ORIGINAL ARTICLE

CONTENTS

Correction of dysmenorrhea in teenage girls with autonomic dysfunction syndrome

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ABSTRACT

Aim: The aim of our study was detection and correction of dysmenorrhea in teenage girls with autonomic dysfunction syndrome.

Materials and Methods: The research group consisted of 37 teenage girls, aged 12-16 years, who were undergoing rehabilitation treatment with signs of dysmenorrhea and vegetative dysfunction syndrome. The study lasted for 2 years (2020-2021). A study of the variability of the heart rate at rest and under the conditions of an orthostatic test was carried out using the "Cardiolab" complex by the method of spectral analysis.

Results: Analyzing the initial state of the autonomic nervous system in girls with menstrual cycle disorders, the primary predominance of the sympathetic nervous system in 33.3% of girls was revealed. Before treatment, autonomic reactivity was characterized by a hypersympathetic type in 44.4% of girls, by an asympathetic type in 22.3% of children. Spectral analysis at the beginning of treatment showed that high frequencies (HF) prevail in most girls (66.0%), which indicates an increased influence of the parasympathetic part of the autonomic nervous system, and 18.5% of girls have a balanced state of the autonomic nervous system. Predominance in the spectrum of LF and VLF components was found in 15.5%, which indicates the predominance of central humoral-metabolic ergotropic effects on heart rate variability. After the course of treatment an improvement in the condition of teenage girls was observed. Menstruation became less painful or painless at all, the duration and frequency of menstruation (from 1 to 3 days, on average 1.8±0.1) and blood loss decreased. The girls felt better, did not complain of dizziness and headache.

Conclusions: According to the results of the study, it was found that the proposed course of treatment for teenage girls with a menstrual cycle disorder with signs of autonomic dysfunction contributed to the normalization of the cycle, improvement of the general condition of the girls.

KEY WORDS: dysmenorrhea, teenage girls, heart rate variability

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INTRODUCTION

Protecting the reproductive health of the population is one of the most important tasks today. According to the reports of researchers from different countries, dysmenorrhea occupies the main place in the structure of gynecological diseases. It accounts for more than 60% of all teenage visits to a gynecologist [1,2]. Most girls have characteristic signs of autonomic dysfunction syndrome, which has recently been observed more and more often among children [3,4]. Deterioration of the environmental situation, the consequences of the COVID 19 pandemic, a significant decrease in the number of children engaged in sports are the reasons for the prevalence of autonomic dysfunction syndrome [5-7]. In 33.3% of children, dysfunction of the autonomic nervous system persists for many years despite treatment, in 17-20% of children they progress [8].

The prevalence of autonomic nervous system disorders, according to some authors, ranges from 54.6% to 72.6%. This is especially true for teenage girls, since the hormonal changes of the body during puberty contribute to more frequent manifestations: «marbling» of the skin, cyanosis of the nasolabial triangle or extremities, thermoregulation disorders, «intestinal colic», heart rhythm disturbances or repolarization processes on the ECG. The «peak» of manifestations of vegetative dysfunction falls on the puberty period, which is accompanied by violent emotional manifestations, psychosomatic disorders, in particular, menstrual cycle disorders. According to many authors, teenage girls with dysmenorrhea and manifestations of autonomic dysfunction due to impaired autonomic regulation of the heart and blood vessels have functional changes in the cardiovascular system [5-7]. Changes in indicators of the cardiovascular system in response to physical exertion are a reliable indicator of adaptive reactions, especially when studying the mechanisms of heart rate regulation [2].

The analysis of heart rate variability will allow to assess the vegetative balance, functional reserves of the body and to fully determine the interaction of all organs and systems and the level of participation of all regulation

mechanisms in the vital activity of the body [8]. It is important to determine the total power of the heart rhythm spectrum.

The complex of medical measures should take into account the adaptive capabilities of the body.

The use of various physical factors contributes to the effectiveness of treatment due to the optimization of the regulatory function of the autonomic nervous system [8].

AIM

The aim of our study was detection and correction of dysmenorrhea in teenage girls with autonomic dysfunction syndrome.

MATERIALS AND METHODS

The research group consisted of 37 teenage girls, aged 12-16 years, who were undergoing rehabilitation treatment in the village of Polyana with signs of dysmenorrhea and vegetative dysfunction syndrome. The study lasted for 2 years (2020-2021).

Using the spectral analysis method, clinical and functional studies were carried out before and after treatment.

To determine the effect of the course of treatment on the manifestations of dysmenorrhea and the functional state of the autonomic nervous system, a study of the variability of the heart rate at rest and under the conditions of an orthostatic test was carried out using the «Cardiolab» complex by the method of spectral analysis.

Spectral analysis is the most accurate method for quantitative assessment of periodic processes in the heart rhythm. The following types of oscillations are distinguished in the structure of the heart rhythm: high-frequency - (High Frequency – HF component), frequency range of 0.4–0.15 Hz – illustrate the influence of the parasympathetic part of the nervous system on heart rate modulation; low-frequency oscillations (Low Freqyency – LF component), the frequency range of 0.15–0.04 Hz illustrates the influence of the sympathoadrenal system; very low frequency - (Very Low Freqyency – VLF), frequency range 0.04–0.015 Hz, associated with humoral-metabolic and cerebral ergotropic effects [8-10].

