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HEADACHE SYNDROME IN ADOLESCENTS WITH AUTONOMIC DYSFUNCTION (VEGETATIVE DYSTONIA) SYNDROME

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Abstract: The structure of headache in adolescents with autonomic dysfunction (vegetative dystonia) syndrome is presented, including types, clinical characteristics, associated manifestations, and relationships with other factors. A total of 167 respondents aged 12 to 18 years were observed. The patients had no significant organic neurological or somatic disorders and were not under specialist follow-up. Among the examined individuals, the majority experienced headaches at least once a month or more often, but only 53.3% reported them, which indicates the subjective perception of this condition and adds additional complexity to its analysis and evaluation. Mental load, stress, and physical exertion were identified as headache triggers. In studying the headache syndrome in adolescents with autonomic dysfunction, gender differences were determined.

Keywords: headache, adolescents, autonomic dysfunction syndrome (vegetative dystonia)

Introduction.

One of the most common complaints among adolescents with autonomic dysfunction (vegetative dystonia) syndrome (ADS/VDS) is headache (HA). According to studies, the prevalence of headaches increases from 3–8% among preschool children to 57–82% in adolescents (9).

In most cases, headaches in adolescents with ADS have a favorable prognosis when an accurate diagnosis is made and timely, appropriate therapy is initiated (3,4). Identifying the causal relationship and determining the nature of headache in children is a rather complex task. The main causes of headache syndrome in this age group are tension-type headache (TTH) and, less frequently, migraine (6,7).

Primary headaches, like headaches in general, negatively affect the daily functioning of children and adolescents, leading to difficulties in adaptation, decreased academic performance, and impaired social activity outside school, which ultimately reduces quality of life (2,8). Headaches also predispose individuals to various disorders in adulthood. Headache may be a manifestation of numerous organic neurological, somatic, and psychogenic diseases (5).

Most advances and publications in the study of headache syndrome concern the problem of cephalalgia in adults. However, research dedicated to the epidemiology, clinical characteristics, and pathogenetic features of headaches in children remains limited. Potential predictors, triggering factors, and pathogenetic mechanisms of onset and chronification of headaches in children are still not clearly defined. There is also a shortage of publications analyzing the impact of chronic somatic pathology on the clinical and psychophysiological features of headache syndrome in childhood. Given these circumstances, this pathology should be classified as an important general medical, social, and economic problem.

Materials of the Study. The study involved 243 adolescents aged 12–18 years with clinically and laboratory-instrumentally confirmed dysfunction of the autonomic nervous system, who

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were receiving outpatient treatment at the Adolescent Center in Tashkent. Voluntary informed consent was obtained from the patients and their parents to participate in the examination.
Among the adolescents with ADS, the number of boys was 1.8 times lower than the number of girls. This is likely due to less pronounced physical and hormonal changes during puberty in boys, which may contribute to a milder manifestation of this pathology (Table 1).

Table 1. Distribution of the examined adolescents by sex and age.

Examined individuals	boys	girls	total
n	87	156	243
%	35,8%	64,2%	100,0%
Average age, years	14,0±2,2	15,3±2,6	14,7±3,1

The average age of clinical manifestation of ADS in girls was 12.2 ± 1.8 years, while in boys it was 13.5 ± 2.1 years. In the group of girls, 23.7% (n = 37) were in the prepubertal age group and 76.3% (n = 119) were of pubertal age. In the group of boys, 28.7% (n = 25) of all examined boys were in the prepubertal age group and 71.3% (n = 87) were of pubertal age (Fig. 1).

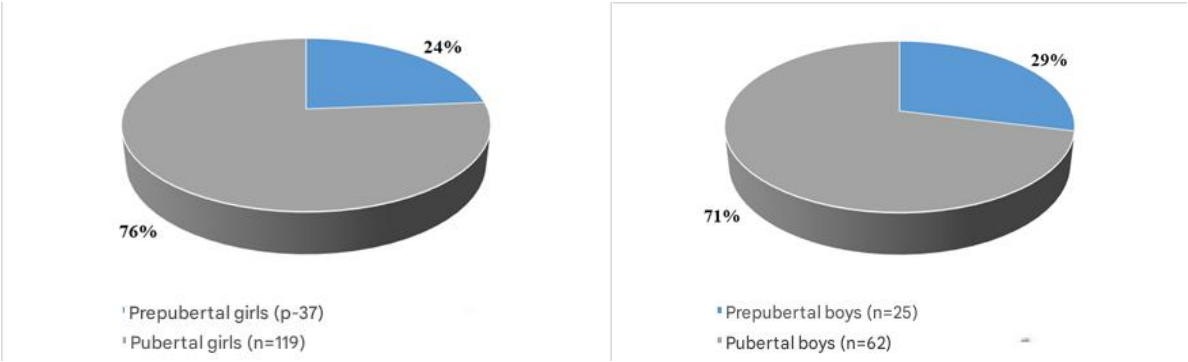

Figure 1. Number of prepubertal and pubertal patients among boys and girls.

