

EFFICIENCY OF MICROCURRENT REFLEXOTHERAPY IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

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Childhood autism is one of the topical health problems in the world, which is determined not so much by the frequency of childhood autism (CHA) in the child population - from 4 to 26 per 10,000 children [3, 8, 15], but by the social significance and insufficient knowledge of the etiology and pathogenesis this disease [2, 9, 10]. Today, autism spectrum disorders (ASD) are widely regarded as neurodevelopmental disorders implying a sharply disharmonious development of the brain and the formation of neural connections [6, 13]. Despite the increase in the incidence of these types of disorders, the awareness of the public and specialists about the problem is extremely low [5, 11].

The diagnosis "ASD" refers to a group of conditions associated with the development of the nervous system and characterized by disorders in three areas: social interaction, communication (use of verbal and non-verbal language), as well as limited and repetitive patterns in behavior, interests and activities [1, 9]. Symptoms typically appear before the age of three, and these conditions have not been diagnosed until recently in most regions of the world. The increasing recognition of disorders, the emotional impact they have on families and the financial burden associated with treatment and social care, each year make ASD an important medical condition in terms of science, public health and human rights [4, 5, 12]. Thanks to the methods of therapy available today, it is possible to achieve a higher level of quality of life for such patients, compared to previous years, but it should be recognized that it is impossible to achieve a complete cure in people suffering from these disorders. Most patients, especially in developing countries (with rare exceptions), do not receive any treatment for it.[7, 14].

Treatment for ASD depends on different factors. The difference in age, the severity of impairments, concomitant diseases, the situation in the family and society, the availability of resources and the economic development of society, the provision of education (or lack of it), medical and material assistance, the possibilities of protected employment and living without discrimination upon reaching adulthood can be huge [6, 11, 15].

Recent reviews of scientific publications indicate that very few of the treatments meet the criteria for evaluating the effectiveness of interventions [8]. However, the quality of the evidence is improving, with a growing number of good planned research as well as randomized controlled trials [15]. However, even if the results are positive, most studies still focus on short-term goals and a limited number of outcome criteria. Few attempts are being made to find answers to questions such as: is treatment effective in the long term or does it really improve the quality of life of patients? Such problems may require very different research strategies such as audits and reviews, systematic problem analysis, and satisfaction assessments. It is also extremely important to accumulate information about the views and beliefs of people with ASD themselves.

Recently, microcurrentreflexotherapy (MCRTH) has been used in the treatment of children with ASD. MCRTH is an effective modern method of treating a wide range of diseases, including CNS lesions in children, in particular in ASD. MCRTH improves the functioning of those parts of the brain that are responsible for speech and the desire to make contact. However, there are few and controversial scientific studies evaluating the effectiveness of MCRTH prescription among children with ASD.

Objective of the study: to study the effectiveness of microcurrentreflexotherapy in children with ASD.

Materials and methods of research: The research is based on survey data of 100 children with autism. The diagnosis of ASD in the study groups was determined using the DSM-IV criteria for the diagnosis of autistic disorder. The age of the children ranged from 2 to 14 years old. Most of the children with autism were between the ages of 2-3 and 4-6 (40% and 45%, respectively). According to the sex composition, a 2-fold predominance of boys over girls was established, which is reliable ($P < 0.05$).

The exclusion criteria from the study were: the presence of epileptic seizures at the present time, a history of epilepsy, hereditary metabolic disorders (phenylketonuria, tyrosinemia, hyperglyciuria, etc.) and chromosomal diseases.

