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Correlation Between Obesity And Sexual Precocity Of Pre-Pubertal Girls In The Republic Of Dagestan

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Abstract

Introduction: The original article considers obesity as a factor of premature development in girls due to the relevance of this problem in our time. [1] Gonadotropin-dependent (central, or true), gonadotropin-independent and partial forms are distinguished. Gonadotropin-dependent premature sexual development (GPR) is associated with activation of the central link of the hypothalamic-pituitary-gonadal system.[2],[3] The cause may be tumors of the chiasmal cell region, organic lesions of the central nervous system, genetic disorders..[4] Gonadotropin-independent PPD is caused by the secretion of sex steroids by gonads or tumors of the gonads or adrenal glands, excessive production of androgens by the adrenal glands due to steroidogenesis disorders. Partial forms represent an isolated enlargement of the mammary glands in girls and an isolated development of puberty. [5] Leptin and adiponectin of adipose tissue act on the hypothalamo-pituitary system and activate GnRH. The hormone initiates the production of FSH and LH of the pituitary gland, which have their effects on peripheral organs.[6],[7] It is also noted that peers are ahead of their physical development at the very beginning, but later, due to the early closure of the epiphyses, stunting is also often observed. [8],[9]
Objectives: To discover the connection between high BMI in the pre-puberty period and premature puberty of girls. Brooke C.G.D., Brown R.S. in the book "Guide to pediatric endocrinology." they write: "Direct measurements of body fat (hydrodensitometry, BIA or DEXA) are interesting, but BMI (weight in kilograms divided by the square of height in meters) is easy to calculate and correlates adequately with direct indicators, so BMI is often used to determine obesity.[10]
Methods: Based on the case histories of patients from hospitals in many cities and districts of the republic, this problem was studied.
Results: The result of the study showed that there is a direct relationship between premature telarche, pubarche and menarche and BMI > 85%. In conclusion, we want to confirm once again the existence of this relationship in children. It is necessary to observe the diet, eliminate physical inactivity in girls to prevent obesity and the development of this pathology, and in the future metabolic syndrome and PCOS. [11]
Conclusions: It was found in this study that the risk of developing PPD increases if a girl is obese of the 1st degree. It is necessary to continue studying girls with obesity of 2 and 3 degrees in order to obtain more information and discover the relationship between BMI and PPD. Lifestyle modification is recommended for younger children – restriction of sweet, fatty foods, the use of hard-to-digest carbohydrates, proteins, as well as the prevention of physical inactivity.

Keywords: obesity, sexual development, pediatric endocrinology, juvenile gynecology, nutrition, physical inactivity, pediatrics, telarche, menarche, pubarche.

1. Introduction

Overweight in children in our century is a matter of course, given the lifestyle, sleep and wakefulness rhythm disorders, stress, nutrition, breastfeeding for less than 6 months, the introduction of carbohydrate foods as complementary foods, the use of a soy protein mixture (phytoestrogen), stress and many other factors leading to a deterioration in metabolism[12] It is believed that puberty on average occurs at 11.2 (±1.1) years in girls and at 11.6 (±1.1) years in

boys. [13], [14] It has also been proven that a high body mass index leads to accelerated maturation of the epiphyseal growth plate, which means that growth lag in the puberty period. The X-ray reveals an advance in bone age by two or more years. Leptin and adiponectin of adipose tissue act on the hypothalamic-pituitary system and activate gonadotropin-releasing hormone. It, in turn, initiates the production of FSH and LH of the pituitary gland, which affect the peripheral glands - testicles, ovaries, which produce more sex hormones.

2. Objectives

Objective: to discover the relationship between high BMI in the prepubescent period and the presence of premature puberty in girls.

3. Methods

Based on the patient's medical records, the problem was studied in the Republican Clinical Hospital of Makhachkala (Department of Endocrinology), polyclinic No. 8 of Makhachkala, RDC (Endocrinological Dispensary), Children's Republican Clinical Hospital named after Kuraeva, Children's Polyclinic No. 3, Children's Polyclinic No. 5, Children's Polyclinic No. 2, Children's Polyclinic No. 4, Children's Polyclinic No. 1, Children's Center for Restorative Medicine and Rehabilitation, Republican Children's Polyclinic, Children's Polyclinic No. 1, Health Medical Center, Central City Hospital Kaspiysk, Buinaksk Children's Health Center. Children's polyclinic of Derbent, Children's polyclinic No. 2 of Khasavyurt, Children's polyclinic of Dagestan Lights, GBU Central district polyclinic of Tarumovsky district. A statistical analysis of 768 medical records of obese girls from 2015 to 2023 was carried out. For an objective assessment of the development of premature sexual development, the Tanner scale is used – the degree of development of the mammary glands, menstrual function and pubic hair. [8] Ten of the girls surveyed at the age of 5 have a normal body weight according to the criteria of the World Health Organization 2006 [WHO Child Growth Standards]. [15]
The distribution of girls by age and body weight is shown in table 1.

