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SOMATIC AND REPRODUCTIVE HEALTH IN OBESE ADOLESCENTS

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The purpose of the work was to study the somatic and gynecological history of obese adolescent girls.

Materials and methods. Over the past 5 years, information has appeared about a change in the morbidity structure towards an increase in endocrine disorders, which significantly affect the development of gynecological pathology. We examined 120 adolescent girls aged 13 to 17 years. The main group included 100 obese girls; the control group included 20 non-obese girls. The formation of menstrual function in girls aged 13-17 years old was assessed on the basis of the following data: age of menarche, duration of the menstrual cycle, number of days of menstruation, intensity of blood loss, presence of pain syndrome.

Height was measured on a vertical stadiometer (verified and approved for work). Determination of body weight was carried out using medical scales of any modification with a measurement range corresponding to the age characteristics of the patient. To assess the severity of obesity, all patients were determined by the body mass index according to Brey (1978) by the formula.

Results and discussion. Somatic diseases were revealed in a significant amount in the subjects of the main group. An important factor should be noted both for girls of the main and control groups – the presence of 3-4 diseases is characteristic. Obese girls are characterized by a high incidence of gynecological diseases, especially inflammatory ones. Uterine hypoplasia was observed in 12 (12%) girls of the main group, polycystic ovary syndrome – in 16 (16%). The Ferriman-Gallwey index in adolescents in the main group was 9 (6.0 - 10.0), in the examined control group – 6 (5.0 - 7.0). The number of adolescent girls with increased body hair growth (Ferriman-Gallwey index above 8) in the main group was 77 (77%), which is significantly higher than in the control 2 (10%). 24 patients of the main group had a regular menstrual cycle from the moment of formation, in other cases violations were observed: irregularity – 43 (43%), painful menstruation – 61 (61%). The duration of the menstrual cycle was within the normal range in 18 (18%) adolescent girls in the main group and in 65% in the control group. The average cycle duration was 28±2.4 days and 28±1.3 days, respectively, for the groups.

Conclusion. Our study showed a high incidence of somatic and reproductive diseases against the background of obesity in adolescents aged 13-17 years. As a result of analyzes of own research, a link was revealed between obesity and menstrual irregularities. We believe that the correction of body weight will lead to the normalization of the menstrual cycle, even without the use of additional therapy.

Keywords: somatic health, reproductive health, adolescents, girls, obesity, menstrual cycle.

Introduction. Along with many negative factors – environmental, social, etc., the modern world is characterized by another very serious problem – a low level of reproductive potential of modern adolescent girls. First of all, this is due to the high overall morbidity: for every girl there are more than three diseases; modern girls are 15% more painful than boys; 70% of girls suffer from chronic diseases (gastrointestinal tract, respiratory system, central nervous system, cardiovascular system) [1, 2].

A special role is played by psychological situations associated with the processes of the formation of reproductive functions and the formation of a gender-related social status [3].

According to literary sources, the proportion of children suffering from gynecological diseases ranges from 4.3% to 26.4% [4]. An even greater discrepancy is found in similar indicators of the prevalence of certain gynecological diseases by age group [5].

Over the past 5 years, information has appeared about a change in the morbidity structure towards an increase in endocrine disorders, which significantly affect the development of gynecological pathology [6].

The problem of obesity is extremely urgent. The number of obese patients is twice the number of patients with diabetes mellitus (DM), while obesity is expected to increase by 50% over the next 20 years. Despite the large amount of research, the problem of obesity needs further research. Particularly interesting is the question of studying metabolic disorders in females, since fluctuations in the hormonal background during the menstrual cycle can affect various types of metabolism. Obesity is one of the most common chronic diseases in the world and is reaching the proportions of a non-communicable epidemic.

In parallel with the increase in the number of cases of obesity in adults, the number of cases of obesity in children increases every year. According to the WHO, in the world more than 155 million children are overweight, more than 40 million are clinically obese, and 20 million children have obesity at the age of less than 5 years [7].

According to the National Center for Health Statistics (NCHS), one in five children in the United States is overweight or obese [8]. American researchers clarified that the prevalence of overweight and obesity among children and adolescents, compared with 1970, increased in different age groups by 2.5-4 times, reaching an average of 37.2% and 17.1%, respectively [9, 10].

The purpose of this study was to study the somatic and gynecological history of obese adolescent girls.

