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THE METHOD OF EVALUATION AND PREDICTION OF FORMATION OF MENSTRUAL FUNCTION OF ADOLESCENT GIRLS

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Timely detection of risk groups at the onset of puberty and menstrual function is key to good physical, sexual, and mental health. Nowadays, many authors work at the problem of identifying risk factors that lead to the disruption of the formation of the reproductive system as well as creat predictive software and maps for the assessment of possible risks of the formation of this system in girls. The paper presents the possibility of predicting the formation of menstrual function in adolescent girls based on prognostic charts. The prognostic chart includes the following criteria: age, health, mother's social position at the time of pregnancy and childbirth, place of birth and residence, and the transferred diseases of a girl with a group definition of health. Medical examination was performed in 432 girls aged 9-13 years and 11 months. It was revealed that more than half of the girls belong to a group with medium risk of all forms of menstrual dysfunction, requiring the attention of a gynecologist for adolescents. The main components of preventive observation and treatment consisted of gynecological examination, normalization of work and rest, nutrition, sanitation of foci of infection, sedative therapy, vitamin therapy, adaptogens, psychological training, physical therapy, and acupuncture. The chart can be used not only by gynecologists for children and adolescents but also by pediatricians, endocrinologists, and health workers in the school setting.

Keywords: adolescent girls; reproductive system; risk factors; prognosis of disturbances.

СПОСОБ ОЦЕНКИ И ПРОГНОЗИРОВАНИЯ СТАНОВЛЕНИЯ МЕНСТРУАЛЬНОЙ ФУНКЦИИ У ДЕВОЧЕК-ПОДРОСТКОВ

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Своевременное выявление групп повышенного риска по нарушению становления периода полового созревания, а также менструальной функции является залогом нормального физического, полового, психического здоровья. На протяжении последнего времени многие авторы работают над проблемой выявления факторов риска, приводящих к нарушению формирования репродуктивной системы у девочек-подростков, а также создания прогностических программ и карт по оценке возможных рисков становления данной системы у девочек. В статье представлены возможности прогнозирования становления менструальной функции у девочек-подростков на основе прогностических карт. Прогностическая карта включает в себя: возраст, здоровье, профессия матери на момент беременности и родов, течение беременности, место рождения и проживания, а также перенесенные заболевания девочки с определением группы здоровья. Проведено обследование 432 девочек в возрасте от 9 лет до 13 лет 11 мес. Выявлено, что более половины девочек по всем формам нарушения менструальной функции относятся к группе среднего риска и требуют регулярного наблюдения у подросткового гинеколога с проведением курсов профилактического лечения. Объем профилактических мероприятий зависел от выявленного отклонения в нарушении становления менструальной функции, а также степени риска. Основные компоненты профилактического наблюдения состояли из осмотра гинеколога (в декретированные или контрольные сроки), нормализации режима труда и отдыха, питания, санации очагов инфекции, седативной терапии, витаминотерапии, адаптогенов, психологического тренинга, физиотерапии, иглорефлексотерапии. Карта может быть использована в работе не только детского и подросткового гинеколога, но и участкового педиатра, эндокринолога, медицинского работника школьных учреждений.

Ключевые слова: девочки-подростки; репродуктивная система; факторы риска; прогнозирование нарушений.

Compared with other body systems, the human reproductive organs are the most sensitive to unstable ecological, economic, social, and adverse moral environments in society. It is well known that a deterioration of general and reproductive health in one generation can directly lead to a decrease in the health of future generations [5-8]. Considering this, children and adolescents are perhaps the most vulnerable groups in a population, and their health status has especially important social and medical implications [10, 11, 13].

Unfortunately, the current system of medical care for children does not provide the necessary level of prevention, diagnostics, treatment, and rehabilitation of reproductive system diseases. Despite a substantial modernization of the reproductive health service in recent years, there is still a clear and steady increase in the number of reproductive system diseases in adolescent girls [9, 12].

However, the timely identification of groups at a high risk of adverse developments in puberty and menstrual function can substantially help improve the probability of normal physical, sexual, and mental health and consequently the likelihood of a "healthy motherhood."

