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MICROCURRENT REFLEXOTHERAPY AS AN INNOVATIVE APPROACH IN THE REHABILITATION OF CHILDREN WITH CONGENITAL MICROCEPHALY

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Abstract

Congenital microcephaly represents a severe neurological disorder characterized by structural brain abnormalities and persistent delays in psychomotor development. Children with this condition often demonstrate impairments in motor coordination, cognitive abilities, and speech formation, which significantly affect their quality of life. The present study evaluates the effectiveness of microcurrent reflexotherapy as a component of комплексной нейрореабилитации in pediatric patients with congenital microcephaly.

A total of 260 children aged between 6 months and 7 years participated in the study and were divided into two groups: a main group receiving комплексное лечение с применением микротоковой рефлексотерапии and a control group receiving standard rehabilitation therapy. The results demonstrated that the integration of microcurrent reflexotherapy contributed to significant improvements in motor activity, speech and cognitive development, reduction of epileptic manifestations, and normalization of muscle tone. The findings indicate that this method can be considered a safe and effective tool in early neurorehabilitation programs for children with microcephaly.

Keywords

congenital microcephaly, pediatric neurology, microcurrent reflexotherapy, neurorehabilitation, psychomotor development.

Introduction

Congenital microcephaly is regarded as one of the most serious developmental disorders of the central nervous system. It is characterized by a significant reduction in cranial and brain size, accompanied by various neurological and cognitive impairments. Children with this pathology frequently present with delayed psychomotor development, motor dysfunction, speech delay, and a high prevalence of epileptic syndromes.

Despite significant progress in modern medicine, therapeutic options aimed at improving neurological outcomes in children with microcephaly remain limited. Traditional rehabilitation methods, including physiotherapy, massage, and pharmacological support, provide partial improvement but often fail to achieve stable functional recovery.

In recent years, increasing attention has been given to physiotherapeutic technologies capable of stimulating neuroplastic processes in the developing brain. Among these approaches,

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microcurrent reflexotherapy has gained interest due to its ability to combine principles of reflex stimulation with low-intensity electrical impulses. Such stimulation is believed to activate microcirculation, enhance neuronal metabolism, and modulate bioelectrical brain activity.

However, despite promising preliminary results, the clinical effectiveness of microcurrent reflexotherapy in children with congenital microcephaly has not been sufficiently investigated. This study aims to expand the existing evidence regarding the role of this therapeutic approach in pediatric neurorehabilitation.

Objective. To evaluate the clinical effectiveness and safety of microcurrent reflexotherapy in the комплексной реабилитации children diagnosed with congenital microcephaly.

Materials and Methods. The clinical investigation was conducted at the Andijan State Medical Institute clinic between January 2025 and March 2026.

The study included **260 pediatric patients** aged from **6 months to 7 years** who were diagnosed with congenital microcephaly.

Participants were divided into two comparable groups:

- **Main group (n = 130)** – received comprehensive rehabilitation including microcurrent reflexotherapy.
- **Control group (n = 130)** – received standard treatment consisting of therapeutic physical exercises, massage therapy, and pharmacological support.

The course of microcurrent reflexotherapy consisted of **15 treatment sessions**, each lasting **approximately 20 minutes**. Electrical impulses with an intensity of **80–200 µA** and frequency **0.5–2 Hz** were applied to biologically active zones located in the occipital region, cervical-collar area, as well as acupuncture points according to **SU-JOK and auriculotherapy principles**.

Clinical effectiveness was assessed using several validated diagnostic scales:

- GMFCS scale for motor function evaluation
- Bayley III scale for cognitive development
- Denver II test for speech and developmental assessment
- EEG analysis for brain bioelectrical activity
- Modified Ashworth scale for muscle tone
- PedsQL questionnaire for quality of life assessment

Statistical processing of the obtained data was performed using **SPSS Statistics 26**, with statistical significance established at **$p < 0.05$**.

Results. The results of the study demonstrated that the integration of microcurrent reflexotherapy into rehabilitation programs produced significant improvements across several clinical domains.

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Motor Function

Evaluation using the GMFCS scale revealed substantial improvement in motor activity among children in the main group. The average severity of motor impairment decreased from **3.8 ± 0.6 to 2.9 ± 0.5 ($p < 0.01$)**. Additionally, the proportion of patients classified within **GMFCS levels I–II increased from 12% to 34%**, indicating improved coordination and greater independence in movement.

In contrast, the control group demonstrated only minor changes that did not reach statistical significance.

Muscle Tone

A noticeable reduction in muscle hypertonicity was observed in children receiving microcurrent reflexotherapy. According to the modified Ashworth scale, spasticity decreased on average by **1.1 points ($p < 0.01$)**. This contributed to improved mobility and facilitated the performance of therapeutic exercises.

Cognitive Development

Assessment using the Bayley III scale demonstrated a clear advantage in the main group. The average cognitive score increased from **62.1 ± 5.3 to 71.4 ± 6.2 points ($p < 0.01$)**, reflecting improvements in attention, learning ability, and visual-spatial perception.

The control group showed only minimal improvement.

Speech Development

According to the Denver II developmental test, children receiving microcurrent therapy showed a marked reduction in speech development delay—from **6.5 ± 1.2 months to 3.1 ± 0.8 months ($p < 0.01$)**. Parents reported increased vocal activity, improved articulation responses, and greater interest in verbal interaction.

Epileptic Activity

A reduction in seizure frequency was observed in the main group, decreasing from **2.3 ± 1.1 to 0.9 ± 0.4 episodes per month ($p < 0.01$)**. EEG examination confirmed these clinical findings by demonstrating a decrease in epileptiform discharges.

Sleep and Behavioral Changes

Following the course of therapy, the frequency of sleep disturbances decreased from **65% to 28%**. Parents also reported reduced irritability, improved emotional stability, and better daily activity patterns in their children.

Quality of Life

Quality-of-life assessment using the PedsQL scale revealed a significant increase in scores within the main group—from **42 ± 10 to 68 ± 9 points ($p < 0.01$)**. These improvements reflected enhanced motor independence, better social interaction, and increased adaptive abilities.

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Safety

Microcurrent reflexotherapy demonstrated a favorable safety profile. Observed side effects were mild and transient, including short-term irritability and mild drowsiness. No serious adverse events were recorded.

Discussion. The obtained results confirm that microcurrent reflexotherapy can positively influence the functional state of the nervous system in children with congenital microcephaly. The therapy appears to enhance neuroplastic mechanisms, improve neuronal communication, and stabilize brain bioelectrical activity.

Importantly, while the therapy did not affect anatomical parameters such as head circumference, it produced meaningful functional improvements in motor and cognitive domains. This supports the hypothesis that the primary therapeutic mechanism involves modulation of neural activity rather than structural brain changes.

These findings correspond with previously published studies highlighting the potential role of microcurrent stimulation in pediatric neurological rehabilitation.

Conclusion

1. Microcurrent reflexotherapy significantly increases the effectiveness of comprehensive rehabilitation in children with congenital microcephaly.

2. The therapy contributes to improvements in motor activity, cognitive abilities, and speech development.

3. Treatment leads to a reduction in epileptic manifestations and normalization of muscle tone.

4. The method demonstrates high safety and good tolerability in pediatric patients.

5. Integration of microcurrent reflexotherapy into rehabilitation programs improves overall quality of life for both children and their families.

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