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APOLOGIES

The publisher of Acta Balneologica journal and authors of the article «The Impact of WATSU as physiotherapy method on fatigue for people diagnosed with Multiple sclerosis» DOI: 10.36740/ABAL202301103, Acta Balneol., VOL. LXV, Nr. 1(173);22:15-24 – Julija Andrejeva, Elinga Mockute, Grazina Sniepiene, Elvira Malyško, Natalja Istomina, and Vaiva Hendrixson apologize: Agnes M. Schitter, Johannes Fleckenstein, Peter Frei, Jan Taeymans, Nico Kurpiers and Lorenz Radlinger for copyright infringement. Article published in our journal lacked information about the use of two quotes from the article by the aforementioned authors entitled the „Applications, indications, and effects of passive hydrotherapy WATSU (WaterShiatsu) – A systematic review and meta-analysis”, PLoS One. 2020 Mar 13;15(3):e0229705, doi.org/10.1371/journal.pone.0229705. The fragment of article concerning the definition and history of WATSU and in parts of discussion there was reference to the fragments being quoted from „Applications, indications...”. There was however a reference to primary sources (the same, as referenced by the authors of the article).

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PROBLEMS IN PHYSICAL MANAGEMENT IN PATIENTS WITH AN IMPLANTED CARDIAC PACEMAKER

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ABSTRACT

In recent years, the number of implanted pacemakers has been increasing. The number of patients with cardiac pacemakers reporting to physiotherapy departments and referred for further treatment at spa hospitals has been increasing. There is an urgent need for popularising knowledge about this issue among physicians and physiotherapists.

The paper presents examples of individual pacing modes and describes possible use of physiotherapy in the patients. Most physical therapy procedures may be performed in patients with a pacemaker, but on condition that appropriate safety principles are followed.

KEY WORDS: cardiac pacemaker, physiotherapy

INTRODUCTION

In recent years, the number of implanted pacemakers has been increasing. In Poland approximately 9500 pacemakers are implanted annually, hence the number of people with an implanted pacemaker is tens of thousands and a large part of them, due to comorbidities benefit from physical and rehabilitation treatment.

The number of patients with cardiac pacemakers reporting to physiotherapy departments and referred for further treatment at spa hospitals has been increasing. There is an urgent need for popularising knowledge about this issue among physicians and physiotherapists [1-5].

Every person with a pacemaker and indications for out- or in-patient physical therapy and rehabilitation should keep their patient card with pacemaker specifications together with other medical documents, so that the medical staff will know the type and current pacing mode of the device.

Nowadays, cardiac pacemakers are approximately 3-4 cm x 4-5 cm x 0.6 cm in size, are built from biologically inactive materials, and their casing contains a hermetically sealed battery and a microcomputer that analyses the patient's need for cardiac stimulation. Electrodes are inserted into an appropriate heart chamber, usually through a vein, or in rare cases during a cardiosurgical procedure [4-7]. Pacemaker pacing modes are marked with an international code consisting of several letters. There are various types of pacemakers and electrodes. Based on the number of heart chambers stimulated, pacemakers may be divided into single chamber (having one electrode in the right atrium or the right ventricle, e.g. types AAI/AAIR, VVI/VVIR, VDD), dual chamber (with two electrodes, both in the right ventricle and atrium; DDD/DDDR), and three chamber devices (electrodes in the right atrium and ventricle and the coronary sinus or cardiac veins; these are devices for atrial or ventricular resynchronisation) [5-9].

Cardiac pacemakers both detect and produce electrical pulses in the chambers of the heart. When a pacemaker is implanted in a patient, its battery has a specific nominal voltage. There are several pacing modes marked with three- or four-letter codes. The first letter (e.g. AAI) refers to the chambers paced (pacing) and the second (e.g. VVI) describes the location where the device senses native cardiac activity (sensing); A means atrium, V means ventricle, and D means dual (both atrium and ventricle). The third letter (e.g. DDI, VAT, DDD) describes how the cardiac pacemaker responds to native cardiac activity.

Newer pacemakers are also marked with a fourth letter, an R (e.g. DDDR, AAIR), which means rate adaptive, that is allowing for rate modulation depending on the patient's physical activity. Basic rate is the minimum programmed pacing rate, a common parameter of all types of cardiac stimulation (basic interval - 60/min).