Table 1 Distribution of girls by age and body weight

Body weight	Age, years				All
	5	6	7	8	
Normal	10	18	6		34
Redundant	20	39	96		155
Obesity of the 1st degree	36	27	103	275	441
Obesity of 2-3 degrees	1		73	50	124
n	67	84	278	325	754

The distribution of girls by age and sexual development is shown in table 2.

Table 2 Distribution of girls by age and sexual development

Period	Age, years				All
	5	6	7	8	
Pubarheh	32	31	113	81	257
Telarche	23	45	128	172	368
Menarche	17	8	36	72	133
N	67	84	278	325	754

Statistical data processing was carried out using the SPSS program. The difference between the groups was assessed according to the Mann-Whitney criterion with a significance level of P=0.05. We calculated the relative risk (RR) of premature sexual development (PPD) in age groups with a 95% confidence interval (95%CI).

4. Results

Normal body weight was determined in 5-6-year-old girls (82.3%), and overweight was mainly characteristic at the age of 6-7 years (87.1%). The age structure showed the highest incidence of obesity in grades 1 and 2-3 at the age of 7-8 years (85.8% and 99.2%, respectively). Consequently, overweight and obesity increase with increasing age of girls (Table 3).

Table 3 Age structure of girls with different body weight (%)

Body weight	Age, years				All
	5	6	7	8	
Normal	29,4	52,9	17,6	0,0	100,0
Redundant	12,9	25,2	61,9	0,0	100,0
Obesity of the 1st degree	8,2	6,1	23,4	62,4	100,0
Obesity of 2-3 degrees	0,8	0,0	58,9	40,3	100,0
N	8,9	11,1	36,9	43,1	100,0

The structure of girls' body weight shows that girls aged 5 had a body mass index from 17 to 24 kg/m2 in 98.5% of cases, at 6 years – 100%, at 7 years – a body mass index from 18 to 34 kg/m2 – 97.8%, 8 years – obesity in all girls (Table 4).

Table 4 Body weight structure in girls aged 5 to 8 years (%)

Body weight	Age, years				All
	5	6	7	8	
Normal	14,9	21,4	2,2	0,0	4,5
Redundant	29,9	46,4	34,5	0,0	20,6
Obesity of the 1st degree	53,7	32,1	37,1	84,6	58,5
Obesity of 2-3 degrees	1,5	0,0	26,3	15,4	16,4
N	100,0	100,0	100,0	100,0	100,0

As shown in Figure 1, normal body weight was typical for girls aged 5-7 years. Periods of puberty and telarche were detected in all girls with normal body weight, only 6-year-olds had menarche (Fig. 1).

