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The Influence of Body Weight on the Reproductive Health of Adolescents

Sobotie Stephanie Efua

Family Physicians (Obstetrics), Department of Family Medicine, Alberta Health Service, Calgary, Alberta.

ABSTRACT

The study aims to address the prevalent issue of childhood and adolescent obesity, affecting over one-third of this population and leading to various health consequences, including reduced fertility potential and earlier puberty. The research evaluates gender differences in the impact of obesity on adolescent sexual activity and examines its association with physical and psychological problems. Methods involve analyzing body mass index (BMI) to age and sex, using data from multiple studies, including a cross-sectional study in Florianópolis, Brazil. Results indicate that obesity is linked to earlier puberty, abnormal uterine bleeding, and increased risk of polycystic ovarian syndrome (PCOS) in adolescents. The findings highlight the necessity of comprehensive treatment approaches, encompassing medical intervention, psychological support, and lifestyle modifications. This study contributes to the understanding of obesity's multifaceted impact on adolescent health and emphasizes the need for tailored interventions to mitigate its adverse effects.

KEYWORDS: *childhood obesity, adolescent health, body mass index, sexual activity, early puberty, psychological problems, polycystic ovarian syndrome, medical intervention, lifestyle modification, comprehensive treatment.*

INTRODUCTION

Childhood and adolescent obesity has become a very common problem, affecting more than one-third of children and adolescents and predisposing them to adult obesity and its associated health consequences. One such consequence is reduced fertility potential. Research shows gender differences in the effects of body weight on adolescent sexual activity, with increased body weight reducing the likelihood of sexual activity in adolescent girls but not boys. Obesity is also associated with earlier puberty and a variety of physical and psychological problems, including increased disease risks and reduced quality of life. Methods for measuring body mass index (BMI) take into account age and sex differences to accurately identify adolescents at risk for weight-related diseases. A study of high school students found that being overweight is associated with earlier puberty in boys and girls. Obesity in adolescence is associated with abnormal uterine bleeding and an increased risk of polycystic ovarian syndrome (PCOS), which requires careful medical monitoring and treatment. Problems associated with obesity include the development of negative body image, decreased self-esteem, victimization by peers and adults, and risk of depression and anxiety. These factors complicate the social and psychological development of adolescents, requiring a comprehensive approach to treatment and support that includes medical intervention, psychological support, and lifestyle modification.

Today, obesity among children and adolescents has become a major public health problem in the United States, where more than one-third of youth are either overweight or obese. Projections show that by 2050, about 25% of children under the age of 16 will be obese. This problem not only predisposes to obesity in adulthood but is also associated with various health consequences, including reduced fertility [1]. Studies have also found gender differences in the impact of body weight on adolescent sexual activity: weight gain decreases the likelihood of sexual activity in girls, while the association is less clear in boys. Obesity is more common among women, less educated and socioeconomically vulnerable populations, and certain racial and ethnic groups. The condition is associated with a host of other health problems and significant medical costs. Being overweight or obese during adolescence significantly increases the risk of obesity in adulthood.

Obesity has a significant negative impact not only on physical health but also on the psychological and social well-being of adolescents. It particularly affects overweight and obese adolescents. Key areas important during adolescence, such as developing a positive body image, forming peer groups, developing sexual identity, and creating intimate relationships, are jeopardized by being overweight.

Adolescents with chronic illnesses, especially those with physical manifestations of these illnesses, often struggle

with self-esteem and body perception issues. Obesity, being a chronic condition, can lead to additional health conditions and problems that make it difficult to reach key developmental milestones related to self-esteem and body image.

Early puberty associated with obesity, especially in girls, is a significant risk factor for the development of negative body image. Earlier onset of menarche in overweight girls leads to increased victimization by both peers and adults [5,6].

Overweight and obesity in adolescents are associated with decreased life satisfaction and self-confidence, as well as increased bullying and victimization. These negative experiences can lead to anxiety, depression, and feelings of isolation, the longer the overweight persists, the more intense the symptoms of depression. Victimization experiences interfere with normal relationship development by causing obese young people to view themselves as a support for others, which can be particularly harmful in romantic relationships, increasing the risk of victimization.

METHODS

Several studies were analyzed in this paper. One study was conducted in 2007 in Florianópolis, Brazil, a cross-sectional study involving 2,339 schoolchildren aged 8 to 14 years (1,107 boys) randomized by region and school type. Participants self-rated their puberty according to Tanner's stages of sexual development, using mean age to assess stages of genital, breast, and pubic hairline development. Another study focuses on differences in the so-called "teen sex market" between teens who are not obese and obese teens. Comparisons were also made between teens in each group by gender.

RESULTS AND DISCUSSION

Body mass index (BMI) can be defined as weight in kilograms divided by height in meters squared. It is an inexpensive method to identify adolescents at risk for weight-related diseases. Standard BMI categories for adults do not take age and gender into account, so they cannot be applied to adolescents. To properly interpret BMI in individuals under 19 years of age, growth charts should be used to determine BMI percentiles by age and sex.