Materials and methods. The work was carried out on the basis of the Department of Obstetrics and Gynecology of the 1st Azerbaijan Medical University, the Perinatal Center of Sabirabad, the Medical Research Center "Saglam Nasil". We examined 120 adolescent girls aged 13 to 17 years. The main group included 100 obese girls, the control group included 20 non-obese girls.

Inclusion criteria:

- age 13-17 years;
- diagnosed obesity of I, II degree;
- violation of the exchange of cholesterol, HDL, LDL;
- informed consent of parents and children for examination.

Exclusion criteria:

- age >13 years old and over 17 years old;
- obesity of III and IV degrees;
- congenital endocrine pathology;
- concomitant extragenital pathology.

All experiments were conducted in accordance with the Council of Europe Convention "On the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine Application of Biological and Medicine Achievements (ETS No. 164)" dated 04.04.1997, and the Helsinki Declaration of the World Medical Association (2008). Each study patient signed an informed consent to participate in the study and all measures to ensure anonymity of patients were taken.

The assessment of the reproductive health of children was carried out on the basis of the study of anamnesis data, the results of an objective, clinical and laboratory study.

The formation of menstrual function in girls of 13-17 years old was assessed on the basis of the following data: age of menarche, duration of the menstrual cycle, number of days of menstruation, intensity of blood loss, presence of pain syndrome.

Height was measured on a vertical stadiometer (verified and approved for work). When this study was carried out, a number of rules were observed: the use of a height meter (stadiometer) with an accuracy of 0.1 cm; the measurement was carried out in a standing position, leaning evenly on both feet, the heels are joined together, the knees are extended; the back of the head, shoulder blades, buttocks and heels touched the stadiometer; the shoulders are down, the head is in the median line; the line connecting the outer corner of the eye and the center of the external auditory canal was located horizontally.

Determination of body weight was carried out using medical scales of any modification with a measurement range corresponding to the age characteristics of the patient, approved for medical use in the Republic of Azerbaijan and attorneys. When carrying out this measurement, the following rules were observed: the accuracy of the scales is up to 0.1 kg; the study was carried out in the morning on an empty stomach.

To assess the severity of obesity, all patients were determined by the body mass index (BMI) according to Brey (1978) by the formula:

BMI = body weight (kg) / height (m) squared

Normal BMI is in the range of 19-25 kg/m^2.

The obtained results were statistically processed by determining the mean mathematical limit (M), standard deviation, mean mathematical limit error (m). The results were considered statistically significant when $p<0.05$. Statistical studies were performed using Microsoft Excel program and Statistica 6.0 program.

Results and discussion. The presented anamnesis of somatic diseases was revealed in a significant amount in the subjects of the main group. As can be seen from the table, endocrine diseases were detected in a small number, only in 21%, we attributed this to an untimely examination and late consultation of a pediatrician, together with an endocrinologist (**Table 1**).

Table 1 – Characteristics of somatic diseases in the examined girls and adolescent girls

Diseases	Surveyed				p
	Main group (n=100)		Control group (n=20)		
	abs. n	%	abs. n	%	
ARVI	96	96	20	100	>0.05
Childhood infections	83	83	18	90	>0.05
Neurological diseases	25	25	2	10	>0.05
Respiratory diseases	47	47	6	30	>0.05
Diseases of the gastrointestinal tract	48	48	12	60	>0.05
Kidney disease	27	27	4	20	>0.05
Endocrine diseases	21	21	1	5	>0.05
Diseases of the Cardiovascular System	9	9	-	-	
Anemia	59	59	6	30	<0.05
Lymphadenitis	7	7	-	-	
Posture disorders	71	71	9	45	<0.05
Myopia	24	24	2	10	>0.05

Significant changes have occurred among the surveyed for the detection of extragenital diseases during puberty. It is known that the age of puberty is characterized by a sharp restructuring of the whole organism, including the hormonal function – there is a sharp increase in the blood of sex steroids, which is associated with a high risk of clinical manifestation of latent somatic diseases and a worsening of the course of a number of diseases, in particular neuroendocrine and hematopoietic systems (**Table 2**).