Because of the importance of this issue, several authors have addressed the challenge of developing a set of risk factors that can lead to problems in the development of the reproductive system. Substantial effort has also been devoted to the creation of various prognosis algorithms and charts to assess the impact of various possible risks to the development of the reproductive system in girls [1-3]. In this study, an attempt is made to improve the methods that are currently used in this regard.

MATERIALS AND METHODS

In the course of preventive examinations of girls aged 9-11 years, it is possible to predict the upcoming formation of menstrual function using a method proposed by G.A. Ushakova (Kemerovo, 1993). Further development of this method was achieved by the works of S.I. Elgina [4]. In accordance with the resulting approach, the following issues can be predicted: (a) an early age of menarche; (b) a late age of menarche; (c) an excessively long period required to establish a normal rhythm of menstruation; (d) dysmenorrhea, and (e) abnormal uterine bleeding during the pubertal period.

To improve the predictive capability of this system, we propose several enhancements:

- Creation of a single comprehensive chart that includes complete information of all the risk factors.
- Identification of specific risk groups based on the main types of disorders of menstrual function.

Using this enhanced system, the most important preventive measures for adolescent girls can be determined and employed, depending on the type of menstrual function and the specific risk group involved.

The prognostic chart developed by this study includes the following factors: age, health, profession of the mother at the time of pregnancy and childbirth, course of pregnancy, place of birth and residence, and history of illnesses. Each factor has its own gradation expressed in a digital prognosis ratio. To determine the risk involved, it was necessary to analyze the statistical impact of these explanatory factors, and the calculated prognosis coefficients corresponding to these independent variables were then combined together with the resulting sum divided by the total weight index. An example of the prognosis chart, using the relevant coefficients for determining the early age of menarche, is presented in Table 1.

To determine the degree of medical risk for any particular individual, the value obtained is analyzed using a Risk scale. If the predicted value lies in the minimum risk range, the girl is referred to be in the favorable prognosis group; if the predicted value is in the average risk range, the girl is referred to be in the "observance" group; if the predicted value is in the maximum range, the girl is referred to be in the unfavorable prognosis group.

The number of preventive measures considered appropriate depended on the predicted deviation from the normal course of establishing a healthy menstrual function, as well as the degree of risk. The main components of preventive monitoring consisted of examination by a gynecologist (on decreed or control dates), normalizing the regime of work and rest, diet, sanitizing sources of infection, use of sedative and vitamin therapy, adaptogens, psychological therapy, physiotherapy, and acupuncture.

RESULTS AND DISCUSSION

In total, 432 prognostic charts of girls aged 9-13 years 11 months were analyzed in this study. The average age of girls was 10.3 ± 0.9 years. Most girls (95.8%) were born in a megalopolis where they lived at the time of the examination, and 4.2% lived in rural areas. Only 20 patients (4.6%) lived in relatively environmentally clean areas of the city, and most of the examined patients lived in "intermediate" or "polluted" areas, with extensively developed highway networks and the presence of enterprises producing harmful environmental effects (81.5% and 13.9%).

The age of the mother at the time of the girl's birth is shown in Figure 1.

Table 1

Prognostic chart for the detection of the early age of menarche

Таблица 1

Прогностическая карта определения раннего возраста менархе

Early age of menarche		
Factors	Factor grading	Prognostic coefficient (*p*)
Mother's age	Up to 20 years	3.5
	20-24 years	2.8
	25-29 years	1.7
	30-34 years	1.7
	≥35 years	1.5
Mother's occupation	Employee of enterprises with occupational hazards	1.2
	Employee of other enterprises	1.4
	Office employees	1.4
	Housewives	0.9
Mother's health	Healthy	1.0
	Unhealthy	1.4
Course of pregnancy	Normal	2.1
	Complicated	11.5
Place of birth	City	1.5
	Village	1.1
Place of residence	Polluted	2.9
	Intermediate	1.2
	Relatively clean	2.1
Past medical history of the girl	No illnesses	1.6
	1-2 illnesses	1.1
	>2 illnesses	2.5
Health of the girl	Healthy (health group 1)	1.2
	Functional abnormalities (health group 2)	1.5
	Controlled disease (health group 3)	1.8
Total weight index		*15.3*
Risk scale	Minimal risk	0.66-1.15
	Average risk	1.16-1.55
	High risk	1.56-1.95

