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PREVENTION AND REHABILITATION OF HEALTH PROBLEMS OF SCHOOLCHILDREN FROM THE ZONE OF MILITARY CONFLICT IN UKRAINE

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Ключові слова: діти шкільного віку, які проживають у зоні військового конфлікту, діти іммігрантів, реабілітація, медична та психологічна підтримка

Abstract. Prevention and rehabilitation of health problems of schoolchildren from the zone of military conflict in Ukraine. Lebets I.S., Dynnik V.O., Matkovska T.M., Medvedovska N.V., Kashkalda D.A. The purpose of the research is to justify the necessity for rehabilitative medical and psychological support of schoolchildren from the zone of military conflict with psychosomatic disorders, psychological divergences in conditions of post-traumatic stress of different levels. There were surveyed 286 children of school age who suffered as a result of military conflict in the East of Ukraine. Anxiety, the level of stress, psychological, emotional internal health, the intensity of stress-realizing systems (cortisol, adrenaline, norepinephrine, diene conjugates, thiobarbituric acid-active products) and stress-limits of systems (serotonin, methlorinate, recovered glutathione, glutathionperoxidase, superoxide-midase) were assessed. It is established that in the majority (59.52%) of schoolchildren from the Joint Forces Operation (JFO) zone in both boys and girls an increased level of emotional tension was recorded. It was found that the past stress provokes the activation of stress-regulating systems, the severity of which depends on the intensity of stress. Cortisol, diene conjugates, thiobarbituric acid-active products, reduced glutathione, melatonin play a special role in these processes. Children-migrants have a higher level of certain indices of the stress-realizing system (adrenaline) compared to schoolchildren from the military zone, which confirms the influence of a place of living as an additional stress factor on the child's body. It was found that most of the surveyed children have numerous somatic and psychosomatic complaints, and clinical symptoms are characterized by polymorphism. Among organic and functional disorders, diseases of the digestive, endocrine system, neurotic and non-psychotic disorders of residual-organic genesis dominate. The problem of deteriorating health status of schoolchildren from the zone of military conflict was revealed, a possibility of systematic impact on preservation and strengthening the health of this contingent was justified. The revealed disorders of the psychosomatic health of children from the zone of military conflict require a multidisciplinary approach (consulting and follow-up of specialist-doctors of various profiles) to prevent their progression.

Реферат. Профілактика та реабілітація порушень здоров'я школярів у військовій зоні конфлікту в Україні. Лебець І.С., Диннік В.О., Матковська Т.М., Медведовська Н.В., Кашкалда Д.А. Мета дослідження – обґрунтування необхідності реабілітаційної медико-психологічної підтримки школярів із зони збройного конфлікту з психосоматичними розладами, психологічними відхиленнями в умовах пост-травматичного стресу різного рівня. Було обстежено 286 дітей шкільного віку, які постраждали в результаті збройного конфлікту на Сході України. Оцінювали тривожність, рівень стресу, визначали психологічні, емоційні особливості, внутрішній стан здоров'я, інтенсивність стрес-реалізуючих систем (кортизолу, адреналіну, норадреналіну, дієнових кон'югатів, ТБК-активних продуктів) та стрес-лімітуючих систем (серотоніну, мелотоніну, відновленого глутатіону, глутатіонпероксидази, супероксиддисмутази). Встановлено, що в більшості (59,52%) школярів із зони операції об'єднаних сил (ООС), як у хлопців, так і в дівчат, реєструється