Table 2 – Characteristics of diseases in the surveyed girls and adolescent girls during puberty

Diseases	Surveyed				p
	Main group (n=100)		Control group (n=20)		
	abs. n	%	abs. n	%	
ENT disease	23	23	3	15	>0.05
Neurological diseases	38	38	2	10	<0.05
Skin diseases (acne)	47	47	1	5	<0.001
Endocrine diseases	61	61	1	5	<0.001
Diseases of the gastrointestinal tract	54	54	2	10	<0.001
Kidney disease	32	32	-	-	
Diseases of the hematopoietic system	74	74	5	25	<0.001
Posture disorders	75	75	4	20	<0.001
Myopia	17	17	2	10	>0.05
Healthy	-	-	10	50	

An important factor should be noted both for girls of the main and control groups – the presence of 3-4 "bunch" of diseases is characteristic. There is not a single girl in the main group who falls under the category "Healthy" or "Relatively healthy", i.e. there is a discrepancy between the subjective and objective assessments of their condition.

According to the literature, by the time of the end of puberty, the development of secondary sexual characteristics should take place in a strict sequence, or violations of the organs of the reproductive system – the uterus, ovaries, and also target organs appear. The characteristics of the age of manifestation of sexual development in obese adolescent girls and girls in the control group are presented in **Table 3**.

The severity of the hairline in the study groups had differences. The Ferriman-Gallwey index in adolescents in the main group was 9 (6.0 - 10.0), in the examined control group – 6 (5.0 - 7.0). The number

Table 3 – Average age at onset of signs of sexual development in girls

Group	Thelarche	Pubarche	Menarche
	M±m 95% CI	M±m 95% CI	M±m 95% CI
Main group (n=100)	38.38±2.62 33.20 – 43.56	11.57±0.11 11.35 – 11.80	11.97±0.16 11.65 – 12.29
Control group (n=20)	11.27±0.13 10.99 – 11.54 P <0.001	11.50±0.14 11.20 – 11.80	11.87±0.05 11.76 – 11.97

of adolescent girls with increased body hair growth (Ferriman-Gallwey index above 8) in the main group was 77 (77%), which is significantly higher than in the control – 2 (10%). Stretch stripes were found in 32 (32%) obese adolescent girls over the age of 13 years (**Table 4**).

Table 4 – Assessment of the condition of the skin

Indicator	Group				p
	Main group (n=100)		Control group (n=20)		
	abs. n	%	abs. n	%	
Stretching of the skin (striae)	32	32	2	10	<0.05
Ferriman-Gallwey Index (points)	9 (6.0–10.0)	9	6 (5.0 – 7.0)	30	<0.05
Ferriman-Gallwey Index (in quantity)	77	77	7	35	<0.001

The degree of sexual development according to Tanner was determined taking into account the severity of the development of the mammary glands, the distribution and intensity of hair growth, the presence and nature of menstruation. In 86 (86%) adolescent girls of the main group and in 19 (95%) of the comparison group, the development of mammary glands and sexual hair growth corresponded to stage 5 (**Table 5**).

Table 5 – Sexual development

Indicator	Group				p
	Main group (n=100)		Control group (n=20)		
	abs. n	%	abs. n	%	
Normal sexual development (Tanner stage 5)	86	86	19	95	>0.05
Delay in sexual development (stage 4 according to Tanner)	14	14	1	5	>0.05

Menarche at the age of 13-14 years was in the majority of the examined patients; 54% of patients in the main group and 35% of the control group. The frequency of menarche up to 12 years old and over 15 years old in the study groups was found in 12% and 15% – in the main group and in 10% and 5% – in the control group.

With regard to finding out the late menarche, the subjects did not go to the doctor. Only 24 patients of the main group had a regular menstrual cycle from the moment of formation, in other cases violations were observed: irregularity – 43 (43%), painful menstruation – 61 (61%). The duration of the menstrual cycle was within the normal range in 18 (18%) adolescent girls in the main group and in 65% of those in the control group. The average cycle duration was 28 ± 2.4 days and 28 ± 1.3 days, respectively, for the groups. There were also identified violations in the quantitative parameters of menstrual function. The duration of the menstrual cycle in 58 (58%) girls was more than 35 days. Violation of the type of menorrhagia occurred in 56 (56%) cases of the main group, the duration of menstruation in this case ranged from 5 to 8 days. In the control group, this violation was noted only in 1 case (5%). Scanty menstrual flow was detected in 15 patients of the main group and in 2 cases in the control group. Bloody discharge from the genital tract before, in the middle and after menstruation was noted only among the patients of the main group (11%). Anamnesis data indicate the presence of algodismenorrhea in 61 (61%) adolescent girls in the main group and in 7 (35%) in the control group.