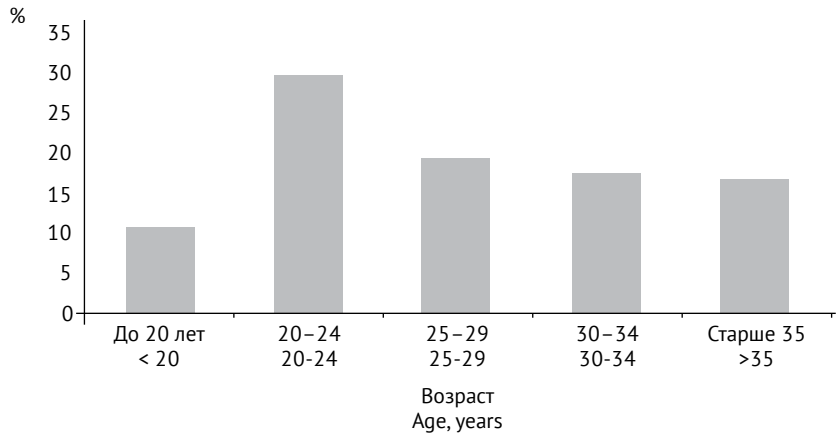

Fig. 1. Age of the mother at the time of delivery
Рис. 1. Возраст матери на момент родов

Table 2

Degree of risk of deviations at the time of menarche onset

Таблица 2

Степень риска отклонений по времени наступления менархе

Risk scale	Early age of menarche		Late age of menarche	
	N	%	N	%
Minimal	276	63.9	416	96.3
Average	140	32.4	14	3.2
Maximum	16	3.7	2	0.5
Total	432	100	432	100

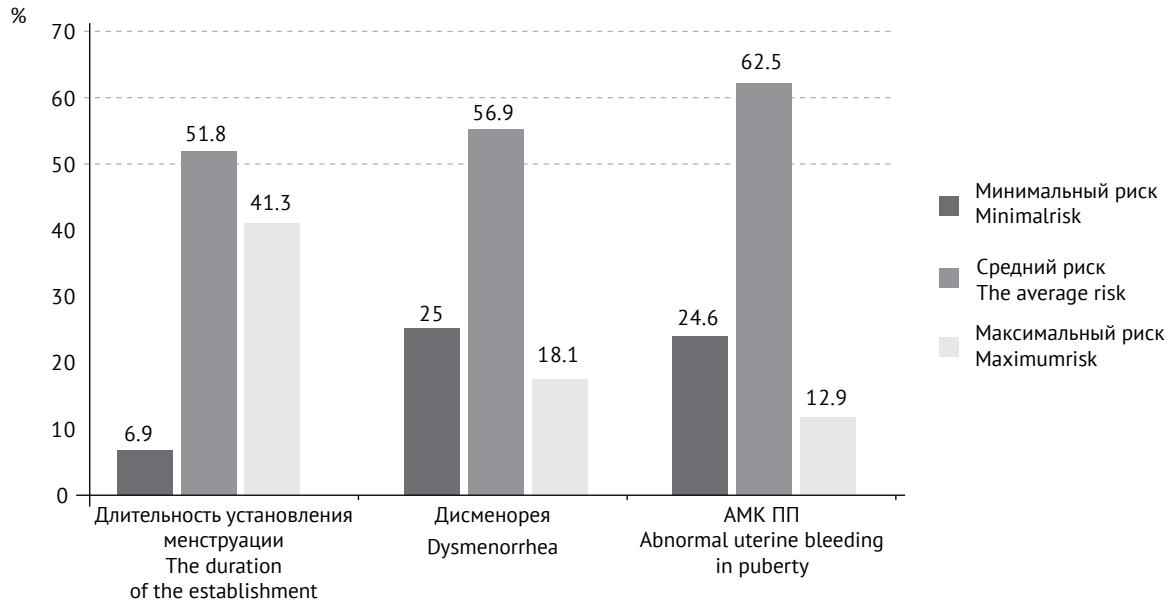

Fig. 2. Prognosis of menstrual disorders
Рис. 2. Прогноз нарушений менструального цикла

Thus, 30.1% of the girls were born when their mothers were aged 20-24 years, 19.9% when their mothers were aged 25-29 years, 18.5% when their mothers were aged 30-34 years, 18.1% when their mothers were aged >35 years, and 3.4% when their mothers were aged <20 years.