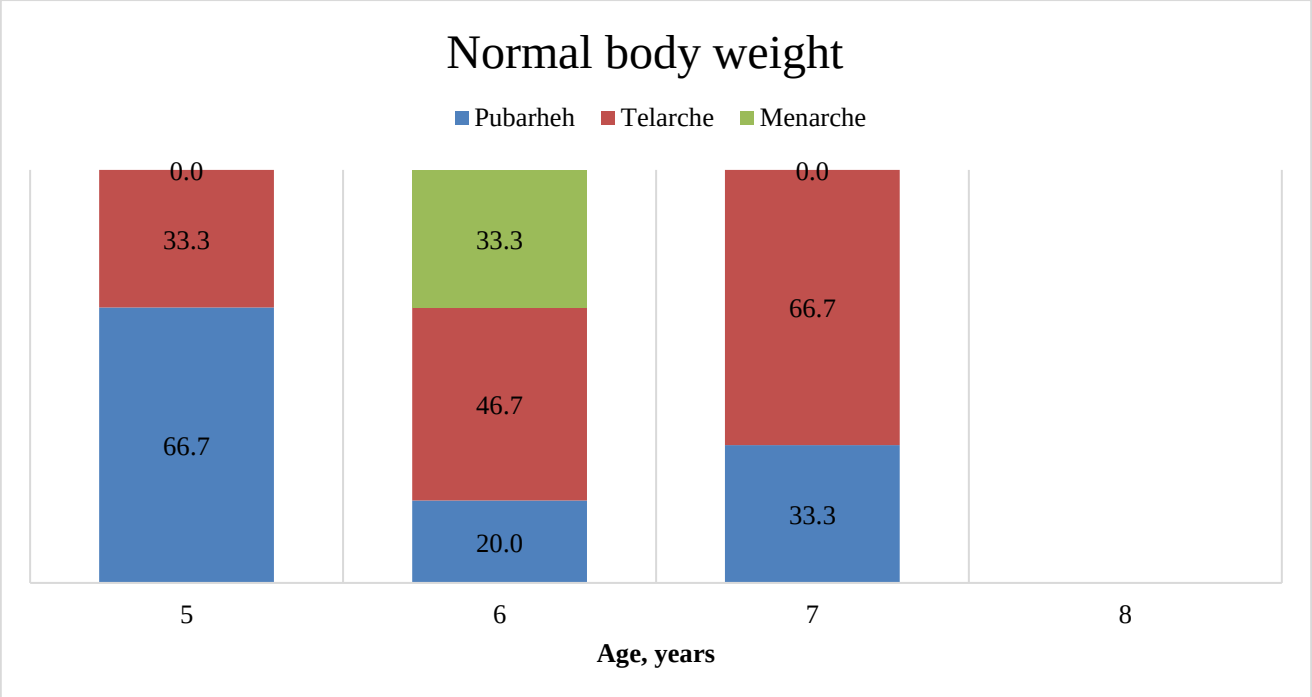

Figure 1. The periods of sexual development of girls 5-8 years old with normal body weight.

The RR of the development of PPD with normal body weight of girls, depending on age, was 1.0 (95% CI 0.53-1.9). Overweight was also observed at the age of 5-7 years. Overweight is characterized by the period of sexual development of menarche at all ages. The telarche period mainly occurred at the age of 6-7 years. Significant differences in the development periods between the ages are explained by the fact that there were only 18 overweight girls (Fig. 2).

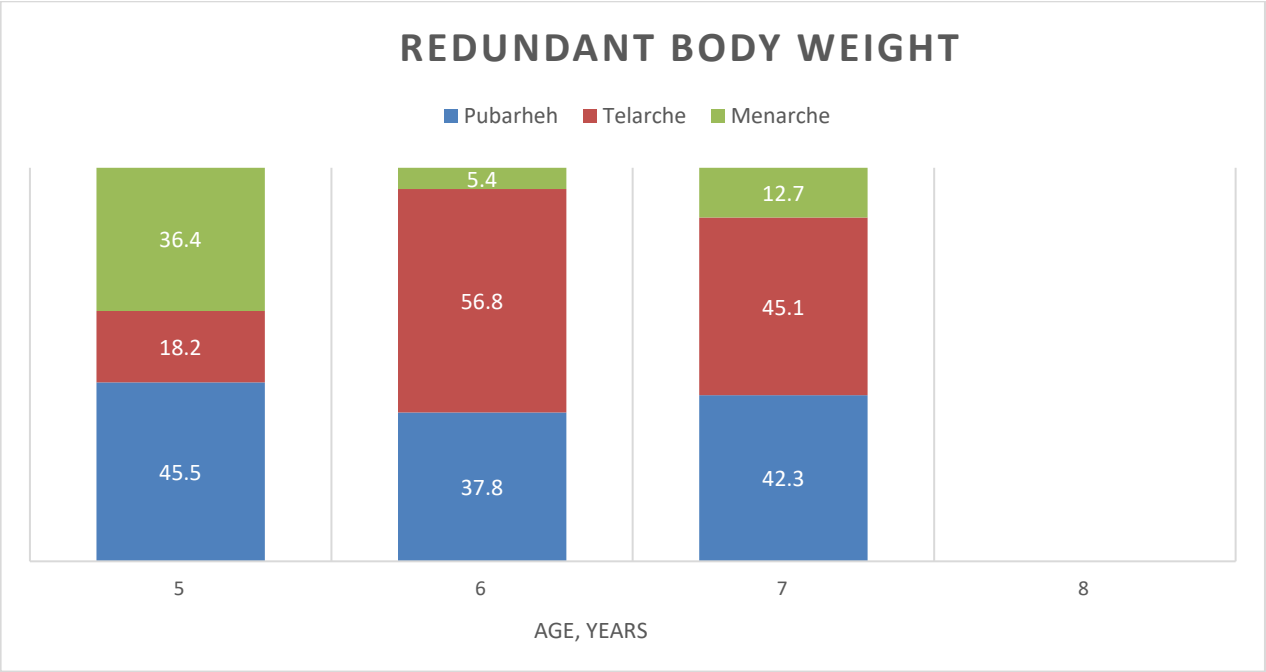

Figure 2. Periods of sexual development of overweight girls aged 5-8 years.