підвищений рівень емоційної напруги. Виявлено, що перенесений стрес провокує активацію стрес-регулюючих систем, вираженість якої залежить від інтенсивності стресу. Особлива роль у цих процесах відводиться кортизолу, дієним кон'югатам, ТБК-активним продуктам, відновленому глутатіону, мелатоніну. У дітей-переселенців реєструється більш високий рівень окремих показників стрес-реалізуючої системи (адреналін) порівняно зі школярами із зони бойових дій, що свідчить про вплив на організм дитини зміни місця мешкання як додаткового фактора стресу. Виявлено, що більшість обстежених мають численні соматичні та психосоматичні скарги, а клінічні симптоми характеризуються поліморфізмом. Серед органічних та функціональних розладів переважають захворювання органів травлення, ендокринної системи, невротичні та неспсихотичні розлади резидуально-органічного генезу. Виявлено проблему погіршення стану здоров'я школярів із зони збройного конфлікту й обґрунтовано можливість систематичного впливу на збереження і зміцнення здоров'я контингенту. Виявлені розлади щодо психосоматичного здоров'я дітей із зони бойових дій вимагають мультидисциплінарного підходу (консультування і спостереження фахівцями-лікарями різного профілю) для запобігання їх прогресування.

For many years the health status of children remains a priority of the national health policy in Ukraine. The difficult period of the country's development associated with the presence of a military conflict in the East determines the relevance of studying the health status of school-age children living in territories controlled by Ukraine, and children-migrants from these territories. The complex nature of the changes in their health involves an analysis of the psychological problems of school-children affected by such stress. Changes in children's health can be complex, including the main areas of personality formation: emotional, cognitive, behavioral, motivational, consumer, communicative [1, 2, 3, 4]. Children's reactions to traumatic events depend on the child's age, stage of development, as well as on his ability to apply different self-help methods and models, while preschool children often show a regressive reaction, and primary school children change significantly after stresses with the appearance of rudeness, frequent complaints to deterioration of health, irritability [5, 6, 7].

The objective of our study was to substantiate the need for rehabilitation medical and psychological support of the selected contingent of schoolchildren with psychosomatic disorders, psychological deviations under the conditions of post-traumatic stress of different levels.

MATERIALS AND METHODS OF RESEARCH

The primary material was the results of a survey of 286 school-age children (7-16 years old) living in the territory of Donetsk and Lugansk regions, as well as same-age children, who were forced to leave their place of residence due to military operations as refugees. Cardiointervalography with analysis of heart rate variability was used to quantify the level of stress.

To assess heart rate variability, 192 electrocardiographies (sections of ECG that included 100-250 RR intervals) were analyzed in terms of calmness and mentally load – “countdown in the head”. The duration of each recording was two minutes, 30 seconds. Analysis of heart rate variability was

conducted using a software package – Neuro Researcher Innovation Suite Cardio-Tension-Test.

The features of self-esteem of health were studied using the methodology for determining the internal picture of health. The intensity of stress systems was evaluated taking into account following indicators: cortisol, adrenaline, norepinephrine, lipid peroxidation products (LPP). The intensity of stress systems was assessed taking into account the following indicators: cortisol in blood serum (Granum kits, Ukraine), adrenaline, norepinephrine in the daily urine [8], lipid oxidation products (LOPs) in blood serum: conjugated dienes and active thiobarbituric acid products in blood serum. To determine the state of stress-limiting systems, we investigated serotonin in the blood, melatonin in the daily urine [8], antioxidant systems indicators: reduced glutathione, activity of glutathione peroxidase and superoxide dismutase in blood. All these methods have passed certification according to the certificate of conformity of the measurement system of National Standard of Ukraine (NSU) ISO 9001:2015 "Quality management system. Requirements" under No. UA 80072.02012183.1-2019 dated March 26, 2019.

In all patients, the state of somatic and mental health was carefully analyzed - complaints, clinical manifestations, additional paraclinical studies. The conducted study made it possible to evaluate in detail the state of health of the indicated contingent and determine the main areas of medical and psychological observation and recovery of such children at the inpatient and outpatient stages.