Neurological examination was carried out, consistently assessing the state of higher cerebral functions, cranial nerves (CN), motor function (voluntary movements, coordination, involuntary movements), sensitivity, meningeal syndrome, vegetative-trophic functions. To determine the severity of autism, the Childhood Autism Rating Scale - CARS (Schopler E. et al., 1988) was used. To assess the dynamics of the state of children in the course of observation and treatment in this study, the CARS scale was used [Schopler E. et al., 1980, 1988; translation by Elina& Uri], which is a widely used rating scale in the United States to determine the severity of autistic manifestations in children from 3 to 15 years old. The scale includes 15 criteria characterizing all areas of the child's functioning that are significant for the survey. These include "relationship to people", "the ability to imitate", "features of emotional reactions", "motor skills", "use of play and non-play objects", "adaptation to changes", "visual reactions", "auditory reactions", "Gustatory, olfactory and tactile reactions", "the presence of fears and anxiety", "speech peculiarities", "non-verbal interaction", "the degree and productivity of activity", "the level and characteristics of the development of intellectual activity", "assessment of the general impression of the clinician." According to this scale, the severity of autism was measured in points. The

final score in the range from 15 to 29 points corresponds to the absence of autism, mild / moderate autism - 30-36 points, severe - 37-60 points.

To assess the effectiveness of the treatment of autism used ATEC - it consisting of 4 parts (speech and communication, socialization, sensing and cognitive abilities, health and behavior): 10-15 points - no autism; 15-30 - slight developmental delay; 30-40 - mild autism; 40-60 - medium degree; 60 and above - severe.

To analyze the results of the study on the effectiveness of the MCRTM method, we divided children with autism into two groups. The main group consisted of 50 children with autism who received MCRTM sessions in complex pharmacological treatment and ABA therapy.

MCRTM was performed using a MERT device approved for use in the European Union (registration number MED 31494_1). The therapeutic effect was carried out sequentially on biologically active points (BAPs) of the craniospinal region, on the speech zones of craniotherapy, on BAPs over the muscles of the articulatory muscles. The exposure time for each BAP is 60 sec. During the MCRTM sessions, the patients were awake, in a sitting position.

During MCRTM, **ultra-small** electrical signals are used, which are fed to various biologically active points to restore the patient's own normal functioning of the brain and spinal cord. The full course of treatment is 3 weeks - 15 treatments. Treatment is carried out daily, the duration of the treatment procedure ranges from 30 minutes to 40 minutes.

The comparison group consisted of 50 children with autism who received standard pharmacotherapy and ABA therapy.

Statistical data processing was performed using the Excel 2017 application package, which includes traditional methods of variation statistics. The significance of differences between the groups was assessed by Student's t-test. Differences were considered statistically significant at $p < 0.05$.

Results of the study: the structure of somatic pathology was characterized in most cases by the presence of diseases of the gastrointestinal tract (dyskinesia of the biliary tract, chronic diseases of the gastroduodenal zone), which accounted for 70% of children with ASD, as well as allergic and immunopathology, represented by bronchial asthma, in a large percentage. atonic dermatitis, allergic rhinitis, secondary immunodeficiency states (60% versus 9%, respectively; $P < 0.05$). Pathology of the ENT organs (chronic tonsillitis, adenoiditis, curvature of the nasal septum) were diagnosed in 23% of children. Abnormalities in the cardiovascular system were mainly represented by dysfunctions of the sinus node - sinus tachy- and bradyarrhythmias, sinoatrial block 2nd degree Type 1, which occurred in 23% of children with ASD.

When studying hereditary predisposition, 85% of children with ASD revealed a history of mental illness. These data are of some interest, since they once again prove that there are genetic factors of predisposition in the development of autism.

The neurological status at the time of examination of the children was characterized by diffuse microsymptomatology in the form of dissociation of tone, changes in reflexes (slight asymmetry of tendon and periosteal reflexes), low speech production and the presence of a defect in social communication.

On the part of the cranial nerves - insufficiency of cranial innervation in the form of asymmetry and flattening of the nasolabial folds, asymmetry of the palpebral fissures, deviation of the tongue from the midline, etc.; violation of convergence and accommodation was in 16% of children, smoothness and less mobility of the nasolabial fold: right - in 17% of children, left -

12% of children; deviation of the tongue from the midline in 2% (most children refused to follow this instruction), bulbar and pseudobulbar symptoms were not detected, but 14% of children showed prolonged retention of food in the mouth with a preserved swallowing reflex.