Among the examined adolescents with VDS, 69.5% lived in urban areas, and 30.5% lived in the countryside (Table 2).

Table 2

Geographical distribution of adolescents with VDS

Place of residence		Girls n=156	Boys n=87	Total, n= 243
city	абс.	115	54	169

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	%	73,7% *	62,1% *	69,5% *
region	абс.	41	33	74
	%	26,3%	37,9%	30,5%

*- p<0.01 (reliability between boys and girls)

Methods of Examination. The physical development of children was assessed using standard anthropometric indicators (height, body weight, chest circumference) according to established methodology, following all requirements for accuracy and reliability. During the study, a questionnaire-based survey was conducted using a specially developed questionnaire clarifying the nature and localization of headaches (PedMIDAS questionnaire). Headache intensity was evaluated using the Visual Analogue Scale (VAS) (2). The state of the autonomic nervous system (ANS) was assessed based on the three main characteristics of ANS functional status: baseline autonomic tone (BAT), autonomic reactivity (AR), and hemodynamic response type in the clinorthostatic test (COT). BAT assessment was performed according to the tables of A. M. Vein (1991) and I. A. Belokon (1987), modified for children by considering complaints, clinical symptoms, cardiointervalography (CIG), and ECG indicators. To determine autonomic tone, the stress index (SI) of R. M. Baevsky (1976), expressed in arbitrary units, was used. Autonomic reactivity was assessed based on indices of the Danini–Aschner oculocardiac reflex. Autonomic support of activity (ASA) was evaluated according to the results of the clinorthostatic test (COT) with measurement of HR, SBP, and DBP at standard time intervals. Interpretation of the data was based on commonly accepted criteria for pathological variants of COT and normal hemodynamic responses (1). Statistical processing of the data was performed using variation analysis. Mean values (M) and their standard errors (±m) were determined, as well as differences between mean values, chi-square (χ^2) tests, and p-values.
The relationship between the studied parameters was evaluated using the linear correlation coefficient (±r). Correlation strength was interpreted as follows: up to ±0.3 – weak; ±0.3 to ±0.7 – moderate; ±0.7 to ±1.0 – strong. Results were considered statistically significant at $p < 0.05$.

Results and Discussion. The most common clinical syndromes in patients with ADS were cephalgic syndrome (68.7%), esophageal dyskinesia (48%), gastric and intestinal dyskinesia (76%), symptomatic arterial hypertension (44.5%) and hypotension (6.2%), functional cardiopathy (42.4%), neurogenic bladder dysfunction (16.5%), vestibulopathic syndrome (12.4%), neuroendocrine syndrome (12.2%), neurogenic syncope (8.2%), and autonomic crises – vagoinsular (8.5%) and sympathoadrenal (2.2%), hyperhidrosis (5.0%), and angiotrophoneurosis (1.2%). Cardiovascular dysfunction manifested as blood pressure lability syndromes: orthostatic hypotension (4% in boys, 2.2% in girls), resting tachycardia (8% and 17%, respectively), and symptomatic arterial hypertension (15.2% and 29.3%, respectively). Cardialgic syndrome was frequently observed, characterized by “stabbing” pains in the apex and pericardial regions (16% and 24.2%, respectively). These syndromes occurred significantly more often in patients with sympathicotonic AR and arterial hypertension.
Electrocardiographic changes included increased T-wave amplitude (6.2% and 8%, respectively), ST-segment elevation (2.2% and 6.2%, respectively), sinus arrhythmia (32% and 42.4%, respectively), and supraventricular extrasystoles (18.4% and 23.4%, respectively). A detailed study of headache syndrome in adolescents with ADS using the PedMIDAS questionnaire revealed that headaches were present in 167 adolescents (68.7%), but only 89 of them (53.3%)

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reported headache complaints, indicating a subjective perception of the condition and complicating its evaluation. Among them, 29 adolescents (32.6%) reported constant headaches, and 60 (67.4%) reported periodic headaches.

The average age of adolescents with cephalalgia was 16.3 ± 1.8 years. Cephalgic syndrome occurred with approximately equal frequency across different age groups, more commonly among urban adolescents, and was significantly more prevalent in girls (twofold). According to the survey, headache syndrome was identified in 116 girls (69.5%) and 51 boys (30.5%), which may be explained by greater emotional lability in females. The mean headache intensity in adolescents with ADS ranged from 4.1 to 7.3 points on the VAS scale. Headaches were most often accompanied by flickering "flies" before the eyes, darkening of vision, nausea, loss of appetite, and less frequently by sensitivity to strong smells or sounds, abdominal pain, vomiting, and other symptoms.