Statistical processing included methods of descriptive statistics: average valuation (M), standard error of the middle of arithmetic ($\pm m$), percent calculation. For studying the reliability of the differences between the two independent samples, methods of parametric statistics were practiced using Student's t-test, as well as non-parametric methods using F-test and Pearson's chi-squared test. The critical value for confidence of the null statistical hypothesis was taken equal to 0,05). For statistical

analysis, we used the SPSS-17 software package (license No. d47646601451106a68cd) and Microsoft Excel'2007 (license CMPJ6-YBX7P-CJPKF-62GPW-F).

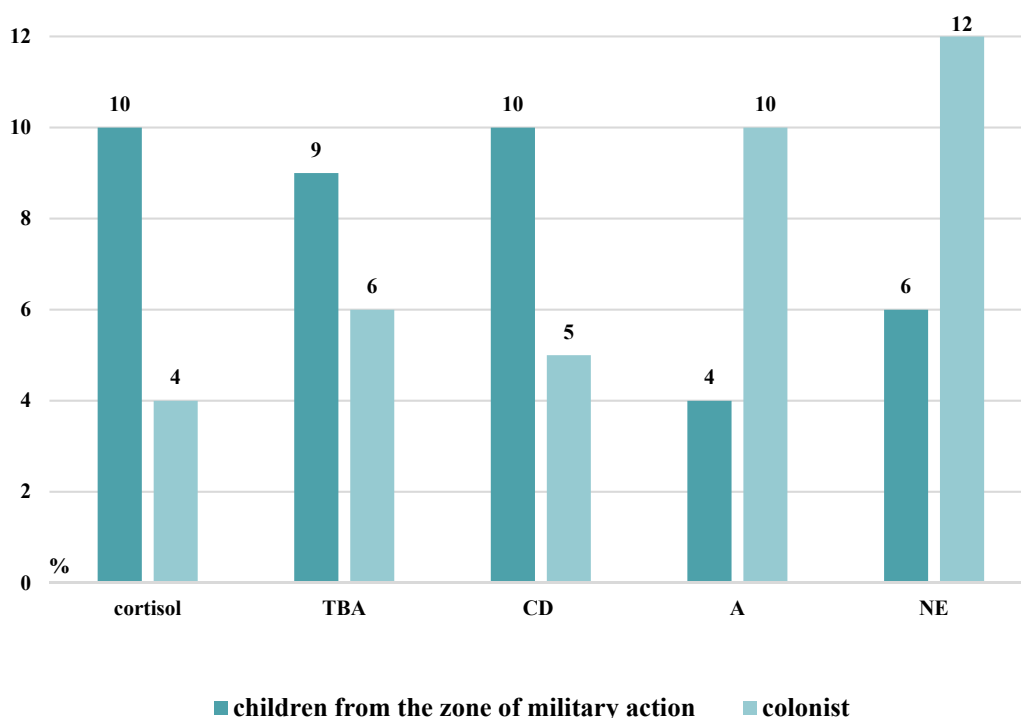
All patients and their parents signed an informed consent to participate in the clinical study. The study was conducted in compliance with the principles of the Declaration of Helsinki of the World Medical Association "Ethical principles of medical research with human participation as an object of research", the UN Committee on the Rights of the Child General Comment No. 5 (2003) on General measures of implementation of the Convention on the Rights of the Child), Law of Ukraine dated April 26, 2001 No. 2402-III "On Child Protection" (as amended in 2002-2016), the Order of the Ministry of Health of Ukraine "On Approval of the Procedure for Conducting Clinical Trials of Medicines and Expertise of Materials of Clinical Trials and Model Regulations on Ethics Commissions" No. 690 of 23.09.2009 (as amended in 2012-2015), about which there is an extract from the minutes of the meeting of the

Committee on Bioethics and Deontology at the State Institution "Institute for the Protection of Children and Adolescents of the National Academy of Medical Sciences" (pr. No. 8 from 15.09.2021)

RESULTS AND DISCUSSION

The data obtained do not raise doubts about the development of stressful events in the organism of school children of different sex, both permanent residents of the conflict zone and displaced persons who left the area and moved to other regions of Ukraine. It should be noted that the intensity of stress has a greater influence on the deviation of the studied parameters in boys and on changes in stress-realizing hormones, which can contribute to the progression of clinical and psychological manifestations of stress.