Overweight	Greater than or equal to 85th percentile to less than 95th percentile
Class I	Greater than or equal to 95th percentile to less than 120% of the 95th percentile
Class II	Greater than or equal to 120% to less than 140% of the 95th percentile, or BMI greater than or equal to 35, whichever is lower
Class III	Greater than or equal to 140% of the 95th percentile, or BMI greater than or equal to 40, whichever is lower

Abbreviation: BMI, body mass index.

Data from Skinner AC, Perrin EM, Moss LA, Skelton JA. Cardiometabolic risks and severity of obesity in children and young adults. N Engl J Med 2015;373:1307–17.

Figure 1. Weight categories [4]

BMI does not measure obesity directly, so it does not always accurately predict health risks, especially in athletic adolescents with high muscle mass and sedentary adolescents with low muscle mass. Overweight in adolescents is defined as a BMI at or above the 85th percentile, obesity at or above the 95th percentile, and severe obesity at or above the 99th percentile. Extreme obesity describes adolescents with a BMI equal to or greater than 120% of the 95th percentile for their age [4].

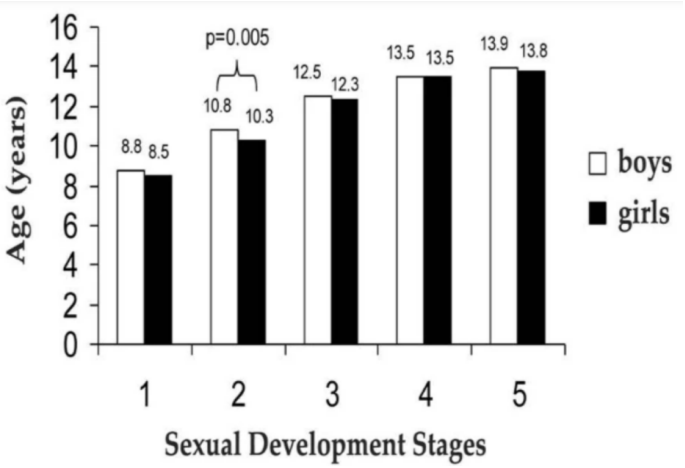

Figure 2. Mean age at stages of pubertal development in boys and girls [3]

Overweight in children is associated with earlier onset of puberty and may influence their sexual behavior during adolescence. This is supported by studies conducted in Florianópolis, where in boys, being overweight is associated with premature genital development and hair loss. The mean age of onset of puberty was younger in overweight children than in normal-weight peers. These findings suggest that the influence of obesity should be taken into account when assessing puberty in adolescents and that more research in this area is needed [3]. It is important to remember that both physical health and psychological and social aspects play an important role in the healthy development of adolescents, including the impact of weight on sexual behavior and the risk of various forms of sexual practices (anal sex, sex in exchange for money or drugs, casual sex) and concurrent alcohol or drug use [2].

The scientific community has traditionally believed that being overweight may protect against early sexual initiation, especially among middle-class white women. This theory was based on the idea that the stigma of being overweight prevented young people from being perceived as desirable partners, which delayed the onset of sexual activity. It was thought that overweight adolescents, faced with negative social evaluations, would be less likely to engage in early sexual activity.

However, studies with more racially diverse populations have shown that the relationship between weight and age of sexual initiation is not as clear among black and Hispanic youth. There is less weight stigma in these communities, which may explain the lack of significant differences in age

of sexual initiation between normal-weight and overweight adolescents. In particular, in some cultural contexts, being overweight may not be perceived as a significant barrier to engaging in sexual activity.

Contemporary research, however, has challenged these findings. They have shown that adolescents with a high body mass index (BMI), regardless of race, are more likely to engage in risky sexual practices. This may indicate that being overweight not only offers no protection against early sexual debut but may also contribute to the development of unhealthy sexuality. Overweight adolescents may experience low self-esteem and may seek sexual activity as a way to enhance their social status or self-image [3].

These new findings contradict earlier observations and point to the need for a more in-depth study of the influence of weight on sexual behavior in different ethnic groups. It is important to consider the complex influence of social environment, cultural norms, and individual psychology on adolescent behavior. Further research is needed to understand how different factors interact and influence the sexual development and behavior of adolescents with different BMIs.

Another problem that has been identified in studies of obese adolescent girls is uterine bleeding. Abnormal uterine bleeding is common in obese adolescents due to various factors such as anovulation, elevated free estrogen levels, and hyperandrogenism. These factors have a significant impact on the reproductive health of adolescents, causing disruption of the normal menstrual cycle and leading to prolonged and heavy bleeding. Elevated levels of free estrogen, often found in obese adolescents, can stimulate endometrial overgrowth, increasing the likelihood of bleeding. The hyperandrogenism associated with obesity can also disrupt normal hormonal balance, contributing to the development of anovulatory cycles, which are a major cause of abnormal uterine bleeding.

When treatment for abnormal bleeding fails, endometrial examination is recommended, especially in obese adolescents. This examination is necessary to exclude more serious pathologies such as endometrial hyperplasia or even endometrial cancer, the risk of which is increased in obese adolescents. Timely diagnosis and intervention can prevent the development of complications and preserve reproductive health.

