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PECULIARITIES OF CLINICAL MANIFESTATIONS AND BIOELECTRICAL PARAMETERS IN CHILDREN AND ADOLESCENTS WITH OPTIMISATION OF PROPER NUTRITION

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Abstract:
Epilepsy remains today the most common chronic disease of the nervous system in children and adolescents. Within the last two centuries, significant milestones have been made towards a better understanding of the multifarious aspects of what was once considered a 'sacred disease'.

Keywords: bioelectrical parameters,children, adolescents, proper nutrition

INTRODUCTION. The development of new pharmacological and alternative therapies is considered massive in this field, but time is fleeting, and previously conducted and proposed principles of diagnosis-patient studies, therapeutic approaches, need to continue modern revision, taking into account the updated classification (2017 ILAE), where 'immune causes' are included in the aetiological basis, with increased interest in the experimental and clinical relationship of the activity of the innate and adaptive immune system to seizure symptoms and epilepsy , alteration of the immune system, and the development of a new approach. Thus, according to recent statistical sources, more than half of all patients do not respond to the currently available drugs and maintain persistent resistance, in this regard, a new therapeutic strategy is considered, reviewing the situation with the impact on inflammatory, immune and intracellular (cytoprotection) factors, not excluding neuromodulation, surgical correction, and importantly, control and quality of dietary intervention as one of the types of promising personalised treatment of epilepsy. Dietary therapy, according to many specialists (epileptologists) is quite a valuable addition to the treatment of epilepsy. The ketogenic diet (high-fat, high-protein, low-carbohydrate) is the most commonly used diet, but other recommended diets are also quite effective, such as the Atkins diet (high-fat, high-protein, low-carbohydrate), polyunsaturated fatty acid enriched diets, or diets tending to maximise calorie restriction. American researchers from the Langone Medical Centre (New York), proved that by following dietary therapy, it is possible to reduce not only the frequency of attacks themselves, but also to prevent complications of the consequences of the attack, in the form of emotional-volitional, mental and cognitive disorders, even in patients who are not helped by pharmacotherapy or surgery. Ketogenic diet, is used mainly for the treatment of children. Ketosis in this case is a simulation of starvation and studies conducted by foreign authors indicate that in patients with epilepsy during fasting reduces the frequency of seizures or in some cases, completely disappear, even if the ketogenic diet is disrupted or discontinued. The exact pathomechanism of understanding this process, scientists do not understand and cannot fully explain, but low blood glucose levels significantly reduce the risk of seizure provocation in patients with epilepsy. Russian scientists have presented scientifically based studies, where it is revealed that in metabolism due to ketogenic diet there is a suppression of voltage-dependent sodium-calcium channels and at the same time the GABAergic system is activated. In addition, a properly selected ketogenic diet has an endogenous anticonvulsant effect, affecting potassium metabolism as a protector for neuronal hyperpolarisation. As a dietary supplement it enhances the metabolic process, thereby lowering the threshold of convulsive and epileptic activity. Thus, the ketogenic diet should be perceived as an effective non-medicinal therapy, the above mentioned being the basis for the study.

PURPOSE OF THE STUDY: to investigate and identify

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the features of clinical, neurological and neurophysiological parameters of epilepsy in the context of age-related changes in children and adolescents with optimisation of therapy using ketogenic diet.