AIM

Presentation of the possibility of performing physical procedures in patients with an implanted cardiac pacemaker.

REVIEW AND DISCUSSION

The paper presents examples of individual pacing modes and describes possible use of physiotherapy in the patients.

The pacing modes most commonly used in clinical practice are AAI, VVI and DDD.

Sample ECG tracing for each pacing mode is shown in Figures 1-3.

When a physician first examines a patient with a cardiac pacemaker, he or she should look for any symptoms that might indicate the device is not working properly. The patient should be asked about any disorders or loss of consciousness, palpitations, missed beats, and peripheral oedema. A physical examination should assess the patient's

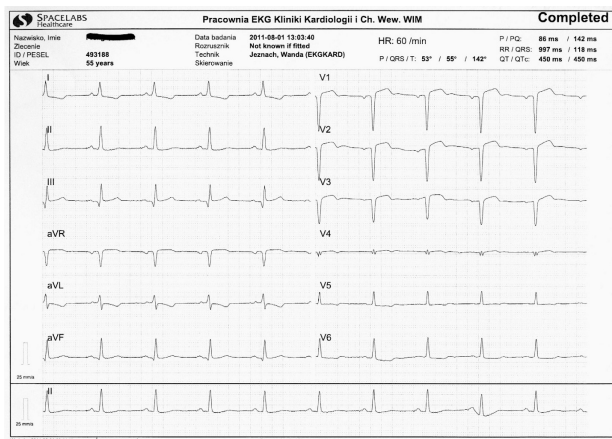


Figure 1. ECG tracing – AAI pacing mode

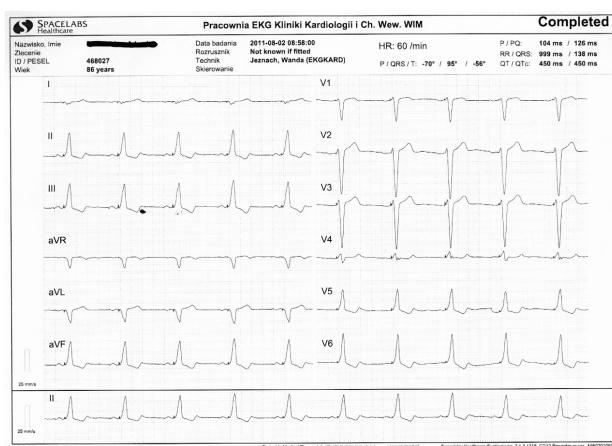


Figure 2. ECG tracing – DDD pacing mode

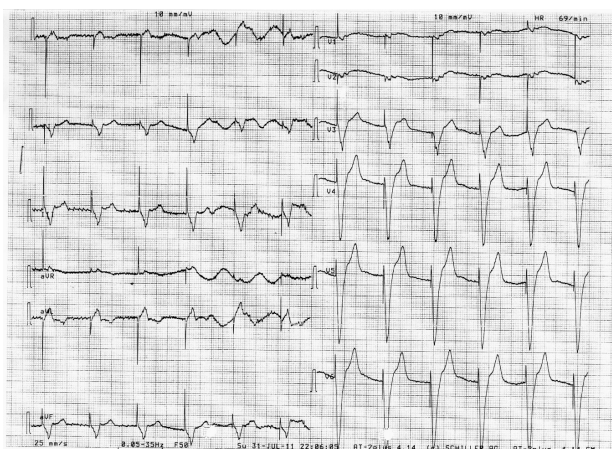


Figure 3. ECG tracing – VVI pacing mode

heart rate, RR, body temperature, congestion of the pulmonary circulation, and jugular vein filling.

Physicians should examine the area of the pacemaker site for oedema, fluid, dilation of veins in the chest wall, and stimulation of the thoracic muscles and the diaphragm.

The patient should undergo resting ECG, which is a basic test assessing normal function. Pacemaker pulses

are shown as a narrow spike followed by stimulated P waves and/or QRS complexes. ECG interpretation is made more difficult by the common use of bipolar electrodes that produce small signals. If the native cardiac electrical activity is faster than the one set in the pacemaker, the device's activity will be inhibited and there will be no paced pulses [5, 8, 10-12].

