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COMPLEX REHABILITATION OF CHILDREN WITH NEUROMOTOR SYSTEM DISORDERS: EFFECTIVENESS OF PHARMACOPUNCTURE

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Abstract. In children with diseases of neuromotor system aged from 5 to 14 during the process of complex medical rehabilitation the application of treatment with methods of pharmacopuncture showed good results. The group contained 51 patients who were treated by using conventional medical treatment. Maximal anthropometric, laboratorial and clinic recovery was detected in patients with upper and lower monopareses after the usage of pharmacopuncture in combination with Cerebrolysin.

Key words: rehabilitation, neuromotor system disorders, pharmacopuncture.

Introduction. Various approaches to treatment of pediatric patients with neuromotor disorders, including drug, mechanic, kinetic, physical, and reflex therapy exist in modern medical rehabilitation practice. It is known that, a more rapid body response (including antinociceptive) is obtained upon direct intervention with receptors through specialized acupuncture needles. Use of pharmacologic substances through a needle after insertion into biologically active points triggers intensification of treatment effect. Using special acupuncture needles not only excludes loss of drug due to spills, but it also ensures high level of local action, which in its turn adds to the intensification of stimulation.

Purpose of Study was to investigate role of pharmacopuncture with nanodoses of cerebrolysin in affected extremity in children with neuromotor disorders.

Study Materials and Methods included anthropometry of affected and healthy extremities using technique developed by Roginski Y.Y. et al. (1978) and modified by Smirnova N.S. et al. (1981). Myometric measurements included muscle contraction force registered by electroneuromyograph: static contraction force; dynamic contraction force; time and duration of contraction; Harvard step test. Biochemical methods: determining intensity of highly reactive oxygen species generation via determination of

free malonic dialdehyde (MDA) in serum (Nagoyev B.S. et al, 2008). Catalase activity was measured using permanganometry by S.M. Zubkova et al. (1972). Superoxid dismutase activity was measured using method proposed by Mirsa P.H and Fridovich J. (1972) and modified by Brusova O.S. et al. (1976). Average Plasma Molecules Fraction (a-MPF) was determined by spectrophotometer using Karyakina E.V. et al. method (2004). Obtained biochemical parameters were recounted to calculate total protein count (Lowry O.H. et al., 1951). Statistical analysis of available results was conducted on a personal computer in Excel using Fischer's and Student's Reliability Criteria.

Study Results. The study was conducted in Republican Pediatric Rehabilitation Center for Musculoskeletal Diseases. 51 patients at the age up to 14 were examined using anthropometric methods. The cohort included children with monoparesis of upper (n=25) or lower (n=26) extremities at the age of 11-12. Control group consisted of children at similar age admitted to Traumatology Department of Institute's Clinic diagnosed with torticollis and platypodia (n=25). It was identified, that affected extremity had lower diameter in brachium, antibrachium, femor, and tibia versus healthy extremity and anthropometric parameters of control group.

Electroneuromyographic potential in affected

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arm and leg was significantly lower compared to healthy extremity. Pharmacopuncture using nanodoses of cerebrolysin was conducted for 10 days. Follow-up electromyography was performed in three positions: at rest, at stress, and after muscular activity. Measurements have determined that in 26 of 30 patients, electroneuromyographic potential increased after physical activity. 4 patients had 2-4 times more increase in electromyographic potential compared to average increase. Muscular atrophy was the highest in these children.

Formation of malonic dialdehyde (MDA) and serum content of average molecular weight peptides (AMWP) are integral indicators of generation of highly reactive oxygen species. Significant increase in serum level of MDA was observed in children with musculoskeletal disorders, 6 times exceeding control values (0.51 ± 0.06 nmole MDA/mg of protein/min). Use of pharmacopuncture resulted in decline of MDA levels in serum down to 1.52 ± 0.19 (nmole MDA/mg protein/min), which was significantly higher than control values ($P < 0.05$). It is known that, AMWP is a degradation product of interaction of protein molecules with highly reactive oxygen species. Significant increase in serum level of AMWP was observed in children with musculoskeletal disorders, twice exceeding relevant value in control group (0.021 ± 0.005 U/mg protein). AMWP value in subjects of control group is insignificant and comparable to that of venous blood flowing through healthy extremity. Normalization of relevant parameter was observed in patients' blood as a result of pharmacopuncture with cerebrolysin (0.025 ± 0.06). It may be assumed that, being a protein, cerebrolysin stimulates destruction of macromolecules of protein nature at a higher level.