MATERIAL AND METHODS OF RESEARCH, the patients with epilepsy of different forms with the debut of the disease in the number of 41, at the age of 12-13 years, which made up the 1st group and the 2nd group, as a comparison 43 patients with different forms of epilepsy at the age of 17-18 years (adolescence), which together made up the main group of 84 children and adolescents with epilepsy; the control group consisted of children and adolescents (adolescence), healthy 48. Written permission for the examination was obtained from parents and guardians. All patients were observed in in-patient (first 10 days) then out-patient clinic conditions, on the basis of SamSMU Multidisciplinary Clinic (Multidisciplinary Clinic of Samarkand Medical State University) for the period of 2021-2024. The criteria for inclusion in the study were patients aged 12-18 years, with complaints of seizures, epilepsy attacks, and established diagnosis of epilepsy (by anamnesis, for the given period). The grounds for exclusion in the study were diseases of organic nature, where the epileptic seizure had a secondary character (cerebral palsy, a consequence of traumatic brain injury, a consequence of encephalitis, etc.). The diagnosis was classified taking into account the nature of the seizures and was established according to the criteria of the international classification of the ILAE Commission Report on Classification and Terminology (2017), the clinical and anamnestic findings were compared with the electroencephalographic diagnostic indicators in dynamics. The gender distribution in the groups was with a slight male predominance of 57% (43% girls), which is in accordance with the literature. The examined category of patients in the presence of parents underwent a questionnaire stage (random questioning on anamnesis); standard laboratory analysis (according to the protocol of outpatient admission); Electroencephalography recording was carried out in dynamics, video-EEG monitoring (VEM), on the apparatus 'Bioss' (Russia) and on the universal encephalograph 'MBNNeurokartogrof' (Russia), where the initial signal was obtained according to standard methodological signals. EEG was analysed according to Zhirmudskaya EA (1993), with 5 types distinguished. Additionally, the patients and the control group were examined by specialists: paediatrician, ophthalmologist, otolaryngologist, neurosurgeon, psychologist, to exclude, first of all, somatic pathology and the patient's ability to participate in the study. In accordance with the set goal, in this study as a consultant, a nutritionist (a staff member of the Clinic), together with the main disease, optimised menu - nutrition (for each day): ketogenic diet, adapted to the age needs of patients, the peculiarities of climatogeographical and social opportunities. Parents and carers underwent a 'training school', for a proper understanding of the problem, studied the meaning of the proposed diet, the need for proper compliance with the task. Only after that the patients were gradually offered the transition from the usual diet to the ketogenic diet (in hospital conditions, in the department of paediatric neurology, the stepping approach allows to accelerate the process of ketosis). Examination of children, for the period of transition of children to a specialised diet required checking (daily) the content of glucose and ketone bodies (the norm is 3.3-5.5 mmol/l). The level of ketone bodies in urine was detected using special test strips, (normal range +++/++++). The analysis was controlled before meals, and depending on the amount of food intake, in the future (with stability of the organism and laboratory data), the indicators were determined once a week. Statistical analysis of the obtained data was carried out on an individual computer, with the traditional application of the Student's criterion reliability assessment method.

THE RESULT OF THE STUDY, PATIENTS (children and adolescents, adolescent age) diagnosed with epilepsy, who applied to the outpatient clinic at the MC SamSMU (using a standard research protocol), at the first stage underwent a questionnaire. The questionnaire differed from the usual collection of anamnesis by a more detailed description of life history, description of family history of predisposition to the disease, history of the present disease; in parallel, the questionnaire reflected neuropsychological testing with the help of scales-questionnaires (reflecting cognitive potential, mental state). Of all the noted risk factors for generalised epilepsy in the examined patients, hereditary predisposition (by anamnesis) accounted for 35% (occurrence of the disease in second line relatives or seizure episodes in 15% of cases). Among pre- and perinatal disorders, statistically significant risk factors for the development of generalised epilepsy were found to be: threat of pregnancy termination and neonatal asphyxia (placental abruption, maternal pre-eclampsia, TORCH infection, large foetus with mismatch between the functional capacity of mother and foetus). Neurological examination according to the established starts (Badalyan method), in patients of groups 1 and 2, no gross focal neurological symptoms and signs of decreased intelligence were revealed, minor diffuse microsymptoms without neurological deficit, in the form of muscle hypotonia, anisoreflexia, mild motor awkwardness, and minor insufficiency of VII and XII pairs of cranial nerves. Finally, 79% of cases had no neurological symptomatology (which is consistent with

