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PSYCHONEUROLOGICAL DISORDERS IN CHILDREN WITH ATOPIC DERMATITIS

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ABSTRACT

Background: Atopic dermatitis (ATD) is a chronic relapsing skin disease. It is characterized by itchy and eczematogenic lesions (pruritus, erythema, pemphigus, papulation, exudation, cortex). Over the past three decades, the incidence of ATD has been steadily increasing. Atopic dermatitis is a common disease in pediatric dermatological practice. **Methods:** The study is included 217 children of both sexes in the age from 6 to 12 years old. The main group is consisted of 147 children (74 boys and 73 girls), the average age was 8.7 ± 1.88 years with a diagnosis of ATD determined earlier. The assessment was carried out by a dermatologist with SCORAD scale. A comparison of the shares was used for the analysis of qualitative features, (chi-square test with Yeats correction for continuity). **Results:** Neurosis-like disorders in the form of thikoid hyperkinesis, stuttering, enuresis, encopresis, sleep and appetite disorders among children in the main group were noted in 80.6% of cases ($n = 62$), among children in the control group - in 13.3% of cases ($n = thirty$). In more than half of cases, children with ATD had dissominal disorders (66.7%, $n = 62$). **Conclusions:** Neuropsychiatric symptoms in children with atopic dermatitis are due to the action of exogenous organic factors pathogenic for the central nervous system in the early stages of ontogenesis. Sensory and motor deprivation of a child at an early age (up to 3 years), which inevitably occurs due to the manifestation of somatic suffering, aggravates the formation of neuropsychological deficiency and the structuring of residual cerebroorganic symptoms.

INTRODUCTION

Over the past three decades, the incidence of ATD has been steadily increasing [1]. The proportion of ATD among allergic diseases in the pediatric population is up to 75%. The disease is detected in people of both sexes and in different age groups. Girls get sick 1.5 times more often than boys. In 70% of cases, ATD is debuting in the first year of life. Moreover, half of the children subsequently form an "atopic march" - the addition of hay fever, allergic rhinitis, and often bronchial asthma [2]. The disease is detected in people of both sexes and in different age groups. Girls get sick 1.5 times more often than boys. In 70% of cases, ATD is debuting in the first year of life. Moreover, half of the children subsequently form an "atopic march" - the addition of hay fever, allergic rhinitis, and often bronchial asthma [2]. Common associated problems in this case are: school maladaptation, attention deficit hyperactivity disorder, neurotic disorders. As adults, such patients are prone to anxiety and depressive disorders, have frequent conflicts in the family, and abuse psychoactive substances.

A large number of scientists believe that stress in infancy can instigate damage to the neuroendocrine system, thus laying the patho-genetic basis for the autoimmune process [2]. Subsequently, the functioning of the hypothalamic-pituitary-adrenal axis, the immune-skin system, and central neuro-mediator processes is disrupted [3]. It explains the frequent occurrence of anxiety-depressive syndromes in patients with ATD. Proponents of the psychoanalytic concept associate the symptoms of the disease with the development of specific neurotic personality traits [2]. The obsessive itching feeling and the desire to scratch are a reflection of the unconscious indefatigable feeling of resentment against the mother for the lack of warmth and love at a very young age [4].

Modern neuropsychological studies reveal in children with ATD the underdevelopment of the energy block and the weakness of the activating brain system [5]. Such violations can be explained by diffuse organic damage to the central nervous system (CNS) (with predominant localization in the mid-stem structures) in the early stages of ontogenesis. Moreover, the limitation of tactile contact with the mother in connection with the manifestation of symptoms of ATD aggravates the clinic of the emerging neuropsychiatric disorders [6].

The aim of the study was to establish the clinical and patho-genetic patterns of the development of mental disorders in children with ATD.

MATERIALS AND METHODS

Subjects: The study was conducted at the clinical base of the Department of Psychiatry of the Ural State Medical University in the period from 2016 to 2018 years (Protocol of approval by the local ethics committee of UMMU No. 6 dated 06.24.2016). The study included 217 children of both sexes in the age from 6 to 12 years, attending kindergartens and elementary grades of secondary schools. The intelligence level was accorded to the Wexler test, it was not lower than average (IPR > 90 points).

KEY WORDS
Children; atopic dermatitis; mental disorders; neuropsychology

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Inclusion exclusion criteria: The main group consisted of 147 children (74 boys and 73 girls), the average age of which was 8.7 ± 1.88 years with a diagnosis of ATD determined earlier (at least one year) according to the ICD-10 (L20) criteria, without severe somatic or mental pathology. Given the comparative age approach in the study, three age subgroups were identified: 6–7 years ($n = 62$), 8–10 years ($n = 55$), and 11–12 years ($n = 30$).