In overweight girls in the age groups 5-6 and 7-8 years, the RR was 1.03 (95% CI 0.77-1.37).
A comparative analysis of the periods of sexual development of girls with obesity of the 1st degree showed that more than 40% were in the period of telarche. The frequency of puberty varied between 23.3% and 43.8%. The menarche period is marked in all age groups (Fig. 3).

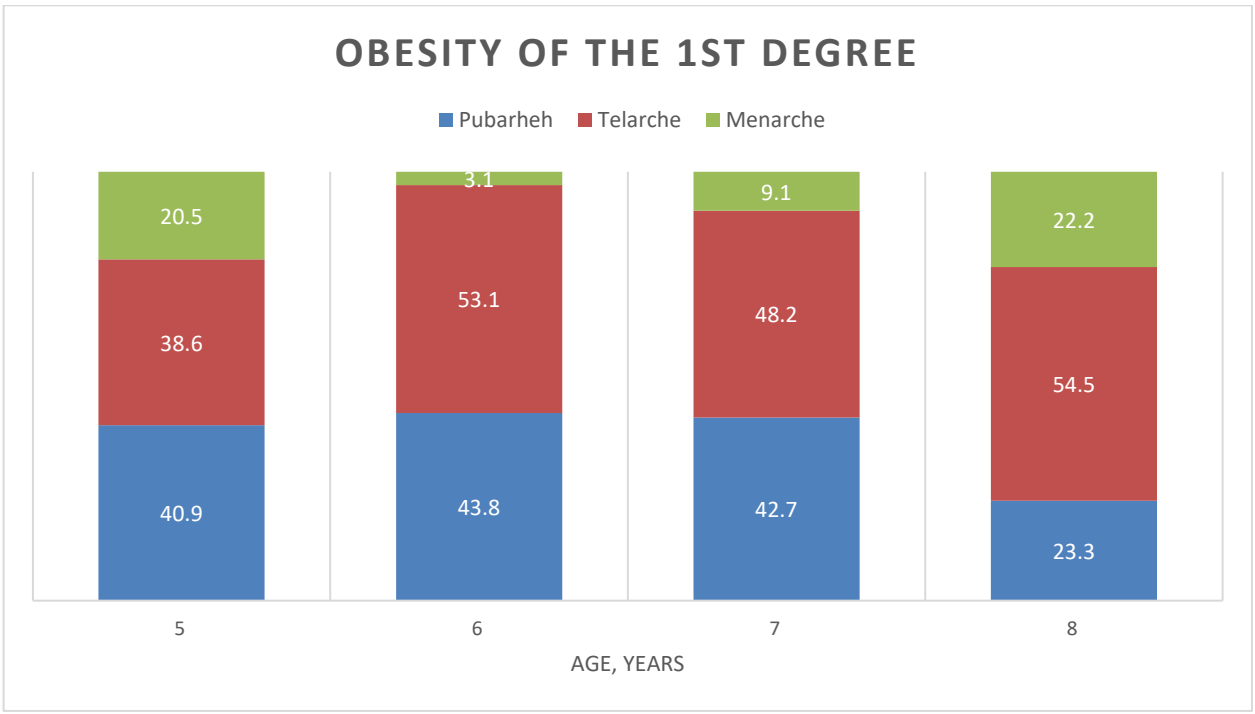

Figure 3. The periods of sexual development of girls 5-8 years old with obesity of the 1st degree.

In the group of girls with grade 1 obesity, the relative risk of developing PPD in girls aged 7-8 years was significantly higher compared to the age of 5-6 years and amounted to 0.82 (95% CI 0.67-0.998).
In 124 girls with obesity of 2-3 degrees, the structure of sexual development at the ages of 7 and 8 years was the same. At the same time, puberty was noted in 35.6% of girls, telarche – in 44.3%, menarche - in 20.1% (Fig. 4).