The physician checks the patient card with pacemaker specifications for pacing parameters, pacing mode, and information about native cardiac activity. Knowing only the device's setting, one may precisely determine whether its function is currently normal. When the paced rhythm slows down by approx. 10% as compared with the setting, this means there is a risk of the battery running down .

Other symptoms suggesting abnormal pacing include the presence of ineffective pacemaker peaks and disturbed recording of potentials from inside the heart. The former is characterised by the lack of QRS complexes (or P waves) after a paced impulse and the latter results from the lack of pacemaker inhibition by endogenous potentials from the atrium or ventricular complexes. It is important to compare the current pacing mode with the mode listed on the patient pacemaker card .

When the ECG tracing is normal and physical examinations and history-taking show no abnormalities, the patient may be qualified for physical therapy and rehabilitation, but with numerous limitations. Pacemakers are sensitive to high-energy magnetic fields and electromagnetic fields produced by the equipment used in physical therapy procedures [9-21].

Short-wave diathermy may cause interference if the source of waves is located near the pacemaker site. As a source of high-frequency current, diathermy procedures may inhibit pacemaker activity and cause heat damage to the generator (due to increased temperature). There have been reports of high-frequency electromagnetic oscillation damaging electronic parts of a pacemaker, resulting in a permanent malfunction.

When a pulsed low-frequency magnetic field is used, the metal parts do not overheat, but there is a possibility of disturbances in the pacemaker function and thus it is recommended not to perform such procedures on the chest. The procedures may be used in the area of the pelvis and lower limbs as long as appropriate safety precautions are followed and the procedure is being directly supervised by a physician. The use of galvanic current, iontophoresis, and low and medium frequency currents is possible outside the area of the chest.

Any type of current may cause temporary pacemaker function inhibition, mainly in pacemaker-dependent patients. Rhythm interference may occur only in those whose native cardiac activity is faster than that of the pacemaker when the device enters an asynchronous mode. Unipolar pacemakers (rarely used today) are much more sensitive to interference than the commonly used bipolar devices.

The area of the body involved in the procedure is very important. Electrical muscle stimulation in patients with damage to the radial or peroneal nerve is possible as long as

safety precautions are followed. Problematic cases include facial and phrenic nerve paresis, where electrical stimulation may be conducted only under close supervision.

Central nervous system damage in patients after stroke and in the course of many organic CNS disorders is also a problem. Severe spasticity significantly hinders physical therapy, but the procedures are performed under close supervision.

Light therapy consists in the use of IR and UV radiation, including PUVA and SUP. There are no contraindications to these procedures.

Heat therapy includes paraffin and peloid compresses. There are also no contraindications.

Local and whole-body cryotherapy is also permitted.

Ultrasound may cause interference when the source is 20-30 cm from the pacemaker, thus resulting in transient pacing interruptions (this may be significant only in pacemaker-dependent patients). Consequently, the use of ultrasound therapy for instance in painful shoulder syndromes must be conducted with the transducer at least 40 cm away from the pacemaker.

CLINICAL CASE

A 54-year-old female patient with painful shoulder syndrome was referred to a physiotherapy department. Due to inappropriately conducted ultrasound therapy, the function of the patient's cardiac pacemaker was blocked and her heart rate slowed down dramatically to 32/min. An emergency implantation of another pacemaker was necessary.

In special clinical cases, where patient management requires electrotherapeutic procedures (e.g. diaphragmatic paralysis), the physician should assess the degree of pacemaker-dependency, i.e. performance and stability of the native cardiac activity, and set the pacemaker to make it relatively more resistant to interference (bipolar configuration control, sensitivity level to be as low as possible, or a triggered pacing programme with a very long refractory period and increased pulse amplitude); this is possible if a given hospital has a pacemaker control centre.

Once the treatment is complete, the pacemaker should be fully examined and reverted to the previous setting. The pacemaker's electrode is an electrical coil; when it is placed in a variable electric or magnetic field, an induction

current is created that may result in interference, cause asynchronous activity and block stimulation or stimulate the heart without the pacemaker (when an old electrode is left in place).

It may burn the endocardium near the electrode tip and produce control and pacing disturbances. Static magnetic fields open access to the circuits and variable fields may alter pacemaker settings. Very strong electrical currents may damage the pacemaker (insulation layers of the electronic circuits). Rapidly reversing electromagnetic or magnetic fields cause thermal effects in the metal parts of the pacemaker and damage the device in other ways.