Clinical examinations: The severity of the clinical manifestations of ATD at the time of examination among the children of the main group ranged from mild to severe. The assessment was carried out by a dermatologist on the SCORAD scale [7]. A mild degree was detected in 53.1% of the children of the main group ($n = 147$), the average value on the SCORAD scale was 16.7 ± 9.8 ($n = 78$). A moderate degree of clinical manifestations was noted in 33.3% of children with ATD ($n = 147$), the average SCORAD value was 33.8 ± 10.2 ($n = 49$). A severe clinic was noted in 13.6% of the children of the main group ($n = 147$), the average SCORAD value was 62.1 ± 13.8 ($n = 20$). In 43 children of the main group, concomitant bronchial asthma was detected; 34 children have gastroesophageal reflux disease. The presence of hereditary burden due to atopic diseases by close relatives was noted in 34.0% of cases ($n = 147$). Among children with a hereditary disease, children of the older age category with a stable mild or moderate clinic prevailed. The control group consisted of 90 children (45 boys and 45 girls) with indicators of relative somatic health. The average age of children in this group was 8.7 ± 1.94 years. In each age category, there were 30 children.

The main research methods were clinical-anamnestic and clinical-psychopathological. To establish the clinical regularities of the course of mental disorders in ATD, an approach was used based on the periodization of the stages of the neuropsychic response of children [8]. An in-depth analysis of all pathogenic factors that influence on the occurrence, clinical dynamics of psychopathological disorders were associated with AT, depending on the age stages of the neuropsychic response. The clinical method was accompanied by an assessment of the mental and neurological status among all children of the main and control groups according to the generally accepted pattern [9]. The psychopathological method was supplemented by a questioning of parents using a questionnaire to assess the neuropsychic sphere of the child, proposed by N.N. Zavadenko [10]. Most of the children of the main group ($n = 105$) underwent a neuropsychological study using the adapted neuropsychological study [11], shortened in comparison with the generally accepted method A.R. Luria. An objective study was carried out according to the scheme, which included 67 samples related to 14 studied functions: thinking, speech, memory, praxis, gnosis, coordination. The interpretation of the results of a neuropsychological examination was based on the identification of disorders, the determination of topical lesions and related dysfunctions of the brain systems.

Statistical analysis: Statistical processing of the obtained data was carried out on a personal computer running the Windows 10 operating system using the Statistica 12 program. For the analysis of qualitative features, a comparison of the shares was used (chi-square test with Yeats correction for continuity). The differences were regarded as significant at a confidence level of $p < 0.05$ [12].

Ethical statement: The work was carried out with case histories of patients, who were taken from the archive, personal data of patients. The case histories were not disclosed.

RESULTS

The influence of pathogenic factors: In the course of the clinical and anamnestic study, pathogenic factors were identified. Pathogenic factors were contributed to the formation of mental disorders that acted at the very early stages of development. Thus, in the main group, signs of pathology of pregnancy of the mother were significantly more often compared with the control group in the form of: a burdened obstetric and gynecological history (50.3%, $n = 147$); threats of termination of pregnancy at different periods (40.8%, $n = 147$); development of intrauterine hypoxia (55.8%, $n = 147$); transferred during pregnancy or chronic infectious diseases (43.5%, $n = 147$); consumption of nicotine or alcohol at different stages of pregnancy (26.5%, $n = 147$).

The frequency of birth pathology in the studied groups had significant differences. Premature (less than 37 weeks) or postponed (over 42 weeks) pregnancy in the main group occurred in 40.1% of cases ($n = 147$), in the control group - 23.3% ($n = 90$). Operational resolution of childbirth (emergency or planned) in mothers of children of the main group took place in 29.2% of cases ($n = 147$), in the control - in 12.2% of cases ($n = 90$). Asphyxia in childbirth was observed in 55.8% of children with ATD ($n = 147$) and 3.3% of healthy children ($n = 90$). The diagnosis of perinatal damage to the central nervous system (PCNS) was established in 42.2% of cases among children of the main group ($n = 147$) and in 8.9% of cases among children of the control group ($n = 90$).

Analysis of the manifestation of the clinical manifestations of ATD in children of the main group shows that in most cases the onset of the disease occurred in 1–2 years of the child's life (68.0%, $n = 147$). Less commonly, symptoms developed between 2 and 5 years (21.8%, $n = 147$). In rare cases, clinical manifestations began after 6 years (10.2%, $n = 147$). In almost half the cases, parents attribute the onset of the disease to a traumatic factor - fear, emotional stress, etc. An examination of the family's psychological climate, types of upbringing, and social conditions of living did not reveal significant differences among the children of the main and control groups.

According to the anamnesis and medical records, an organic neuropathy syndrome was detected at the age of 1 year, which was represented by increased excitability with prolonged crying, motor anxiety with hypertonicity and tremor, autonomic dysfunction in the form of hyperhidrosis, sub febrile conditions, sleep disturbance and wakefulness. The prevalence of the described phenomena among children of the main group was 82.3% (n = 147), among children in the control group - 30.0% (n = 90). 30.6% of children with ATD (n = 147) had a history of convulsive paroxysms up to 1 year old.