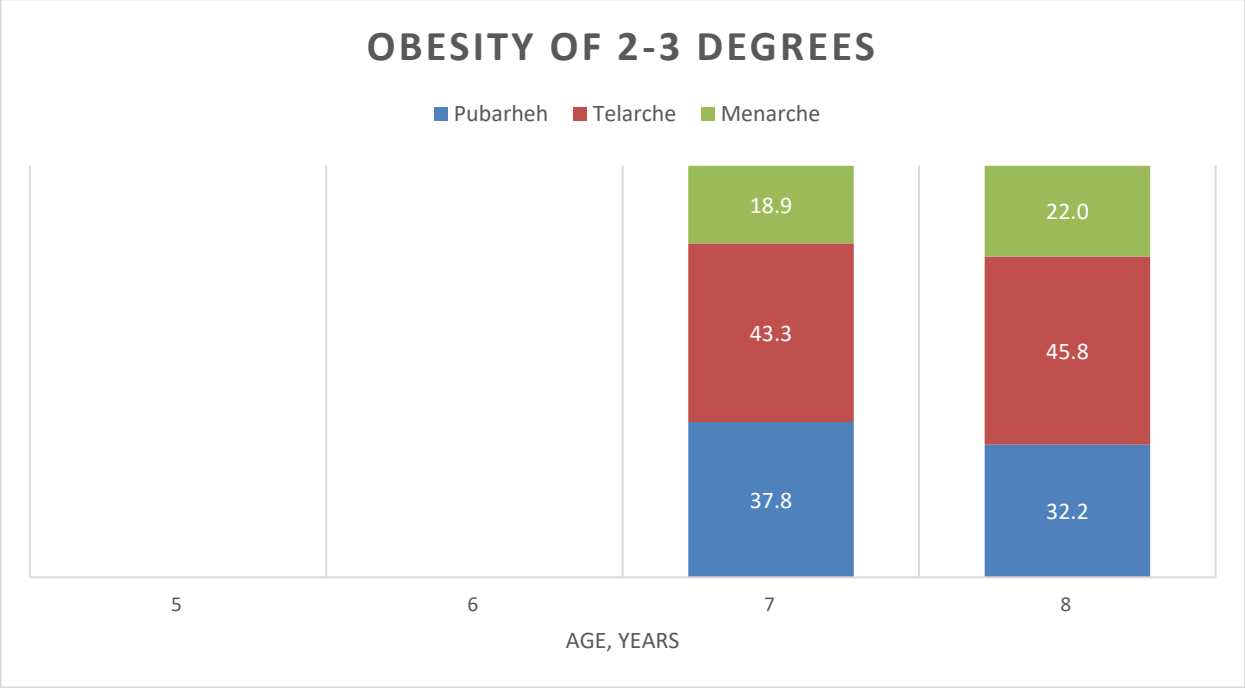

Figure 4. The periods of sexual development of girls 5-8 years old with obesity of 2-3 degrees.

5. Discussion

The nutritional characteristics of the population of the Republic of Dagestan currently contribute to an increase in the proportion of children with an increased BMI. According to the results of our study, obesity was observed in 74.9% of cases in girls aged 5-8 years in Dagestan.

An analysis of the results of studies in other localities and countries has shown the existence of a relationship between obesity and premature sexual development, and in a number of studies - the absence or doubtfulness of the results. In a study by V.V. Dedov and others, it was noted that in the Moscow region in 2005, girls aged 10-18 years were studied. Obesity was found in 15%. Menarche was observed up to 15 years old, at the maximum - at 13 years old, at the minimum – at 10 years old [16]. Our work differs in that we studied an earlier age. It is also possible to note an increase in obese patients compared to 2005.

In the article by A. Kubo, a direct link was noted between early puberty and intrauterine exposure to hyperglycemia and obesity in the mother [17]. The results of our work also confirm the early sexual development of girls, even at the age of 5-8 years.

In the work of I.R. Mustafayeva, 89 girls aged 13-17 were studied. There was an increase in follicle-stimulating, luteinizing hormones, hyperprolactinemia, changes in the function of the adrenal glands and thyroid gland. The amount of hair on the Ferriman-Colvey scale is 20.1±0.13 points [18]. The early sexual development of girls in Dagestan is also likely associated with increased hormone production at the age of 5-8 years.

The proven link between childhood obesity and premature puberty was confirmed in this study. At the same time, the greater the weight of the examined girl, the earlier sexual development was observed earlier. [19] it was found in this study that the risk of developing ppd increases if a girl is obese of the 1st degree. It is necessary to continue studying girls with obesity of 2 and 3 degrees in order to obtain more information and discover the relationship between bmi and ppd. Lifestyle modification is recommended for younger children – restriction of sweet, fatty foods, the use of hard-to-digest carbohydrates, proteins, as well as the prevention of physical inactivity. [20] it is also necessary to create a favorable environment within the family, since stress is also a factor in the development of pathology. [21] pregnant women need to realize that her lifestyle completely affects the development of the fetus, which can even lead to diabetes mellitus of the child due to dietary errors. Nursing mothers need to convey the idea of the importance of breastfeeding, the dangers of feeding a child and using mixtures unnecessarily. [22]

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