Dissociation of tone, pathological reflexes, coordination disorders were in 35-41%. Neurological symptoms were more pronounced in children with autism in the age group 3-6 years old, but did not disappear, at the age of 7-10 years.

It was found that in children with ASD, the frequency of sleep disorders (dyssomnia, insomnia, somnolonia, somnambulism, nightmares) was recorded in 41%. The percentage of children who do not have pathological changes in the central nervous system was only 9%.

Neuropsychological examination complemented neurological examination, significantly increasing the efficiency of topical diagnosis of brain lesions and interhemispheric interactions. In order to clarify the mechanism of symptom formation, as well as to analyze the state and dynamics of the development of mental functions in various variants of speech development disorder, we conducted a neuropsychological study. The revealed neuropsychological disorders of the higher cerebral functions in the examined children are shown in Fig. 1.

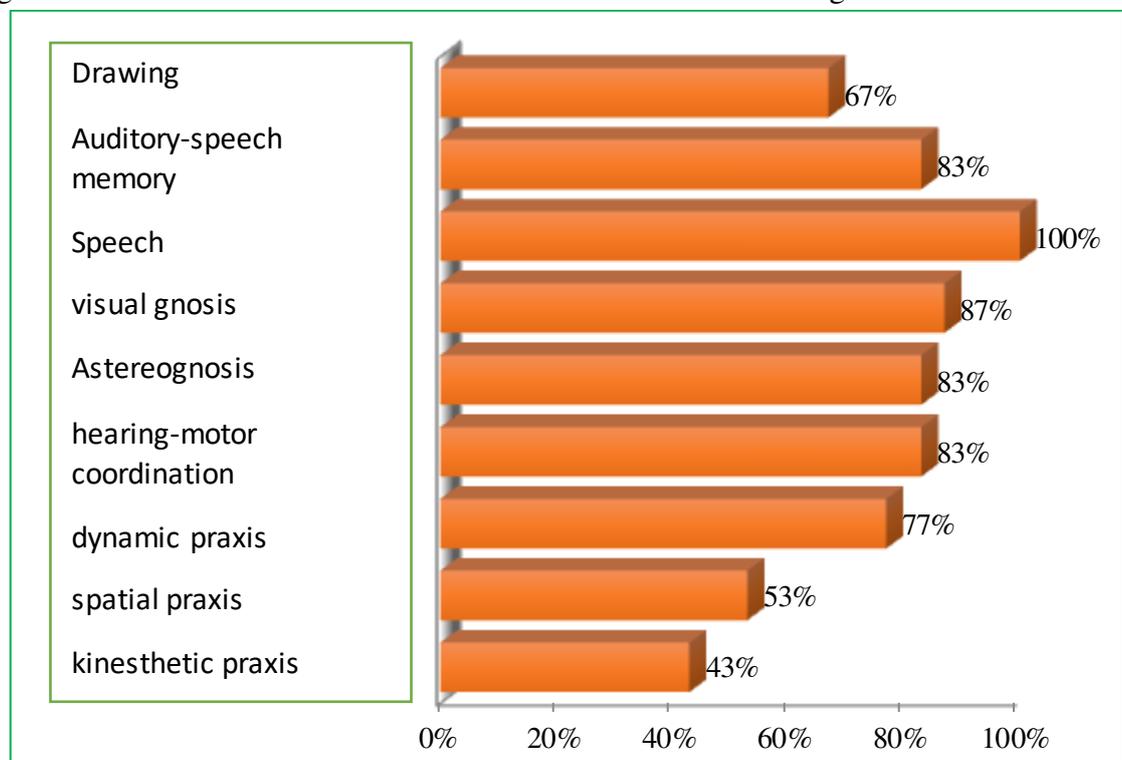


Fig 1. Cognitive dysfunctions in the studied children with autism

The neuropsychological study included an assessment of kinesthetic, dynamic and spatial praxis, auditory-motor coordination, stereognosis, visual gnosis, speech, auditory-speech memory, drawing and visual memory.

Speech impairment occurred in 100% of cases in both groups. Drawing impairment and auditory-speech memory were found in 67% and 83%, respectively.