The analysis of biochemical indicators showed that in children from the zone of armed conflict the past stress provokes activation of stress-regulating systems, the severity of which depends on the intensity of stress and the factor of forced migration (Fig.).



Specific weight of children with increased levels of some indices of the stress-realization system

It was found that, children-migrants had a higher level of individual indicators of stress-realization system (adrenaline) compared to schoolchildren from the war zone, which testified to the influence of the change of place of residence on the child's body as an additional stress factor.

It was found that, children living in the zone of armed conflict were characterized by a progressive

increase of the concentration of cortisol and tiobarbituric acid products with increasing of stress levels, a decrease in concentration of reduced glutathione. The detected changes confirm a lack of compensation for oxidative stress in schoolchildren living in an area of armed conflict. In children-migrants significant changes in the studied indicators regarding the intensity of past stress, were not found

however they had a higher level of peculiar indicators of the system of stress (adrenaline) compared to schoolchildren in the war zone, which indicated the impact of change of place of living on the child's body as an additional stressor.

Children who are in a war zone or displaced persons are a risk group for the formation of chronic pathology [9]. Observation data showed that practically all patients had somatic complaints (97.6%).

At the same time, they were somewhat excessive in 24.4%. More than half of the patients complained daily about various pain sensations that impeded their functioning and daily activities. Most of them have been associated with poor health and psycho-emotional load. In frequency, the first positions were occupied by astheno-neurotic and gastroenterologic complaints (Table 1).

Table 1

Characteristics of complaints of children from the war zone and migrants, P±m, %

Complaints	Children the war zone n=209		Total	Migrants n=77		Total
	boys N=89	girls N=120		boys N=30	girls N=47	
Astheno-neurotic	n=74 83.1±4.4	n=102 85.0±3.5**	n=176 84.2±2.7**	n=23 76.7±9.0	n=25 53.2±10.2	n=48 62.3±7.0
Gastroenterological	n=28 31.5±8.9	n=58 48.3±6.6*	n=86 41.1±5.3*	n=7 23.3±17.3	n=6 12.8±14.9	n=13 16.9±10.8
Cardiac	n=21 23.6±9.5	n=33 27.5±7.8	n=54 25.8±6.0	n=6 20.0±17.9	n=5 10.6±15.4	n=11 14.3±11.1
Rheumatological	n=21 23.6±9.5	n=28 23.3±8.1	n=49 23.4±6.0	n=3 10.0±21.2	n=12 25.5±13.1	n=15 19.5±10.6

Notes: * – p<0.05, in the compared groups and between the girls of the compared groups; ** – p<0.01, in the compared groups and between the girls of the compared groups.

It should be noted that in the structure of somatic pathology the leading place was occupied by digestive disorders (52.7%), among which functional disorders prevailed. Organic pathology (gastroduodenitis, cholecystitis) was found in 23.0% of children. Circulatory diseases were reported in 29.8% of patients, joints – 31.3%. However, the frequency of damage to the above and other systems did not differ significantly from the main indicators in Ukraine.

Literature sources indicate that in children affected by armed conflict disorders of mental and psychological states, that can be traced throughout life develop first [10, 11].

Among the psychopathological symptoms prevailed the following: anxious, depressed, behavioral, somatic. These symptoms may be predictors of development of nosological forms of mental disorders (anxious-depressed, somatoform, psychosomatic diseases, etc.) in the following stages of observation.