So what do we see in obese teenage girls? The age of the first menstruation in the subjects varied within the range of 12-14 years. Early menarche was observed in 12 (12%) obese girls, and 15 (15%) patients began to menstruate at the age of 14. Normal menstrual function was observed only in 18% of patients in the main group, irregular menstruation in 76%. Menstrual disorders manifested themselves in the form of hypomenorrhea in 15 (15%) patients, intermenstrual bleeding occurred in 76 (76%), the most frequent menstrual irregularities were hypermenorrhea or metrorrhagia in 56 (56%) cases.

During a gynecological examination, the external genital organs met the age-specific standard criteria. The analysis of gynecological health revealed a significant increase in the frequency of gynecological diseases and surgical interventions on the pelvic organs in girls with complicated puberty, compared with girls with a physiological course of puberty.

Obese girls are characterized by a high incidence of gynecological diseases, especially inflammatory ones. Uterine hypoplasia was observed in 12 (12%) girls of the main group, PCOS – in 16 (16%). The development of the mammary glands reflects the degree of saturation of the body with both sex and steroid hormones. The revealed dysplasia of the mammary glands is the body's response to metabolic and hormonal disorders (**Table 6**).

Table 6 – Characteristics of gynecological diseases in the examined girls and adolescent girls

Diseases	Surveyed				p
	Main group (n=100)		Control group (n=20)		
	abs. n	%	abs. n	%	
Inflammatory diseases of the external genital organs	18	18	2	10	>0.05
Pelvic inflammatory disease	19	19	1	5	>0.05
Salpingo-oophoritis	21	21	1	5	>0.05
Endometritis	3	3	-	-	
Ovarian cysts	9	9	1	5	>0.05
Polycystic ovary syndrome	16	16	-	-	
Mastopathy	21	21	-	-	
Uterine hypoplasia	12	12	-	-	

Unfortunately, the listed disorders and diseases were revealed for the first time during our outpatient appointment, and therefore, the corresponding drug and non-drug correction was not carried out earlier.

Thus, the relevance of studying obesity in the present time is not questioned, since along with the development of socially significant diseases such as hypertension, atherosclerosis, type 2 diabetes mellitus, etc., they play an important role in the development of various reproductive health disorders. On the other hand, the frequency of overweight and obesity among adolescents aged 14-17 is increasing every year and ranges from 10 to 36% [4, 10]. As a result of analysis of literature data and our own research, a link was revealed between obesity and menstrual irregularities. Our study once again confirmed that the correction of body weight leads to the normalization of the menstrual cycle, even without the use of additional therapy.

Conclusions

1. Adolescent girls aged 13-17 years old have a high incidence of somatic and reproductive diseases against the background of obesity. Both for girls of the main and control groups, the presence of 3-4 "bunch" of diseases is characteristic.
2. A link was revealed between obesity and menstrual irregularities.

3. The correction of body weight will lead to the normalization of the menstrual cycle, even without the use of additional therapy.

Perspectives of further research. In the future, it is planned to continue research aimed at studying the correction of body weight by non-drug methods.

