or ridiculed because of their weight, and these experiences contribute to the increased incidence of depression.[14]

In a study by ***Esposito et al.*****[15]** of 148 obese prepubertal children, obese children showed significantly higher levels of depressive symptoms, and Pearson correlation analysis showed a strong positive correlation between BMI and depression scale scores. ***Blanco et al***.[16] found higher rates of anxiety, depression, weight-related distress, and low self-esteem in the obese group and demonstrated a mediating role for weight-related distress in the relationship between BMI and psychological well-being.

In their studies of children and adolescents aged 8 to 16 years, ***Şahin et al***.[17] found that rates of depression and bullying were higher in obese children and adolescents, with obesity leading to a 3-fold increase in bullying rates, and depression was higher in children who were bullied. The prolonged conflict in Syria has exposed civilians to serious human rights violations, including killing, maiming, sexual assault, torture and displacement, with 89% of the population living in extreme poverty.[18]

Obese children are often middle-class and well-off, while children in Syria, with their different socio-economic and cultural backgrounds, suffer from a range of economic, social and psychological stresses in the context of war, economic blockade, environmental and health disasters, which have had an impact on their psychological and physical health. These factors contributed to the lack of significant differences in depression scale scores between the two groups.

In contrast, *Lindberg et al.[19]* in a national study in Sweden of 12,507 obese children found an increased incidence of depression in obese children and found that other risk factors associated with depression such as neurological and psychiatric disorders and low socio-economic status were higher in obese children and adolescents.

Jahanbin et al.[20] also found no significant differences in depression levels between obese and normal-weight children This was explained by the nature of the sample on which his study was conducted, as it was limited to patients with first-degree obesity, and that severe obesity is associated with the occurrence of depression, not simple obesity.

Because depression is a multifactorial disease resulting from the interaction of a combination of genetic, environmental and biological factors, it has been difficult to determine whether obesity alone, and independently of other risk factors, causes an increase in depressive symptoms. This requires further longitudinal studies to monitor the impact of obesity on children's mental health and the development of depressive symptoms and to investigate mediating factors in the development of depression, such as bullying, low self-esteem and distorted body image.

Study limitations: The sample size and the method of sampling from the clinics are limitations of the study because obese children often visit the clinics with physical complaints of psychological origin resulting from their desire to miss school due to bullying and withdrawal from sports activities in addition to the psychological effort associated with dieting and food deprivation in order to lose weight. The use of a questionnaire to investigate symptoms of depression is another limitation because the response to the questionnaire may be influenced by the socially desirable answer; therefore, the two groups were compared on the basis of symptoms, not disease.

CONCLUSIONS

Obesity is a predisposing factor for depression in children, and the risk of depression in obese children increases with the severity of obesity. Low socioeconomic status, low family income, difficult living conditions, trauma, and a disrupted family situation are all predisposing factors for early depression and mental health disorders in obese and normal-weight children.

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