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the literature). The use of the ILAE international classification of epilepsy revealed the following forms of epilepsy among the examined contingent of children of group 1: idiopathic focal epilepsy was noted in 5% of cases; idiopathic generalised epilepsy, in its majority of cases, was detected in 50% of cases; children with symptomatic focal epilepsy and cryptogenic focal epilepsy together made up 43%; the remaining 2% were patients with progressive myoclonus epilepsy. At the same time, in group 2 of older patients (adolescence and young adulthood), the prevalence of epilepsy with symptomatic and cryptogenic forms was 56%, while the second form accounted for the other half of the percentage - idiopathic generalised epilepsy 44%. In the course of analysing the survey of patients (and parents), the peculiarities of the type of epilepsy with different frequency of occurrence were revealed. Thus in group 1, generalised and secondary generalised seizures dominated 63%, focal seizures were found in a small percentage of 12%, the remaining patients formed a group with 'other' seizures, which included absences, myoclonic seizures, etc. All children and adolescents (adolescent age) of the main and control groups were examined by electroencephalography in dynamics. Thus, in group 1, with focal and cryptogenic epilepsy, regional slowing was noted, with multiregional epileptiform activity being registered in children with focal epilepsy in 80% of cases, and with cryptogenic focal epilepsy in 76%; here, the severity of regional discharge with peak-wave complex, or acute-slow wave complex and regional half-peaks was noted in 88% of cases (25%). Diffuse change in bioelectrical activity and epileptiform activity as part of the factor of secondary bilateral synchronisation was determined in 22% of cases in children with focal epilepsy. Interestingly, in cases of generalised and diffuse discharges, a combination of peak-wave or sharp-slow wave phenomena on EEG was detected in repeated images (recordings) in children diagnosed with different EEG devices. At the same time, in group 2, diffuse changes in epileptiform activity were observed in the form of short unifications of peak waves and short bilateral-synchronous sharp-slow waves. At the same time, with generalised seizures, in 89% of cases, focal epileptiform changes were noted, which appeared in the form of peak-wave, acute-slow-wave projections, more often in the frontal regions on a low index, and rare bifrontal peak waves. Rare cases of absence epilepsy, describes in patients on EEG (in all cases) the presence of generalised epiactivity, as variants: bilateral-synchronous peak waves (frequency 3.5-4.5 Hz) and single diffuse peak waves. As a result, the analysis of EEG diagnostic results indicates pathological signs in 69% of cases. Where, most commonly seen is a decrease in bioelectrical activity in 19% of cases or high peak-wave activity in 65% of all observations.

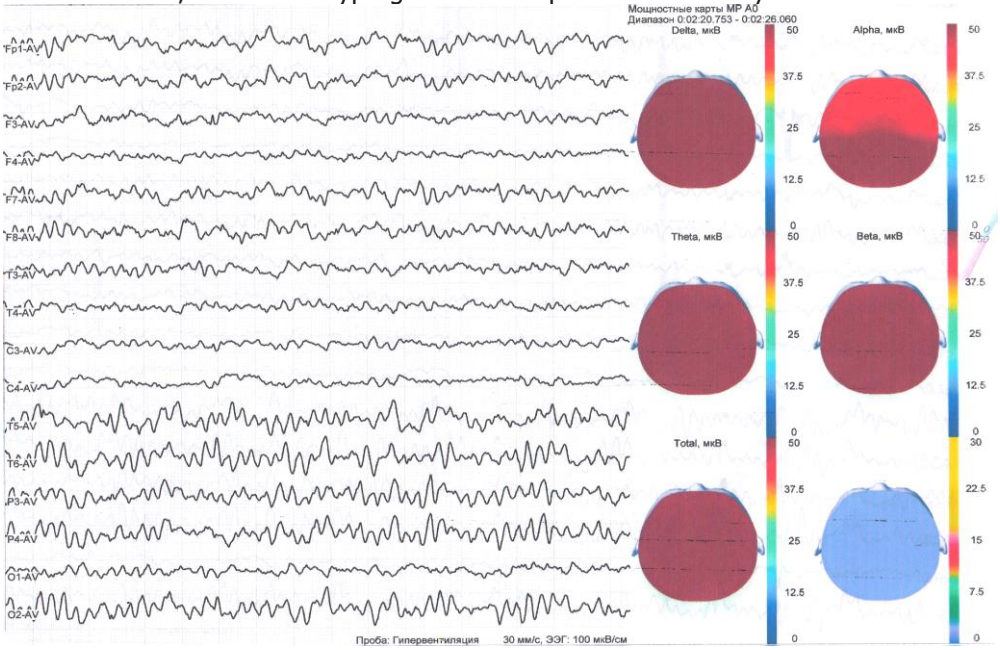

Fig. 1. Patient Y. born in 2016. Moderate diffuse EEG changes are registered. Paroxysmal activity is registered (patient on admission)