KINESIOTHERAPY

Patients with cardiac pacemakers tend to limit their physical activity and suffer from emotional problems. They withdraw from activity both physically and psychologically. Some patients require psychological support and training plans adjusted to their clinical status. The patients should be convinced to engage in controlled physical activity. They should avoid strenuous activity and more intensive movements in the shoulder girdle up to 6 weeks after pacemaker implantation in order to prevent electrode dislodgement and pacemaker displacement.

Patients should undergo an exercise ECG. The aim of a stress test on an ergometer or treadmill is to assess the body's response to physical activity and determine an optimum training heart rate. Endurance training should be conducted in these patients at the level of maximal oxygen uptake. Physiotherapists, psychologists and physicians should work together to help these patients in terms of how they assess their health status and see their future.

Patients with cardiac pacemakers who require emergency electrical cardioversion: defibrillation electrodes placed in the anterior-posterior position, the anterior electrode must be 15 cm from the cardiac pacemaker, and the pacemaker – electrode tip axis should be perpendicular to the discharge axis.

CONCLUSIONS

Most physical therapy procedures may be performed in patients with a pacemaker, but on condition that appropriate safety principles are followed.

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CONFLICT OF INTEREST

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical review of the article, F – Final approval of article

BALNEOLOGICAL TREATMENT OF PATIENTS WITH LONG COVID-19 SYNDROME IN HEALTH-RESORT CONDITIONS

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ABSTRACT

Aim: The aim of our research was to evaluate the effectiveness of treating patients with Long COVID Syndrome in health-resort conditions.

Materials and Methods: 33 patients were qualified for the research. They have all suffered virus infection confirmed by PCR test and met the criteria of Long COVID Syndrome. Course of the acute phase of infection varied among these patients: 22% had mild, 60% moderate and 18% severe symptoms. Patients were treated with our own program including: dietary treatment, kinesiotherapy, balneotherapy, physical therapy and Oxygen therapy. Each patient underwent 5 individually selected therapeutic procedures per day for the period of 14 to 28 days. Each day body temperature, saturation, blood pressure, weight and general clinical condition were monitored. Before and after treatment there was a clinical assessment of physical capacity based on indirect stress test on cycle ergometer, determining general physical capacity level and the maximum capacity of Oxygen absorption (VO_2 max/l/min.) according to Astrand-Ryhming normogram.

Results: statistically significant improvement in clinical condition has been achieved. In case of 10 patients (1/3 of all researched) all syndromes resolved, other patients' symptoms became fewer and less severe. Differences between average values before and after treatment were statistically significant. In terms of physical capacity a general improvement determined by capacity level was ascertained. 46% of patients researched had initially low or very low capacity level, and after treatment none of them presented the symptoms of low physical capacity. Those patients reached the average physical capacity level. Differences between the average values of VO_2 max before and after treatment were not statistically significant, which is probably due to little number of patients capable of taking the stress test with the use of cycle ergometer.

Conclusions: 1/ Treating patients with Long COVID Syndrome in health-resort conditions is very effective and beneficial, and provides comprehensive therapy of patients with multi-morbidity. 2/ Properly prepared program of treating Long COVID Syndrome allows not only to improve patients' life quality, but also increases their non-specific immunity, regulates gut microbiome and may help in preventing future infections.

KEY WORDS: Long COVID Syndrome, results of health-resort treatment

INTRODUCTION

Pandemic has been officially called off, but still many countries, i.e. China, suffer increased incidence for various mutations of COVID-19. Apart from acute COVID-19 infection the health problems following the infection are a major medical problem worldwide. We can therefore state that the issue of COVID-19 pandemic is still current, yet in different form. Pandemic directly concerned a total of 427 005 084 people worldwide (Coronavirus Research Center, England, February 2022). The highest incidence and mortality rate was in European, North- and South-American countries. The most vulnerable individuals were the elderly, patients with decreased immunity and people with co-morbidity increasing the risk of virus infection. Additional factor was a decrease in physical activity resulting from pandemic restrictions. This triggered numerous mental disorders and decreased non-specific immunity which facilitated various infections [1, 2]. At the initial stage of pandemic the main interest of medicine was to treat the acute phase of illness and