At the time of pregnancy and childbirth, 286 women (66.2%) were healthy and 146 (33.8%) had a certain somatic or gynecological pathology.

The mother's place of work during pregnancy and childbirth was analyzed, and it was found that approximately half of the women (48.6%) were office employees (female students, doctors, teachers, etc.), and 20.8% of women did not work outside of their homes (housewives). The remaining women worked in industrial enterprises (24.1%), including those with harmful production factors (6.5%).

From a somatic medical history, it was revealed that 44.9% of girls had no illnesses, 39.4% had a history of 1-2 diseases, and 15.7% had more than two diseases. As a result, 62.9% of girls were assigned to health group 2, where there were different functional abnormalities, and 16.6% to health group 3 (chronic diseases in the stage of remission); 20.5% of girls were included in the health group 1.

In the course of this study, it was noted that a favorable outcome was generally observed at the time of the onset of menarche (Table 2).

Table 2 shows that for most of the girls, a timely onset of menarche was predicted. Only 3.7% (early onset of menarche) and 0.5% (late onset of menarche) were included in the group of unfavorable prognoses and required rehabilitative measures.

The greatest interest was generated from a prognosis of the main types of menstrual cycle disorders during puberty (Figure 2).

The study revealed that more than half of the girls were in the middle risk group in all forms of menstru-

al function disorder and required regular monitoring by a gynecologist specialized in this age group. The majority (62.5%) of the girls were included in the "observance" group because of the development of abnormal uterine bleeding in the pubertal period (AUB PP). Approximately 41.3% of girls, who had a prognosis of prolonged establishment of normal rhythm of the menstrual cycle, were entered into the high-risk group and were provided with in-depth preventive measures. According to dysmenorrhea and AUB PP metrics, these figures were 18.1% and 12.9%, respectively.

CONCLUSION

The data obtained indicate the efficacy of using the proposed prognostic chart during preventive examinations of girls to identify the predictors of issues that might disrupt the establishment of a normal menstrual function, for subsequent monitoring of the groups identified as being at risk for various disorders, and appropriate implementation of preventive measures. The chart can be used not only by child and adolescent gynecologists but also by pediatricians, endocrinologists, and medical workers at schools. However, further research of a comparative study of the relative effectiveness of various preventive measures in girls in the risk groups for menstrual function disorders is required.