The highest average score on the CARS subscales in patients with ASD was on the “verbal communication” subscale (3 points), which indicates the difficulty of social communication of children with ASD. Fear and nervousness are also often determined in these children. The lowest average score was on the non-verbal communication and object use subscales of 2.12 points. Otherwise, there were average indicators among all studied children (Fig. 2).

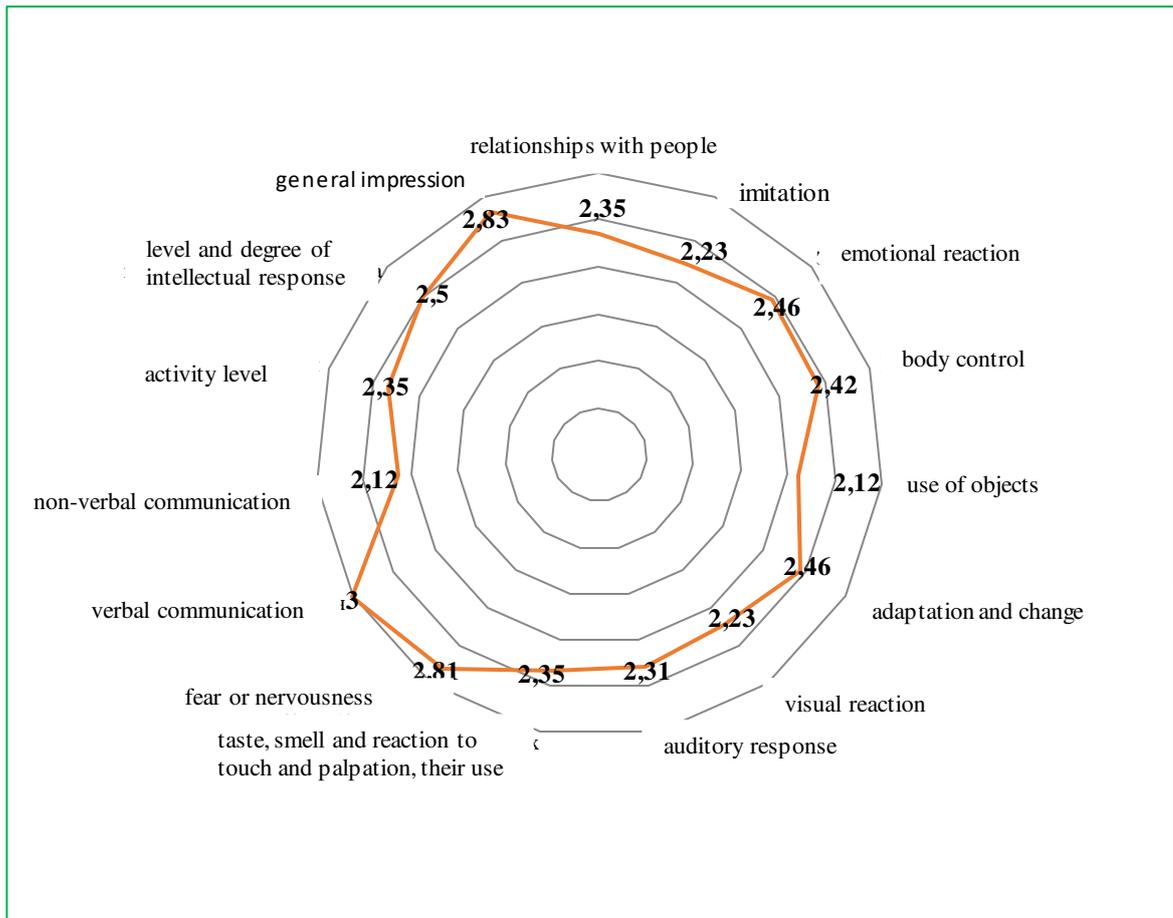


Fig. 2. Assessment of the condition of children with ASD according to CARS subscales

In children with ASD, 80% of children had a moderate degree of autism and was in the range of 35-37 points, 6 children (20%) had a severe degree of autism, they were older.