prevent further infections by promoting vaccination and social isolation. Unfortunately this was not the end of pandemic problems, as today we face new medical challenges related to the emergence of long-term complications known as „Long COVID Syndrome” or „Post-COVID Syndrome”. According to WHO definition Long COVID Syndrome is the emergence or persistence of at least one of syndromes in 3 months following the detection of virus within the organism. The syndromes taken into account are not a consequence of any coexisting illness [3]. Literature also describes the post-infection syndrome in other ways. Some state that in Long COVID Syndrome symptoms become present about 4 weeks after the end of acute infection, while in Post-COVID Syndrome symptoms are later, that is after about 12 weeks. Other researchers place Long COVID after 4 months [4, 5] or 6 months [6-9] after initial symptoms are no more present. Yet others have stated that even after 2 years after leaving hospital prolonged complications of COVID infection were present [10]. These authors

claimed, that the more severe was the acute phase, the more intense were the long-term complications. Long-term syndrome may have the form of either persistence of the initial symptoms in less severe form or the emergence of new ones after several weeks or months since the acute infection has been treated. Aside from establishing the definition and the frequency of symptoms, the basic guidelines of treating the Long COVID Syndrome were created by a group of experts from Institutes of Health and Improvement of Health Care of Great Britain (NICE) [11]. Methods of treating patients with Post-COVID Syndrome were published in "Stanford Hall" document [12].

Pharmacotherapy of Long COVID Syndrome is limited to treating symptoms resulting from damage to cardiovascular, respiratory or nervous system [5,13-15]. The non-pharmacological treatment we propose has not only symptomatic impact, but also increases the non-specific immunity [2] and positive psycho-therapeutic effect [1].

AIM

Evaluation of the purposefulness and effectiveness of implementing our own program of treating Long COVID Syndrome with the use of balneotherapy in health-resort conditions.

MATERIALS AND METODS

The research included 33 patients treated according to a program created beforehand in Balneoklinika St. George in Ciechocinek, Poland. The group comprised 19 female and 14 male patients aged 59-82, with average age of 68. All but 2 patients had comorbidities, the majority of which were a risk factor of COVID-19 infection. The following conditions were the most common: diabetes, obesity, high blood pressure, asthma, ischemic heart disease, atrial fibrillation, joint-muscle and spine conditions. Most of the patients went through the infection 3-6 months prior to research. The starting point of treating Long COVID Syndrome and patients' qualification to health-resort treatment was after at least 3 weeks after resolution of acute infection syndromes. Virus infection was confirmed in all cases by PCR test. Patients treated within the health-resort have suffered infection of various severity. 7 people (22%) were outpatients with mild infections. 19 people (59%) had moderate condition with high temperature and respiratory system infection (treated either in or outside hospital). 6 people (18%) went through severe infection requiring hospital stay, with one case of very severe illness requiring intensive care and the use of respirator. The latter patient stayed in long coma (for 3 weeks) and was treated in hospital in Germany for over 3 months. Some patients manifested less intense prolonged symptoms, some developed new long-term symptoms. All patients agreed to take part in research and be treated for the Long COVID Syndrome (Tables 1, 2).

TREATMENT METHODS

The aim of treating patients with Long COVID Syndrome in health-resort was: achieving general systemic recovery,

Table 1. Clinical characteristics of patients (n=33)

Gender: F/M (n)	19/14
Age (years): average, range	68; 59-82
Comorbidities	Diabetes, obesity, atrial fibrillation, ischemic heart disease, asthma, SM, arthritis
No comorbidities (n)	2 individuals

Table 2. Course of acute infection among research group (n=33)

Course of infection	Number of patients (n)	Number of patients (%)
Mild	7	22,2
Moderate	20	60,6
Severe and very severe	6	18,2

increasing the muscle strength and physical capacity, increasing the non-specific immunity, improving mood and well-being, improving cognitive skills, improving gut microbiome and improving the quality of living. The program included:

Dietary treatment – implementing our own balanced high-fiber diet, improving the gut microbiome

Balneo-physical treatment selected individually depending on the kind and severity of existing medical conditions: kinesiotherapy, hydrokinesiotherapy, hydrotherapy, peloidotherapy, physical therapy, inhalations, massages