As a result of the screening examination, all patients showed increased rates of anxiety and depression, and some patients even refused psychiatric examination and psychological counseling. Increased manifestations of enuresis (24.4%), obsessive actions (27.3%), ticks (23.6%), stuttering (25.6%), dyspnoea (22.4%) were noted. Anxiety disorders, short-term

and long-term neurotic and depressive reactions predominated. However, there were no statistical differences in the frequency of main mental illness among children affected by armed conflict and population indicators (Table 2). All these data do not contradict the world literature data [11, 12, 13].

The psychiatrist most often revealed the following complaints: headache (96.8%), sleep disturbance (96.8%), irritability (68.5%), cognitive impairment (51.0%), fatigue (42.4%), aggression (36.8%), longing (29.6%), phobias (28.8%), impaired performance (28.0%), autonomic disorders (24.4%), apathy (23.2%), loss of feeling of satisfaction (23.4%).

The results of the cardiointervalography showed that in most children from the area of armed conflict there are signs of transmitted stress of different levels of severity. In general, medium and high levels of stress are found in 33% of people.

All children were characterized by deterioration in school performance, irritability, depressed mood, in most – hypoactivity, easy retention of affect in facial expression, excessive tearfulness, social isolation was noted.

60.0% of children have a symptom of guilt. Self-esteem decreased in 70.4%. At the same time, 27.6% of children pointed to one important problem, which

they could not solve, 36.8% – evaluated themselves in a mostly negative way or sluggishly answered questions that were asked, talked about themselves negligently, humiliated or underestimated themselves which is typical for depressive disorder.

One of the pathognomonic symptoms that often develops in children with depression is depression of mood (100%). Almost all children (97.6%) had a symptom of excessive tearfulness. At the same time, patients themselves and their parents stated that children cry more often than their peers, and sometimes for no apparent reason, and 46.4% cry

almost daily. According to the multidimensional assessment of general anxiety, it can be underlined that among children and adolescents living in the territory of the armed conflict there was noted a larger number of subjects who had increased general anxiety in contrast to children-migrants (57.4% vs. 36.5; $p < 0.01$). This was due to relationships with peers (42.9% vs. 27.9%; $p < 0.05$), the assessment of those around.

According to many authors, all children and adolescents, who have experienced psychological trauma related to armed conflict, need psychosocial support and rehabilitation [15, 16, 17].

Table 2

Comparative frequency of borderline neuropsychiatric disorders in children from the zone of armed conflict and in the population, %

Clinical forms	Population indicators	Children affected by armed conflict
Neurotic disorders	32.80	33.23
Non-psychotic disorders of residual-organic genesis	28.11	33.62
Mental retardation with maladaptive behavior	3.15*	1.30
Disorders of psychological development	8.61*	0.87

Note. * $p <$ reliable differences between population data and indicators of children affected by armed conflict.

The spectrum of detected deviations in the health status of school-age children from the zone of military conflict leads to the justification of an algorithm that includes organizational, therapeutic, preventive measures at the level of:

- family doctors, therapists working with adolescents pediatricians who carry out regular preventive measures within the framework of outpatient care at the place of residence using modern medical and diagnostic and rehabilitation technologies and taking into account the peculiarities of the formation of functional disorders, pathological disorders. The same doctors are responsible for information support, organization and control of timely counseling for patients by specialists of different profiles, carrying out sanitary and educational work among schoolchildren, parents, dissemination of knowledge on the prevention of acute and chronic somatic pathology, infectious, parasitic diseases in the zone conflict;

- receiving specialized medical assistance, in particular psychological assistance at the place of residence or in institutions temporarily allocated for this purpose, among migrants – conducting individual and group sessions on psychological correction of children, taking into account the state of somatic

health. Given that children in the area of armed conflict have a high incidence of endocrine diseases, they require annual examinations by a specialist-endocrinologist. From the point of view of possible formation of gynecological pathology, it is necessary to consult girls by a gynecologist when detecting disorders of the menstrual cycle, onset of time and rates of sexual development.