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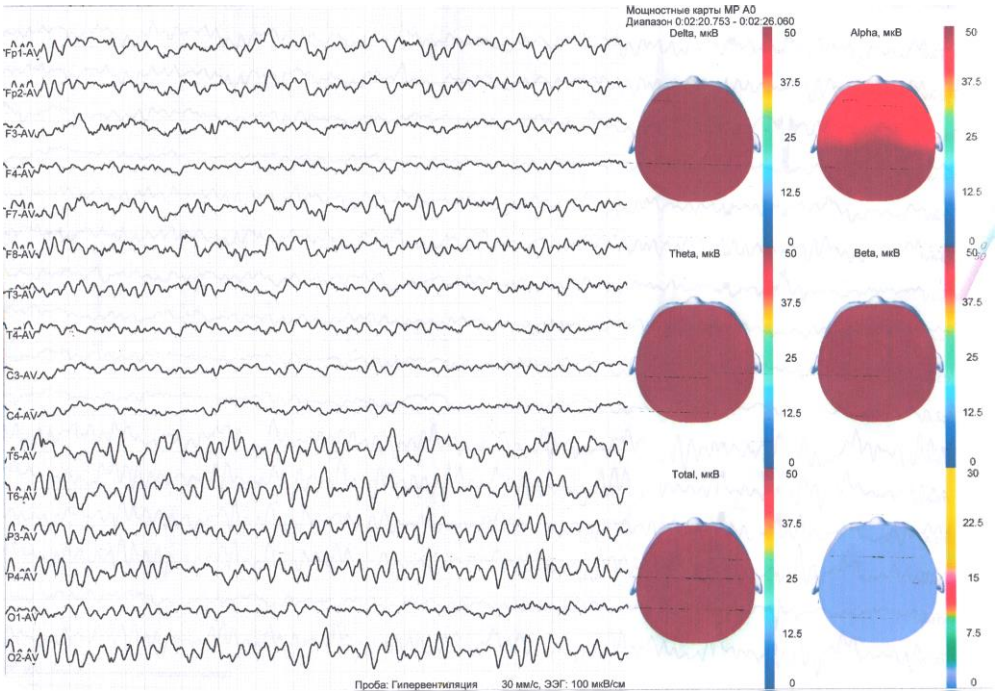

Fig. 2. Patient Y. born in 2016. EEG without diffuse changes and without signs of local pathology is registered. A slight decrease and sharpening of the background rhythm is registered (the same patient after 4 months).

In addition, it is important to note the absence of any pathological signs on EEG in the interictal period in 54%. Thus, the study showed that in the comparative groups of children 12-13 years old and adolescents 17-18 years old (adolescence) with epilepsy, according to clinical-neurological, neurophysiological indicators, in the dynamic section, is characterised by polymorphism of seizures, with differences in the nature of seizure manifestation, In addition, unlike epilepsy in adults (according to the literature), in which symptomatic epilepsy predominates, the majority of the patients examined had idiopathic epilepsy. Moreover, with the debut in childhood, simple and complex partial, absences, myoclonic, tonic, atonic, clonic and tonic-clonic seizures prevailed; in the adolescent group - 17-18 years (adolescence), there were no such types of seizures as atonic or tonic.

The next stage in the study was the transition of children to the ketogenic diet. Patients on admission were on certain antiepileptic drugs: depakine, topiramate, levetiracetam and carbamazepine, lamitrigine, in order to avoid complications, it was recommended not to change the dosage of PES and, moreover, not to cancel the drugs for the period of transition to the ketogenic diet. In the fourth month, the established diet therapy showed positive results, the frequency of focal motor seizures decreased by 70%, while the EEG showed a 53% decrease in epi-activity. It was noted that parents in the questionnaire emphasised the fact of the difficulty of the recovery period after the seizure, especially the frequency of epistatus, in the form of lethargy, apathy, poor response to motor and emotional activity. At the same time, after 4 months (against the background of a steady diet), epileptic status was noted only in 3 children (group 1), and one patient (group 2); the frequency of seizures sharply decreased, and after the seizure period the patients practically had no gross complications. The result of monitoring of laboratory data indicators of the study, which is no less important, as well as the seizures themselves (in dynamics) revealed the content of ketonemia and glycaemia, on average, at the beginning of the study, the value ranged from 3.0 and 5 mmol/l, at the end of the study (4 month) were within the average range of 2.2 and 5.5 mmol/l, while the level of ketone bodies in the urine, during this period had limits +++.