Oxygen therapy, including hyperbaric treatment

Each patient received 5 individually selected procedures per day for at least 12 days. Kinesiotherapy in exercise room or water pool covered most patients. In case of joint and neurological conditions physical therapy, peloids and brine baths were introduced. In case of respiratory conditions inhalations were used, and carbonic acid baths in peripheral ischemia. Patients with upper airway conditions, including those who went through pneumonia or bronchitis and had lower saturation, underwent hyperbaric treatment. The latter procedures were performed every other day, each patient received 6-8 hyperbaric sessions during the entire treatment. Each day the therapy results were monitored by checking: temperature, saturation, weight, blood pressure, clinical condition and patients' well-being. Patients with high blood pressure, diabetes or ischemic heart disease had their pharmacotherapy continued. Time of health-resort treatment was no shorter than 14 days, with up to 28 days for few patients who went through the most severe course of the acute COVID infection.

RESEARCH METHOD

All patients have undergone physical examination and clinical interview, focused mainly on Long COVID Syndrome. The following data was recorded in special protocol: information regarding the course and therapy of infection, time of Post-COVID Syndrome onset and its severity. After treatment was completed clinical parameters were assessed by score tests prepared specifically for this research. Each

patient had illness symptoms qualified as Post-COVID scored before and after treatment, with 1 symptom equal to 1 point. Severity of symptoms was graded with very mild or mild – 1 point, moderate – 2 points and severe or very severe – 3 points. Symptoms of dyspnea were assessed according to Borg's scale. Presence of depression-related symptoms was assessed by the Beck's questionnaire. Apart from that, the course of comorbidities was tracked.

Aside clinical assessment physical capacity was evaluated before and after treatment. It is an important test, as all the patients reported some level of weakness and exhaustion. Physical capacity was evaluated indirectly, by determining the maximum capability of absorbing Oxygen (VO_2 max) by the Astrand-Ryhming test. VO_2 max means the maximum Oxygen consumption at maximum physical effort in ml/kg/min. This value is the maximal Oxygen consumption for test exercise of sub-maximal intensity. Pulse rate before the exercise and during its final minutes was measured on cycle ergometer set to 60 RPM. Patients would exercise for a total of 8 minutes with load individually adjusted to such an extent, that pulse rate would not exceed 120-170 BPM. Pulse rate was controlled every minute, and the average was determined at the end. The load was displayed by the cyclo ergometer in Watts, which were later multiplied by 6 to achieve Kgm. The value of maximum Oxygen consumption was read on normogram, which takes into account the load and pulse rate during the final 2 minutes. The VO_2 max result was multiplied by the age coefficient. The level of physical capacity was assessed by table with values adequate for male and female patients, in regard to VO_2 max in ml/min for given age range. The result corresponding to physical capacity was further classified according to a table as: very low, low, average, high or very high. Figure 3 shows the Astrand-Ryhming normogram [16]. Unfortunately not all patients qualified for exercise on cycle ergometer, due to significant weakness or cardiac and respiratory ailments. 19 patients were subjected to this exercise. Statistical analysis was conducted according to t-student parametrical criteria, and the evaluation of probables was read from Fisher's table. For arithmetic values the arithmetic average, standard deviation (SD) and standard error (SE) were determined. Values of p below 0.05 were considered statistically significant probability of difference between averages.

RESULTS

All the patients met the criteria of diagnosing Long COVID Syndrome according to WHO, and the virus infection has been confirmed by the PCR test. All patients have manifested syndromes of various level fatigue, which appeared after infection and resolved (or lessened) after treatment. More than 50% manifested dyspnea, 78,8% suffered increase in muscle-joint pain. 24% suffered loss of hair, 30% had impaired taste and smell, 12% had persistent diarrhea and 15% had symptoms of depression (Table 3). Most patients went through moderate or mild virus infection. One

Table 3. Presence of clinical symptoms of Long COVID Syndrome among researched group

Symptoms	Number of patients (n)	Number of patients (%)
Weakness, fatigue	33	100
Dyspnea	17	51,5
Memory impairment, confusion	21	63,6
Muscle-joint pain	26	78,8
Diarrhea	5	15
Depression	10	30,3
Hair loss	8	24
Taste and smell impairment	10	30,3