A comprehensive and differentiated approach to the examination and observation of children from the area of armed conflict will facilitate timely identification of possible disorders of different systems of the body and the implementation of therapeutic and preventive measures, which, in turn, will help maintain the health of this contingent. In case of determination of low level of emotional stress in the presence of chronic somatic pathology or functional disorders in such children, it is advisable to carry out an examination once a year at a hospital with the following outpatient supervision by a pediatrician, consultations by a psychologist, if necessary – a psychiatrist, other specialists.

Thereby, the results obtained by comparing the prevalent incidence of somatic pathology, mental health disorders in a group of children from the armed conflict zone and refugee children, suggest that

special attention should be paid to children with high and moderate levels of emotional distress with concomitant gastroenterologic complaints.

Rehabilitation measures aimed at correcting psychological abnormalities should include:

1. Psychodiagnosis of post-traumatic stress disorder or other psychological abnormalities.

2. Psychological counseling for children with psychological distress, which involves individual and group psycho-counseling assistance. Emotional listening is used to reduce emotional stress caused by stress.

3. Psychological counseling for parents of children and adolescents. Mainly counseling is aimed at developing family psychocorrection of psychological disorders, enhancing the adaptive capacities of the parents themselves.

4. Psychological counseling and psychoeducation of health workers on the support of children with psychological distress in order to ensure a safe and friendly environment in the institution, including the medical one, where the child is located.

5. Psychological correction is aimed at helping a child to become "above the situation", to teach him/her to adjust to reality and to overcome psychotropic effects. It may be based on a set of psychocorrectional techniques.

Working closely with children with psychological disorders includes psychological education and counseling for their parents (or their caregivers), relatives, and other children with them.

In our opinion, the diagnosis and treatment of neurotic and psychiatric disorders in this contingent are complicated by the fact that classical criteria are often masked by other comorbid conditions. In this regard, a special role in the diagnosis process is given to family doctors, pediatricians, dynamic monitoring of patients.

CONCLUSIONS

1. It was found that the majority (59.52%) of schoolchildren from the zone of armed conflict have an increased level of emotional stress. Past stress provokes the activation of stress-regulating systems, the severity of which depends on the intensity of stress. A special role in these processes is given to cortisol, conjugated dienes, active products of thio-barbituric acid, reduced glutathione, melatonin.

2. Children-migrants have a higher value of certain indexes of the stress-realizing implement system (adrenaline) compared to schoolchildren from the combat zone (38.3 vs. 25.7 nanomoles per liter; $p < 0.05$), which testifies to the influence of change of place of living as an additional stressor on the child's body.

3. One of the priority tendency for preservation and health promotion of schoolchildren from the zone of armed conflict is using of principles of medical and psychological support. The algorithm of its activity should be based on organizational, treatment and prophylactic steps at the level of school doctors, therapists working with adolescents, paediatrists, family physicians.

4. Psychological support of children and adolescents from Donbass (combat zones) and migrants should include the following: psychodiagnosics, psychological consulting of children, psychological consulting of parents of children and adolescents, psychological consulting and psychological education of medical workers, psychological correction.

5. Necessity of prevention the development and progression of psychosomatic disorders in children from the conflict zone is based on their high frequencies and polymorphism, which requires an interdisciplinary approach, rehabilitation steps and supervision of pediatrician, therapist working with adolescents, family psychiatrist, neurologist, gynecologist, endocrinologist.

Prospects for further research. The problem of deterioration of health status of schoolchildren from the area of armed conflict has been identified and the reasonable possibility of systematic influence on preserving and promotion of the health of the this contingent needs further study in order to find out the effectiveness and efficiency of implementation of the proposed approaches with the introduction of organizational, therapeutic, preventive measures.

Contributors:

Lebets I.S. – methodology, investigation, writing – original draft;

Dynnik V.O. – conceptualization, writing – review & editing;

Matkovska T.M. – resources, data curation;

Medvedovska N.V. – investigation;

Kashkalda D.A. – resources, validation.

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