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A higher blood catalase activity (55.51 ± 2.89 mmole H₂O₂/mg protein/min) was determined in children with monoparesis of upper or lower extremity compared to similar parameter in control group (38.12 ± 2.14 mmole H₂O₂/mg protein/min). Increase in blood catalase activity up to 64.17 ± 0.88 mmole H₂O₂/mg protein/min was noted as a result of application of pharmacopuncture with use of cerebrolysin.

There was a slight increase in SOD activity in patients' blood, being 3.01 ± 0.22 , as a result of treatment with cerebrolysin pharmacopuncture. Cerebrolysin consists of a brain lysate of swine and has demonstrated stimulating effect on antioxidant system in neuromotor disorders. 10-15 ampules 5 ml each are used for treating children with neuromotor disorders. Cerebrolysin expenditure upon pharmacopuncture method is 10 ml, which shows cost-effectiveness of this treatment technique.

Conclusions

1. Lower anthropometric values and changes in myographic data are observed in damaged extremity in children with musculoskeletal disorders. These changes are accompanied by increase in blood MDA and SMP, which is followed by change in anti-oxidative system enzyme activity: increase in catalase level and decline in SOD level.
2. Use of pharmacopuncture with nano-doses of cerebrolysin in biologically active spots of body had a positive effect on muscular tissue metabolism in disabled children due to neuromotor system disorders, as evidenced by decrease in blood MDA level and normalization of SMP.
3. Use of pharmacopuncture with cerebrolysin in children with musculoskeletal disorders resulted in increased activity of catalase and SOD in blood.

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XÜLASƏ

NEYROMOTOR SİSTEM XƏSTƏLİKLƏRİ OLAN UŞAQLARDA KOMPLEKS REABİLİTASIYA: FARMAKOPUNKTURANIN EFFEKTİVLİYİ

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5-14 yaşlı neyromotor sistemin xəstəlikləri olan uşaqlarda kompleks tibbi reabilitasiya prosesində farmakopunktura metodları ilə müalicələrin tətbiqi yaxşı nəticələr göstərmişdi. Tədqiqat ənənəvi müalicə metodları ilə müalicə edilən 51 xəstəni əhatə etmişdir. Yuxarı və aşağı monoparezi olan xəstələrdə Cerebrolizinlə müştərək olaraq farmakopunkturanın istifadəsi zamanı maksimal antropometrik, laborator və klinik yaxşılaşmalar qeydə alınmışdır.

Açar sözlər: reabilitasiya, sinir-əzələ sistemi xəstəlikləri, farmakopunktura.

РЕЗЮМЕ

КОМПЛЕКСНАЯ РЕАБИЛИТАЦИЯ ДЕТЕЙ С ЗАБОЛЕВАНИЯМИ НЕЙРОМОТОРНОЙ СИСТЕМЫ: ЭФФЕКТИВНОСТЬ ФАРМАКОПУНКТУРЫ

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У детей с заболеваниями нейромоторной системы в возрасте от 5 до 14 лет в процессе комплексной медицинской реабилитации применение лечения с методами фармакопунктуры показали хорошие результаты. Группа охватила 51 пациентов, которые лечились с помощью традиционного медицинского лечения. Максимальные антропометрические, лабораторные и клинические восстановления были обнаружены у пациентов с верхним и нижним монопарезом после использования фармакопунктуры в сочетании с Церебролизином.

Ключевые слова: реабилитация, заболевания нейромоторной системы, фармакопунктура.

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