Among boys with headache syndrome associated with ADS, 42.7% rated their health as "good," and 54.4% rated it as "satisfactory." These values differed significantly from those of girls with headaches – 36.4% and 62.1%, respectively (Fig. 3). This further supports the presence of a direct correlation between headache syndrome and the overall well-being of patients.

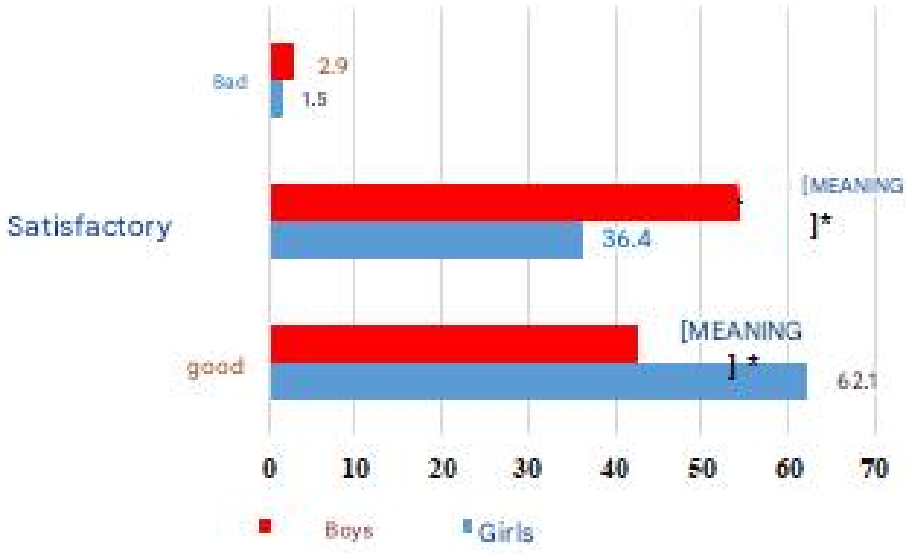

Figure 2. Self-assessment of health among adolescents with autonomic dysfunction syndrome (ADS). — *$p < 0.01$ (significant difference between boys and girls)*

According to the questionnaire results, the most common triggering factor was mental stress (reported by 56 respondents, 65.9%), followed by emotional stress (46 adolescents, 51.6%), and physical exertion (18 examined individuals, 20.2%).

Among those complaining of headaches, 47.2% had an average academic performance score of 4–4.5. Students with good and average performance reported headaches at approximately the same frequency. Among those not complaining of headaches, the distribution of academic performance was similar. Therefore, it can be concluded that there is no clear relationship

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between headaches and academic performance in this patient group. It should be noted that 47.7% of boys surveyed had anxiety disorder, with 8.0% classified as moderate severity. Among girls with headaches, mild anxiety disorder was observed in 51.7% (Fig. 3). These data may indicate a clear relationship between the occurrence of headaches and anxiety traits depending on sex.