The study of possible pathogenic factors for the central nervous system in the period up to 3 years revealed a difference between the groups in the frequency of colds. Thus, frequent colds (more than 4 times per year) among children with ATD were noted in 66.6% of cases (n = 147), and among children in the control group - in 27.8% of cases (n = 90).

The effect of artificial feeding: Some researchers associate the pathogenesis of ATD with early sensitization of the child's body resulting from artificial feeding [13]. In the present study, no significant differences were found between the groups in the initial type of feeding. However, the period of breastfeeding in most children of the main group was not exceeded 4 months (75.5%, n = 147). Among children in the control group, a similar transition to artificial feeding was noted only in 32.2% of cases (n = 90). There were also no differences between the groups of mothers of children who used allergenic products during the period of active breastfeeding.

Speech and motor skills: We studied the development of speech and motor skills during the first age crisis (3-4 years), when the somato vegetative stage ends and the psychomotor begins. Speech and psychomotor disturbances obviously reflect damage to brain structures in the early stages of its development. The delay in speech development by the age of 4 years was observed in children of the main group in 60.5% of cases (n = 147), in the control group - in 17.8% of cases (n = 90). The delay in the formation of motor skills in the main group was noted in 62.6% of cases (n = 147), in the control group - in 8.9% of cases (n = 90).

The formation of neurosis-like disorders is depending on the age period. Clinical and psychopathological study of children in various age categories allows us to identify the typology and dynamics of neuropsychiatric disorders in children with ATD. The seventh and eighth years of a child's life corresponds to the second critical age period, when the affective (7-12 years) is superimposed on the psychomotor stage of development (3-10 years). This stage is characterized by decompensation of residual organic cerebral insufficiency in the form of formalized psycho-vegetative disorders, manifestation of psychomotor disorders, and the onset of the formation of neurosis-like disorders. In the next age category of 8-10 years, there is compensation for psycho-vegetative disorders that have begun earlier, a clinic of psychomotor disorders is revealed, and neurosis-like syndromes are formed. At the age of 11-12 years, the following critical period arises, associated with the end of the affective and the beginning of the emotionally-ideational stage of development, the formation of self-awareness. This period is characterized by decompensation of current cerebro-organic disorders that significantly affect the formation of personality traits. Accordingly, during this period patho-character reactions, affective vibrations, and psychopathic disorders are actively progressing [14].

Among children of the age category 6-7 years, manifestations of cerebral growth in the form of persistent headache with nausea and nosebleeds, meteorological dependence, irritable weakness and vestibule-vegetative disorders were detected in 88.7% of cases among children of the main group (n = 62), among children of the control group - in 30.0% of cases (n = 30). Neurosis-like disorders in the form of thikoid hyperkinesis, stuttering, enuresis, encopresis, sleep and appetite disorders among children in the main group were noted in 80.6% of cases (n = 62), among children in the control group - in 13.3% of cases (n = thirty). In more than half of cases, children with ATD had dissominal disorders (66.7%, n = 62). 23 children of the main group of this age category (n = 62) showed signs of attention deficit hyperactivity disorder (ADHD) that meets the ICD-10 criteria (F90).

In the age category of 8-10 years, 69.1% of children with ATD (n = 55) retain cerebrosthenic phenomena, which are milder in comparison with the previous age category, but with more frequent manifestations of emotional lability. Among children in the control group, cerebrosthenic disorders were noted in 20.0% of cases (n = 30). Also, neurosis-like syndromes were noticeably less common in children of this age: 65.5% of cases (n = 55) in children of the main group, 10.0% of cases in children of the control group (n = 30). In 41.8% of children with ATD at the age of 8-10 years (n = 55), neurotic reactions of the "avoidant type" to generalized skin manifestations were revealed. At 15 children of the main group (n = 55) parents noted hysterical failure reactions in predisposing situations; in 11 children with ATD (n = 55), anxiety-phobic and depressive states were noted; 18 children in this group (n = 55) showed signs of ADHD. No similar phenomena were detected among children of the control group.

In children in the age group of 11-12 years, cerebral phenomena occurred in 33.3% of cases in the main group (n = 30) and in 13.3% of cases in the control group (n = 30). In such children, affectively excitable character traits and dysphoric paroxysms were revealed. More than half (56.7%) of children of this age with ATD (n = 30) had neurotic reactions in the form of anxiety-phobic, anxious-suspicious or depressive short-term (up to two weeks) conditions. Impaired disturbances in the form of stuttering, enuresis, and dysomnia were detected in 56.7% of children in the main group (n = 30) and 13.3% in the control group (n = 30). Adolescent ADHD was found in 12 children of the main group of the 11-12 year old age group (n = 30). Patho

characterological reactions were observed in 56.7% of children with ATD at the age of 11–12 years (n = 30) were represented by reactions of rejection, opposition, compensation and hyper compensation, emancipation.