References

1. Al-Daghri NM, Al-Attas OS, Alokail MS, Alkharfy KM, Charalampidis P, Livadas S, et al. Visceral adiposity index is highly associated with adiponectin values and glycaemic disturbances. *Eur J Clin Invest*. 2013 Feb;43(2):183-9. PMID: 23278387. doi: 10.1111/eci.12030
2. Andreeva VO, Zaika VG, Tkachenko NV. Psychopathological disorders in the genesis of oligomenorrhea in obese adolescents. *Reproduct Health Children Adolesc.* 2017;2-3:63–72.
3. Cave MC, Hurt RT, Frazier TH, Matheson PJ, Garrison RN, McClain CJ, et al. McClain and Stephen Obesity, Inflammation, and the Potential Application of Pharmaconutrition. *Nutr Clin Pract.* 2008 Feb;23(1):16-34. PMID: 18203961. doi: 10.1177/011542650802300116
4. Centers for Disease Control and Prevention. About BMI of children and adolescents. Available from: https://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html
5. Chang G, Chen S.T. The musculoskeletal effects of obesity. *Curr Opin Pediatr*. 2009 Feb;21(1):65-70. PMID: 19242242. doi: 10.1097/MOP.0b013e328320a914
6. Danilack VA, Dore DD, Triche EW, Muri JH, Phipps MG, Savitz DA. The effect of labour induction in the risk of caesarean delivery: using propensity scores to control confounding by indication. *BJOG*. 2016 Aug;123(9):1521-9. PMID: 26411752. doi: 10.1111/1471-0528.13682
7. de Ridder CM, Thijssen JH, Bruning PF, Van den Brande JL, Zonderland ML, Erich WB. Body fat mass, body fat distribution and pubertal development : A longitudinal study of the physical and hormonal puberty of girls. *J Clin Endocrinol Metab*. 1992 Aug;75(2):442-6. PMID: 1639945. doi: 10.1210/jcem.75.2.1639945
8. Donna M, Feriero M. Medical progress neonatal brain injury. *N Engl J Med*. 2004 Nov;351(19):1985–1995. PMID: 15525724. doi: 10.1056/NEJMra041996
9. Guo F, Moellering DR, Garvey WT. The progression of cardiometabolic disease: validation of a new cardiometabolic disease staging system applicable to obesity. *Obesity (Silver Spring).* 2014 Jan;22(1):110-8. PMID: 23894121. PMCID: PMC3866217. doi: 10.1002/oby.20585
10. Shadyab AH, Macera CA, Shaffer RA, Jain S, Gallo LC, Gass ML, et al. Ages at menarche and menopause and reproductive lifespan as predictors of exceptional longevity in women: the Women's Health Initiative. *Menopause.* 2017 Jan;24(1):35-44. PMID: 27465713. PMCID: PMC5177476. doi: 10.1097/GME.0000000000000710

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СОМАТИЧНЕ ТА РЕПРОДУКТИВНЕ ЗДОРОВ'Я У ПІДЛІТКІВ ДІВЧАТ З ОЖИРІННЯМ

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Резюме. *Мета.* Вивчити соматичний та гінекологічний анамнез підлітків дівчат з ожирінням.

Матеріал та методи. В дослідженні прийняли участь 120 дівчат-підлітків віком від 13 до 17 років. Основна група включає 100 дівчат з ожирінням, 20 дівчат увійшли до контрольної групи без ожиріння. Формування менструальної функції дівчат 13-17 років оцінювалась на основі наступних даних: вік початку менархе, тривалість менструального циклу, кількість днів менструації, інтенсивність крововтрати, наявність больового синдрому. Ріст вимірювали на вертикальному ростомірі (перевіреному та допущеному до роботи). Визначення маси тіла здійснювалось за допомогою медичних ваг будь-якої модифікації з діапазоном вимірювання, що відповідає віковим характеристикам пацієнта. Для оцінки тяжкості ожиріння всім пацієнткам визначали індекс маси тіла відповідно до формули Brey (1978).

Результати. В опитаній основній групі соматичні захворювання були виявлені у значних кількостях. Необхідно відзначити важливий чинник як для дівчат основної, так і контрольної груп – наявність 3-4 захворювань. Для дівчат з ожирінням, характерна висока частота гінекологічних захворювань, особливо запального характеру. У дівчат основної групи гіпоплазія матки спостерігалась у 12 (12%), синдром полікістозних яєчників – у 16 (16%). Індекс Ферріман-Голуея у підлітків основної групи становив 9 (6.0-10.0), в контрольній групі – 6 (5.0-7.0). Кількість дівчат підлітків з підвищеними оволосінням тіла (індекс Ферріман-Голуея вище 8) в основній групі становив 77 (77%), що достовірно вище, ніж у контрольній (2 (10%)). У 24 хворих основної групи менструальний цикл був регулярним з моменту формування, в інших випадках були порушення: нерівномірність циклу – у 43 (43%), болісна менструація – у 61 (61%) дівчат. Тривалість менструального циклу була в межах норми у 18 (18%) підлітків дівчат основної групи, та у 65% контрольної групі. Тривалість середнього циклу становила 28±2,4 дні і 28±1,3 дні, відповідно за групами.

Висновки. Дане дослідження показало високу частоту соматичних та репродуктивних захворювань на тлі ожиріння у підлітків дівчат 13-17 років. В результаті дослідження було виявлено зв'язок між ожирінням та порушенням менструального циклу. Корекція маси тіла призведе до нормалізації менструального циклу навіть без використання додаткової терапії.

Ключові слова: соматичне здоров'я, репродуктивне здоров'я, підлітки, дівчата, ожиріння, менструальний цикл.

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