REFERENCES

1. Аболонина О.В. Прогнозирование, диагностика и лечение нарушений формирования репродуктивной системы у девочек с задержкой полового развития: Автореф. дис. ... канд. мед. наук. – М., 2006. [Abolonina OV. Prognosis, diagnosis and treatment of reproductive system disorders in girls with a delay in sexual development. [dissertation] Moscow; 2006. (In Russ.)]
2. Забирова С.Д. Особенности становления репродуктивной системы девушек с избыточной массой тела: Автореф. дис. ... канд. мед. наук. – М., 2012. [Zabirova SD. Features of the formation of the reproductive system of girls with excessive body weight. [dissertation] Moscow; 2012. (In Russ.)
3. Елгина С.И. Репродуктивная система девочек на момент рождения и профилактика нарушений ее становления в постнатальном периоде: Дис. ... д-ра мед. наук. – Омск, 2009. – 273 с. [Elgina SI. Reproductive system of girls at the time of birth and prevention of disorders of its formation in the postnatal period. [dissertation] Omsk; 2009. 273 p. (In Russ.)]
4. Елгина С.И., Ушакова Г.А., Вайгауз А.М. Свидетельство об официальной регистрации программ для ЭВМ № 2007610979 «Репродуктивный прогноз детей» // Официальный бюллетень «Программы для ЭВМ. Базы данных и топологии интегральных схем». – 2007. – № 2 (59, Ч. 2). – С. 227. [Elgina SI, Ushakova GA, Vaygauz AM. Certificate of official registration of computer programs No. 2007610979 "Reproductive prognosis of children". *Ofitsial'nyy byulleten' "Programmy dlya EVM. Bazy dannykh i topologii integral'nykh skhem"*. 2007;(59, Part2):227. (In Russ.)]
5. Костин И.Н. Резервы снижения репродуктивных потерь в Российской Федерации: Автореф. дисс. ... д-ра мед. наук. – М., 2012. – 48 с. [Kostin I.N. Reserves for reducing reproductive losses in the Russian Federation: avtoref. [dissertation] Moscow; 2012. 48 p. (In Russ.)]
6. Кохреидзе Н.А., Ануфриенко Э.Г., Боброва И.В., Миронова А.В. Интимная гигиена девочки-подростка: принципы, современные возможности и проблемы внедрения // Педиатр. – 2014. – Т. 5. – № 3. – С. 42–45. [Kokhreidze NA, Anufriyenko EG, Bobrova IV, Mironova AV. Intimate hygiene of an adolescent girl: principles, modern opportunities and problem of introduction. *Pediatr*. 2014;5(3):42-45. (In Russ.)]
7. Кузгибекова А.Б., Култанов Б.Ж., Кусаинова А.С. Репродуктивное здоровье девочек-подростков // Международный журнал прикладных и фундаментальных исследований. – 2012. – № 7. – С. 15–16. [Kuzgibekova AB, Kultanov BZh, Kusainova AS. Reproductive health of adolescent girls. *Mezhdunarodnyy zhurnal prikladnykh i funda-mental'nykh issledovaniy*. 2012;(7):15–16. (In Russ.)]
8. Кузнецова И.В. Девочка-подросток как пациент. Эндокринная гинекология физиологического пубертата: оптимальный минимум коррекции. Информационный бюллетень. – М.: Редакция журнала StatusPraesens, 2014. – 20 с. [Kuznetsova IV. A teenage girl as a patient. Endocrine gynecology of physiological pubertal: the optimal correction minimum. Moscow: Redaktsiya zhurnala StatusPraesens; 2014. 20 p. (In Russ.)]
9. Минздрав РФ, Департамент анализа, прогноза, развития здравоохранения и медицинской науки, ФГБУ «Центральный научно-исследовательский институт организации и информатизации здравоохранения Минздравсоцразвития Российской Федерации». Основные показатели здоровья матери и ребенка, деятельность службы охраны детства и родовспоможения в Российской Федерации. – М.: 2012. [Minzdrav RF, Departament analiza, prognoza, razvitiya zdravookhraneniya i meditsinskoy nauki, FGBU "Tsentral'nyy nauchno-issledovatel'skiy institut organizatsii i informatizatsii zdravookhraneniya Minzdravsotsrazvitiya Rossiyskoy Federatsii". The main indicators of maternal and child health, the activities of the child welfare and obstetric service in the Russian Federation. Moscow; 2012. (In Russ.)]

10. Миронова А.В., Баласанян В.Г., Журавлева К.Л. Роль врача-педиатра в половом воспитании девушек-подростков // Педиатр. – 2015. – Т. 6. – № 1. – С. 76–80. [Mironova AV, Balasanyan VG, Zhuravleva KL. The role of the pediatrician in the sexual education of adolescent girls. *Pediatr*. 2015;6(1):76-80. (In Russ.)]
11. Основные показатели деятельности службы охраны здоровья матери и ребенка в Российской Федерации / Под ред. Г.Т. Сухих, Л.В. Адамян. – М., 2010. – 158 с.
12. The main indicators of the activities of the mother and child health service in the Russian Federation. Ed by G.T. Sukhikh, L.V. Adamyan. Moscow; 2010. 158 p. (In Russ.)]
13. Уварова Е.В. Детская и подростковая гинекология: руководство для врачей. – М.: Литтерра, 2009. – 384 с. [Uvarova EV. Pediatric and adolescent gynecology: rukovodstvo dlya vrachey. Moscow: Litterra; 2009: 384 p. (In Russ.)]
14. Women and health: today's evidence, tomorrow's agenda. World Health Organization; 2009:108.

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