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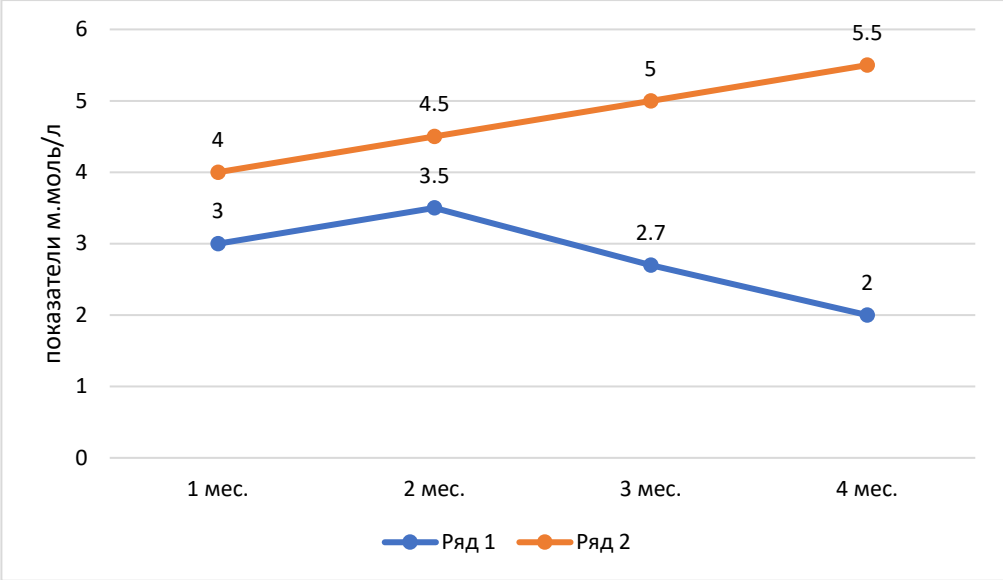

Figure 3. Result of ketonemia and glycaemia analysis in the main group subjects

Repeated interviews with parents and guardians of the patients who have undergone the study indicate an improvement in the quality of life, a positive assessment of the results of the application of the ketogenic diet KD, from the normalisation of general well-being and activity of children and adolescents (adolescence), from the emotional, mental and cognitive signs, towards positive dynamics. It is noted, despite the complexity of the transition from the usual (habitual) diet to ketogenic, especially the first day, the final result, in the end, showed a fairly good tolerance; no severe or minor changes in side effects.

CONCLUSIONS:

1. analysis of the results of the study, Epilepsy with childhood debut, revealed a high polymorphism in the types of seizures, both simple and complex, in the form of: partial, absences, myoclonic, tonic, atonic, clonic and tonic-clonic seizures. For epilepsy, no atonic or tonic seizures were identified in the adolescent group (young adolescence) in the comparison.

2 After studying the results of the study, it is necessary to divide epilepsy according to age, despite the relatively similar nature of signs on the level of development, there is a significant difference in clinical, neurological, neurophysiological indicators, with a possible transition from one to other types of epilepsy with age, should take into account atypical forms of epilepsy or non-compliance of clinical and bioelectrical indicators.

3. the study confirmed the data from the literature, the ketogenic diet is an effective treatment for patients with epilepsy, regardless of age or type of seizure; the ketogenic diet is prescribed with certain rules of gradual transition (from the usual diet), with the necessary control of clinical and neurophysiological indicators, laboratory data (ketones and glycaemia); the use of the method of ketogenic diet without disturbances, will help to achieve control of seizures, with a gradual reduction in the dose of anti-epileptic drugs.

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