During the study, the following indicators were determined: total power of the spectrum (TP) (ms^2), content of HF, LF and VLF frequencies, integral indicator – LF/ HF.

Mathematical processing of the obtained research results was carried out using the MS Office Excel computer program, as well as the Statistics 6 software package.

RESULTS

37 teenage girls who were being treated with signs of dysmenorrhea and autonomic dysfunction syndrome took part in the study. The study lasted for 2 years (2020-2021). Girls complained of irregular and painful menstruation, headache, dizziness, general weakness and emotional lability at the beginning of treatment. Menarche appeared in all studied girls at the age of 11-13 years, which corresponds to the age norm. Menstrual cycle pathology was manifested: 22 (59.3%) girls had irregular menstruation, 10 (25.9%) had painful menstruation of normal duration, and 5 (14.8%) had painful and prolonged menstruation. The average duration of the menstrual cycle was 59 ± 14.5 days, the duration of bleeding was 4.6 ± 1.4 days, according to the nature of the blood loss, profuse discharge. The average duration of the menstrual cycle is 27.7 ± 11.6 days.

Analyzing the initial state of the autonomic nervous system in girls with menstrual cycle disorders, the primary predominance of the sympathetic nervous system in 33.3% of girls was revealed. Before treatment, autonomic reactivity was characterized by a hypersympathetic type in 44.4% of girls, by an asympathetic type in 22.3% of children.

Spectral analysis at the beginning of treatment showed that high frequencies (HF) prevail in most girls (66.0%), which indicates an increased influence of the parasympathetic part of the autonomic nervous system, and 18.5% of girls have a balanced state of the autonomic nervous system.

Predominance in the spectrum of LF and VLF components was found in 15.5%, which indicates the predominance of central humoral-metabolic ergotropic effects on heart rate variability (Table 1).

After the course of treatment, which included 10 procedures of electrophoresis, physiotherapy, magnetic therapy and massage of the collar zone, an improvement in the condition of teenage girls was observed. Menstruation became less painful or painless at all, the duration and frequency of menstruation (from 1 to 3 days, on average 1.8±0.1) and blood loss decreased. The girls felt better, did not complain of dizziness and headache.

During treatment, activation of the sympathoadrenal system was observed, as evidenced by an increase in low frequencies in 41.4% of patients, a balanced state of the autonomic nervous system in 37.9%, and activation of the parasympathetic division of the autonomic nervous system in 20.7%.

The dynamics of the HRV spectral analysis data revealed an increase in the total spectral power of TR from 4259±587.8 to 4461±743.0, the absolute values of the power of the LF and VLF components were higher than observed before treatment, a decrease in the HF component was recorded (Table 2).

Table 1. HRV indicators of teenage girls with signs of dysmenorrhea and autonomic dysfunction syndrome at rest

Parameters	Before treatment (n=37)	After treatment (n=37)
TP, ms^2	4259,0±587,8	4461,0±743,2
VLF, ms^2	786,9±69,7	1120,0±207,4 *
LF, ms^2	918,5±103,0	1146,0±156,3
HF, ms^2	2369,0±465,4	2085,5±424,0
LF/HF	0,71±0,09	0,76±0,09 *
VLF, %	23,9±1,7	24,9±1,5
LF, %	24,7±1,4	27,6±2,0
HF, %	46,7±2,7	42,6±2,5

Note: * $p < 0.05$ - significant difference of the indicator before and after treatment.

Table 2. HRV indicators of teenage girls with signs of dysmenorrhea and autonomic dysfunction syndrome during an orthostatic test

Parameters	Before treatment (n=37)	After treatment (n=37)
TP, ms^2	2249,0±209,0	2149,0±224,0
VLF, ms^2	854,3±94,4	892,5±103,9 *
LF, ms^2	824,7±74,1	857±98,0
HF, ms^2	271,5±45,5	272,9±53,8
LF/HF	4,47±0,4	4,31±0,46 *
VLF, %	38,0±2,0	39,0±2,5
LF, %	38,9±2,1	38,4±2,5
HF, %	12,2±1,2	13,2±2,0

Note: * $p < 0.05$ - significant difference of the indicator before and after treatment.

An adequate reaction of the segmental structures of the sympatho-adrenal system during the orthostatic test was noted, in the HRV spectrum this was reflected in the form of an increase in the spectral power (VLF) of waves from 786.9±69.7 to 854.3±94.4 ms^2, a decrease in the spectral power high-frequency (HF) waves from 46.7±2.7 to 12.2±1.2 ms^2.

CONCLUSIONS

Thus, the proposed course of treatment for adolescent girls with a menstrual cycle disorder with signs of autonomic dysfunction contributed to the normalization of the cycle, improvement of the general condition of the girls. Positive dynamics can be observed according to spectral analysis data.

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CONFLICT OF INTEREST
The Authors declare no conflict of interest

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