Polycystic ovary syndrome (PCOS), which can lead to serious consequences, often manifests itself during adolescence. This syndrome is characterized by chronic anovulation, hyperandrogenism, and polycystic ovaries, and is often associated with obesity. The diagnosis of PCOS should be considered in adolescents with obesity, hirsutism, or menstrual irregularities. Adolescents with PCOS may also experience skin problems such as acne and seborrhea, as well as changes in adipose tissue distribution, which may further impair their quality of life and self-esteem [4].

Diagnosing PCOS in adolescents can be challenging due to its similarity to normal pubertal development. During adolescence, normal hormonal changes may mimic the signs of PCOS, such as irregular menstruation and a temporary increase in androgen levels. Therefore, a thorough physical examination including blood tests for hormone levels, ovarian ultrasound, and evaluation of clinical symptoms is necessary for accurate diagnosis. Early diagnosis and adequate treatment of PCOS in adolescents can help avoid long-term complications such as infertility, metabolic disorders, and cardiovascular disease. Attention to abnormal uterine bleeding and PCOS in obese adolescents is an important aspect of medical surveillance. Timely diagnosis and appropriate treatment can significantly improve the quality of life and health of adolescents, helping them cope with these complex conditions and preventing the development of serious complications in the future. Figure 3 summarizes the recommendations of the Pediatric Endocrine Society to assist in the diagnosis of PCOS in adolescents.

Clinical Finding	Recommendation
Hirsutism	• Isolated mild hirsutism should not be considered clinical evidence of hyperandrogenism in the early postmenarcheal years • Moderate-to-severe hirsutism constitutes clinical evidence of hyperandrogenism • Adolescents with acne that is persistent and poorly responsive to topical dermatologic therapy should be evaluated for the presence of hyperandrogenism before initiating medical therapy
Biochemical hyperandrogenism	• Hyperandrogenism should be defined based on the detailed characteristics of the testosterone assay • Biochemical evidence of hyperandrogenism, as indicated by persistent elevation of serum total or free testosterone levels, or both, and determined in a reliable reference laboratory, provides the clearest support of the presence of hyperandrogenism in an adolescent girl with symptoms of PCOS • A single androgen level greater than 2 SDs above the mean for a specific assay should not be considered to be evidence of hyperandrogenism in an otherwise asymptomatic adolescent girl
Oligo-anovulation	• Menstrual intervals persistently shorter than 20 days or more than 45 days in individuals 2 or more years after menarche are evidence of oligo-anovulation • A menstrual interval greater than 90 days is unusual even in the first year after menarche and requires further investigation regardless of year after menarche • Lack of onset of menses by age 15 years or more than 2 years after thelarche regardless of chronologic age is uncommon and warrants further investigation
Polycystic ovarian morphology	• No compelling criteria to define polycystic ovarian morphology has been established for adolescents • An ovarian volume of greater than 12.0 cm^3 can be considered enlarged • Follicle counts should not be used to define polycystic ovarian morphology in adolescents • Multifollicular pattern is more common in adolescents, does not have a relationship with hyperandrogenism, and should not be considered a pathologic finding • In healthy girls with regular menstrual cycles and no evidence of hyperandrogenism, polycystic ovarian morphology does not indicate a diagnosis of PCOS • Antimüllerian hormone concentration is elevated in adolescents with PCOS and is being explored as a surrogate for antral follicle count. Although currently it has no role in the diagnosis of PCOS, it has potential as a screening tool.* • Abdominal ultrasonography, particularly in obese adolescents, may yield inadequate information • Ovarian imaging can be deferred during the diagnostic evaluation of PCOS until better quality or consistent data are available
Insulin resistance or hyperinsulinemia	• Insulin resistance and hyperinsulinemia should not be used as diagnostic criteria for PCOS • Insulin resistance and hyperinsulinemia can be considered as indications to investigate and treat potential comorbidities

Figure 3. Pediatric Endocrine Society recommendations for the diagnosis of polycystic ovary syndrome in adolescents [4]

Even if the diagnosis of PCOS cannot be definitively made in adolescence, treatment may be appropriate. The goal of treating PCOS in adolescents is to eliminate bothersome symptoms. Weight loss helps restore menstrual regularity but has little effect on hirsutism. Metformin is used for impaired glucose tolerance but is not superior to lifestyle modification.

Combined hormonal contraceptives normalize menstrual cycles and androgen levels, and eliminate acne. They also

protect against unwanted pregnancy and reduce the risk of endometrial cancer. Progestin intrauterine devices (IUDs), implants, and depot medroxyprogesterone acetate (DMPA) reduce heavy bleeding and provide effective contraception, but may cause irregular bleeding and do not improve skin manifestations of hyperandrogenism [4,7,8].

CONCLUSION

Overweight in adolescents affects their physical, psychological, and social well-being. Important developmental milestones, such as the development of positive body image and the development of intimate relationships, may be disrupted. Research suggests that being overweight does not protect against early sexual debut, but may contribute to the development of unhealthy sexuality. Abnormal uterine bleeding and polycystic ovarian syndrome (PCOS) are significant problems for obese adolescents.

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