As a result of the conducted studies, an improvement was found, which in some cases was reliable, but with all the indicators of the development of children with ASD, there was a tendency to improvement in the main group in relation to the comparison group (Table 1).

In the comparison group, with all indicators of the development of children, there was a positive trend in the treatment process, however, the reliability was registered only with the indicators "The absence of the pronoun " I "in the lexicon.

**Table 1
Development of the examined children with ASD**

Development indicator	main group (n=50)		comparison group(n=50)	
	Before treatment	after treatment	До лечения	after treatment
Echolalia	28%	16%	24%	20%
The absence of the pronoun "I" in the lexicon	20%	12%*	24%	14%*
Violation of the grammatical structure of speech	12%	6%*	12%	8%

Lack of neatness skills	12%	8%*	10%	8%
Inadequate emotional development	16%	8%*	12%	8%
Anxiety and phobias	12%	6%*	12%	8%
Difficulty in communicative functions	36%	16%*	40%	24%
Aggressiveness	20%	14%	16%	14%
Motor stereotypes	12%	8%	10%	8%
The need for the mother to be present before falling asleep	16%	8%*	16%	10%
Lack of play activity	28%	18%	28%	24%
Game stereotypes	64%	34%	60%	50%

Note: * - reliability of data between groups ($P < 0.05$)

The inclusion of MCRTH in complex treatment helps to restore not only developmental skills in a child with ASD, but also to level the symptoms of anxiety and phobias - almost 2 times, in relation to the comparison group, where children received only pharmacotherapy.

In addition, we conducted research to study the data of the dynamics of indicators of visual and auditory-speech memory, attention, thought processes, and the emotional sphere (Table 2).

Table 2

Examination data of children with ASD before and after treatment

Показатели	Main group		Comparison group	
	Before treatment	After treatment	Before treatment	After treatment
Data on the dynamics of indicators of visual and auditory-speech memory				
Visual memory (first presentation)	1.5 figure	2,9 figure	1,24 figure	1,7 figure
Auditory-speech memory volume (first presentation)	2,1 word	3,75 word	2,2 word	3,0word
Data of dynamics of indicators of attention				
Number of errors in 1 min	9,1	7,3	8,8	8,1
Data of dynamics of indicators of productivity of thinking				
Number of completed tasks	2,05	4,1*	2,3	3,4
Dynamics data of indicators of the emotional sphere				
Phobias	6,1	2,7*	6,9	4,9
Anxiety	7,3	3,6*	6,4	4,2

Aggressive reactions	7,6	3,3*	7,7	6,1
Depressive reactions	5,4	1,9*	5,8	4,2

Note: * - reliability of data before and after treatment ($P < 0.05$)

As can be seen from the data presented in the table, in children with ASD, when MCRTM is switched on, there is a recovery in visual and auditory memory indicators in the dynamics of treatment, however, the numbers were not reliable, but had a more pronounced trend in relation to the comparison group.

A similar picture is observed when analyzing the indicators of attention in the dynamics of treatment, in the main group, children made mistakes 1.5 times less often, while in the comparison group - 1.1 times. According to the data obtained, the reliability of the data was not significant, but it had a pronounced trend in the main group of children with ASD.

When MCRTM is prescribed in complex treatment in children of the main group, there is a 2 times increase in productive attention, while in the comparison group it is 1.5 times ($P < 0.05$).

In the emotional sphere, there was also a significant leveling of indicators in children with ASD in the main group in relation to the data before and after treatment, as well as to the indicators of children from the main group ($P < 0.05$)

Parents of children with ASD complained of a lack of speech contact, instability of attention, difficulty concentrating, lack of interest in communication, selective interest in games with a predominance of a manipulative nature of the game, high non-purposeful motor activity, episodes of excitement in situations of prohibition, stereotypical movements.

By the end of the treatment, positive dynamics was noted: the cognitive interest in the environment increased, fatigue, excitability and manifestations of aggressiveness decreased.