An analysis of the influence of the psychological state on the clinical manifestations of ATD revealed an increase in the clinical manifestations of the disease against the background of stress of various origins in 43 children of the main group (n = 147). Usually, such an exacerbation was of a short-term nature – it was not exceed two weeks.

DISCUSSION

As a result of a comparative study, clinical features were analyzed and patterns of development of psycho-neurological disorders in children with ATD were revealed. The pathological course of pregnancy, detected in most children with ATD (82.3%, n = 147), creates conditions for increased vulnerability of the central nervous system of the fetus. Impaired development of the fetus (40.1% of children with ATD, n = 147) leads to immune-endocrine disorders, contributing to the development of atopic processes. Diffuse organic damage to the brain contributes to asphyxia and PCA, detected in childbirth in children with ATD (42.2%, n = 147). All these factors were decisive in the development of subsequent psychopathological and neurological manifestations of residual-organic genesis and corresponding to the stages of neuropsychic response. The manifestation of the disease, which occurred mainly in the first two years of life in most cases in children with ATD, was accompanied by symptoms of organic neuropathy under the age of 1 year. By age 3-4 years, many of these children experienced a delay in speech and psychomotor development. Decompensation of residual-organic damage to the central nervous system at the age of 6–7 years was manifested by powerful cerebro-stenic symptoms. Disturbances characteristic of the psychomotor stage of the neuropsychic response (ADHD, tics, stuttering) were manifested. Compensation of cerebral age 8–10 years old in most children with ATD was accompanied by active neurosis-like symptoms in the form of affective reactions, neurotic states associated with the appearance of the skin [5]. At the age of 11–12 years, more than half of children with ATD have joined the existing clinic patho-character reactions with affective-excitabile traits and dysphoroid-like paroxysms. The most pronounced neuropsychological disorders in children with ATD were found in the work of the first (energy) block of the brain, which was manifested by a lack of neuro dynamic regulation. The work of the second and third functional blocks in such children is characterized by stiffness and underdevelopment of alternative algorithms, which is due to the weak development of the system of intra- and interhemispheric connections. In our opinion, an additional factor in the development of neuropsychological deficiency is the deprivation of sensory and kinesthetic sensations resulting from the development of skin disease.

Psychological factors of a family nature had a limited impact in the study group. Apparently, the effect of such factors is significant only in the presence of an initial organic central nervous system inferiority.

The results of the clinical and anamnestic study revealed pathogenic factors that predetermined the clinical dynamics of psychopathological and neurological disorders. Those disorders correspond to the dynamics of residual-organic cerebral insufficiency, with a characteristic change in the leading symptoms in accordance with the stages of the neuropsychic response.

In the article by Professor Retyunsky, “Neuropsychiatric Disorders in Children with Atopic Dermatitis,” the neuropsychiatric module of pathogenesis explains the occurrence of ATD by dysfunction of autonomic centers due to early perinatal damage to the central nervous system [5]. Our study confirms these findings. Neuropsychiatric build-up in children with ATD is due to the action of exogenous organic factors pathogenic for the central nervous system in the early stages of ontogeny. Sensory and motor deprivation of a child at an early age (up to 3 years), which inevitably occurs due to the manifestation of somatic suffering, aggravates the formation of neuropsychological deficiency and the structuring of residual cerebroorganic symptoms. Jonathan I. Silverver in his research says that children with ATD are at higher risk for neuropsychiatric disorders, including speech disorders, depression, hyperactivity and seizures. Our article also confirms this statement [15].

CONCLUSION

An analysis of the clinical patterns of the development of mental disorders in children with ATD opens up prospects for the discovery of common patho-genetic mechanisms in the development of neuropsychiatric, somato-vegetative and neuro-immune disorders in ATD. This would allow to develop a set of sound medical, rehabilitation and preventive measures to combat ATD and related disorders. We offer an effective biopsychosocial approach to the treatment of children with ATD, which includes comprehensive psycho pharmacotherapy, neuropsychiatric correction, and social work. Since the altered brain is the biological basis of the pathophysiological mechanisms of ATD, the complex of psycho pharmacotherapy includes nootropic, dehydration, vascular therapy, which is taken in courses of 30 days and repeated up to 4 times a year for 3 years. If the disease is accompanied by tics, stuttering, enuresis, epileptic form activity, anti colvantants should be included in the therapy. Efficiency criteria will be the normalization of the general condition of the child, the reduction in the time to achieve remission of skin processes.

CONFLICT OF INTEREST

The authors declare no competing interests in relation to the work.

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