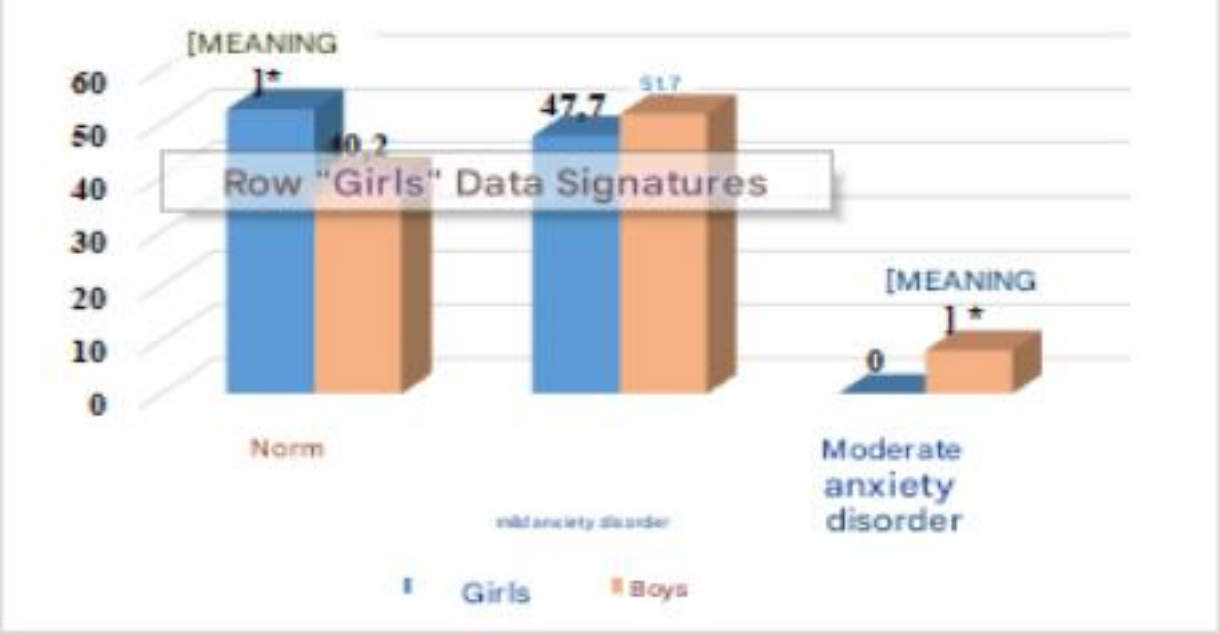

Figure 3. Anxiety disorder in adolescents with autonomic dysfunction syndrome (ADS) depending on sex (%). — *$p < 0.01$ (statistically significant difference between boys and girls)*

Among the group of respondents who reported headaches, all adolescents (100%) used electronic devices throughout the day. In the second group (76 individuals) who did not report headaches, 60 respondents (79.0%) regularly used electronic devices.

Baseline autonomic tone in the majority of adolescents with cephalgic syndrome was assessed as vagotonic (71.6%). These adolescents reported vagotonic complaints such as:

- mottling and cyanosis of the extremities (55.9%),
- increased hyperhidrosis of the palms and soles (53.7%),
- red, elevated, persistent dermographism (69.9%),
- poor tolerance of stuffy rooms (49.4%),
- complaints of “shortness of breath” and “sighing” (45.1%),
- allergic reactions (36.5%).

At the same time, some adolescents with headaches exhibited sympathicotonic signs:

- dry skin and decreased sweating (23.6%),
- pink and white dermographism (20.45%),
- tendency to weight loss (19.3%),
- episodes of increased blood pressure (18.3%),

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- autonomic paroxysms of the sympathoadrenal type (6.5%).

Baseline autonomic tone (BAT) and autonomic reactivity (AR) were studied using cardiointervalography in adolescents with cephalgic syndrome. Analysis showed that most adolescents (39.1%) exhibited eutonia. Sympathicotonia and vagotonia were observed in roughly equal numbers (32.6% and 28.3%, respectively). Regardless of baseline state, adolescents with normotonic reactivity predominated—33 individuals (37.1%), while hypersympathicotonia was less common—27 individuals (30.3%). Adaptation reserve depletion, i.e., asimpaticotonic reactivity, was found in 15 adolescents (16.9%) with headaches. Perinatal and hereditary anamnesis was analyzed in adolescents with headaches. A burdensome perinatal history (threats of termination, toxicosis, anemia, birth complications, etc.) was identified in 80.2% of adolescents with cephalgic syndrome. Adolescents with migraine had a high (77.3%) hereditary predisposition on the maternal side. Migraine onset occurred in the prepubertal age in 33.3% of adolescents and in the pubertal age in 67.7%. In children with tension-type headaches (TTH), disease onset was more frequent in the prepubertal period (52.6%) compared to 47.4% in the pubertal period. This suggests that early headache onset is associated with the appearance of new responsibilities and educational load in children's lives. Migraine attacks could occur at any time of the day. Adolescents reported the following triggers: menstrual cycle in girls (33.3%), weather factors (16.7%), psychotraumatic situations and physical exertion (16.7%). Others did not associate headache onset with any specific external factors. For tension-type headaches, provoking factors were more common: mainly fatigue from college studies (58.7%) and weather factors (23.4%). Children with TTH also reported depressed mood. Most children described their headaches as daily, persistent for long periods, but not interfering with daily activities or worsening with usual physical exertion. Many complained of a feeling of a "helmet" or "hoop" around the head. To cope with headaches, most adolescents (47 individuals, 52.8%) reported that resting and sleeping sufficiently was enough. Other common strategies to reduce headaches included maintaining a work-rest regime, spending time outdoors, regular moderate physical exercise, and consistently avoiding bad habits. However, half of the adolescents (44 individuals, 49.4%) also took analgesics for headache relief, with 18 (20.2%) using them regularly. All adolescents considered themselves generally healthy and did not seek specialist medical help, indicating a high prevalence of self-medication among respondents.

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