The volume of the operative memory in the visual modality increased by 1.93 times; in the auditory-speech modality - 1.76 times. Voluntary attention has become more stable, the number of errors has decreased by 1.28 times.

After completing the course of treatment, the child was able to complete on average 2.95 more tasks, the productivity of thinking increased 3.57 times.

After the course of treatment, phobias decreased, anxiety decreased, aggressive and depressive reactions also decreased.

In 52% of cases, the children of the main group showed a positive dynamics of cognitive activity of a moderate and pronounced degree; 40% of children had a weakly positive dynamics and only 8% of cases showed no dynamics. 8% of children showed positive dynamics of a pronounced degree, these children showed a significant improvement in the emotional state, the appearance of voluntary activity, a decrease in motor stereotypes, the appearance of the communicative function of speech.

In children who received treatment according to the standard method, positive dynamics of a pronounced degree was noted only in 8%, the dynamics of cognitive activity was moderate in 28% of children, in 36% - a weak degree, in 28% of cases there was a lack of dynamics, i.e. lack of dynamics and weak dynamics in 64% of cases; only 36% of children have moderate and pronounced dynamics.

The average ATEC score - the test in the main group decreased from 61.94 to 42.21 points (almost 20 points), while in the comparison group, this indicator decreased from 61.86

points to 48.1 points (about 14 points). This trend was also observed in the remaining subscales, which indicates the effectiveness of the use of MRT in children with ASD (Fig. 3)..

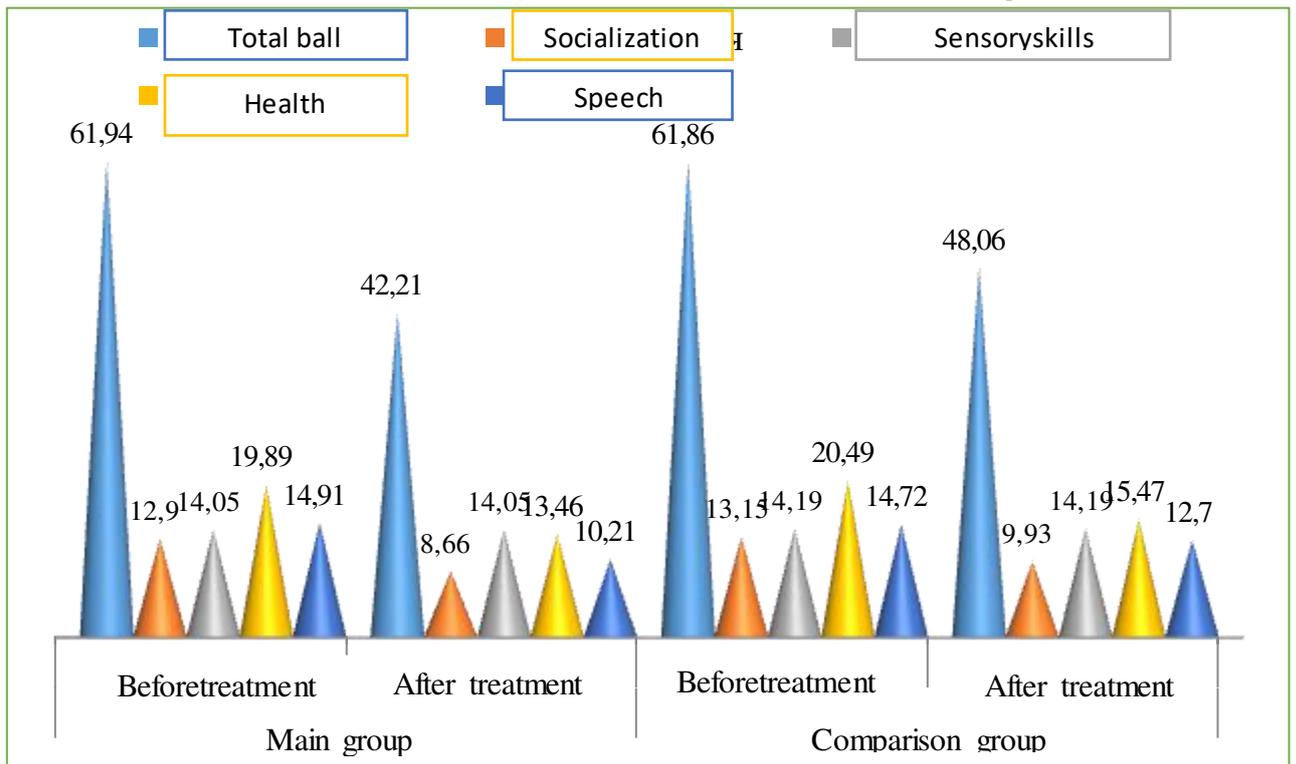


Figure: 3. Evaluation of the effectiveness of treatment according to the ATEK test (points)

As a result of the data obtained, it was found that reliably significant improvements in the social adaptation of children with ASD were recorded after inclusion in the MCRTH treatment program.

Discussion:

Neurological disorders are typical comorbidities in autism [6, 9]. Following the delayed and disharmonious early psychomotor development in children with autism, a peculiar spectrum of movement disorders expressed in varying degrees and disorders of the formation of higher mental functions is formed. Their identification is of great importance in determining the tactics of providing comprehensive care for patients with autism spectrum disorders [5, 10, 14].

In the world clinical practice, there are more than 70 different approaches to the correction of autism [15]. Various approaches and methods for the correction of autism are used - medication, modern hardware technologies, psychological and psychotherapeutic correction, etc. [4, 11, 13]. In world practice, MCRTH has established itself as an effective method used in neurology.

Our experience shows that in the treatment of ASD in children, MCRTH is effective, which allows you to improve the work of those parts of the brain that are responsible for speech and the desire to make contact. Improvement is characterized by the following: vocabulary expands, phrases and sentences appear, diction improves, and learning ability increases. In children with more pronounced developmental delays and autism, at first, there is a gradual

desire to make contact, they begin to understand speech and fulfill simple requests, and develop social skills.

Findings:

1. Neurological symptoms in children with autism depend on age and are characterized by the presence of diffuse microsymptomatology in the form of dissociation of tone, changes in reflexes (slight asymmetry of tendon and periosteal reflexes), low speech production and the presence of a defect in social communication.

2. Revealed neurological syndromes (pyramidal, extrapyramidal insufficiency syndrome, muscular dystonia syndrome, enuresis, etc.) in children with ASD may result from a fairly high frequency of subclinical forms of central nervous system lesions in the perinatal period.

3. In children with autism, in 91% of cases, somatic pathology is detected, which in most cases is characterized by the identification of allergic pathology and gastrointestinal disorders.

4. Significantly significant improvements in social adaptation and increased communication skills in patients with early childhood autism were revealed after inclusion in the MCRTH treatment complex. An increase in the average scores in the main group indicates that children with autism have improved speech and social interaction skills, as well as the acquisition of communication skills by an average of 45.3%.

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SUMMARY

Objective of the study: to study the effectiveness of microcurrent reflexotherapy in children with ASD.

Materials and methods of research: the study is based on survey data of 100 children with autism. The diagnosis of ASD in the study groups was determined using the DSM-IV criteria for the diagnosis of autistic disorder. The age of the children ranged from 2 to 18 years old. The main group consisted of 50 children with autism who received MCRTM sessions. The comparison group consisted of 50 children with autism who received standard pharmacotherapy.

Conclusion: in the treatment of ASD in children, the prescription of MCRTM in combination with pharmacotherapy and ABA therapy improves the functioning of those parts of the brain that are responsible for speech and the desire to make contact. Improvement is characterized by the following: vocabulary , phrases and sentences appear, diction improves, and learning ability increases. In children with more pronounced developmental delays and autism, at first, there is a gradual desire to make contact, they begin to understand speech and fulfill simple requests, and develop social skills.

Key words: autism spectrum disorders, autism, children, neurological status, treatment, microcurrentreflesotherapy