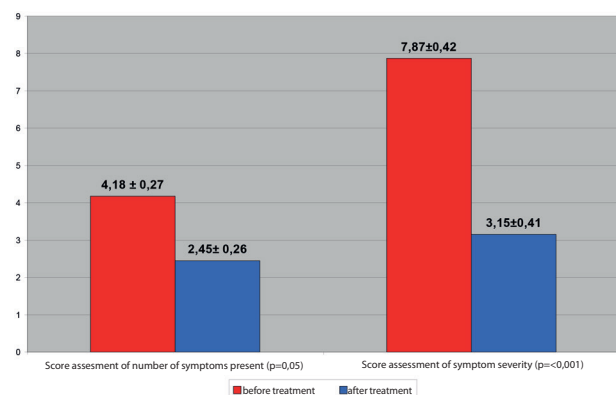


Figure 1. Score assessment of clinical symptoms and their severity in Long COVID Syndrome before and after treatment (averages, standard deviations).

Table 4. Presence of clinical symptoms of Long COVID Syndrome among patients before and after treatment

Presence of symptoms	Before treatment (n)	After treatment (n)	Number of patients with symptom resolution (n/%)
1. Weakness, fatigue	33	22	11 (33%)
2. Dyspnea	17	9	8 (47%)
3. Memory impairment, confusion	21	14	7 (33%)
4. Muscle-joint pain	26	14	12 (46%)
5. Diarrhea	5	1	4 (80%)
6. Depression, medication	10	5	5 (50%)
7. Taste and smell impairment	10	4	6 (60%)

Table 5. Score assessment of presence of clinical symptoms and their severity in Long COVID Syndrome before and after treatment.

	Number of symptoms (score)	Severity of symptoms (score)
Before treatment, X1	4,18 +/- 0,27	7,87 +/- 0,42
After treatment, X2	2,45 +/- 0,26	3,15 +/- 0,41
X1-X2	1,73	4,72
P	0,05	<0,001

X1 and X2 – average score before and after treatment

X1-X2 – difference between averages

+/- SD Standard deviation

P: probability

Table 6. Physical capacity level before and after treatment among patients treated

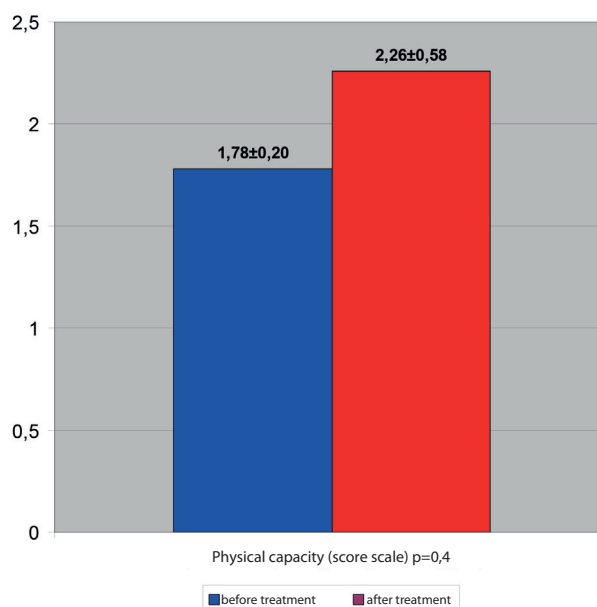
	Low and very low	Average	High
Before treatment	47,4%	36,8 %	15,7%
After treatment	0	68,4 %	31,6%

female patient (already mentioned) was admitted after very serious COVID-19 infection. She was driven by her family from Germany directly from hospital after 3 month stay, including 3 week coma. She was discharged completely physically and mentally capable after 4 week treatment in our clinic. During treatment the number and severity of symptoms decreased among all patients. Table 4 presents the presence of various Post-COVID symptoms before and after treatment. In the final stage of treatment number of symptoms decreased with high statistical significance, and their severity lessened with statistical significance (Figure 1). Among 10 patients symptoms resolved completely, and they have been discharged with no symptoms of infection. Only 1 patient has been discharged with no condition improvement. Therefore life quality among patients improved. Table 5 presents the score assessment of presence of clinical symptoms and their severity in Long COVID Syndrome before and after treatment.

Before treatment 47,4% patients had low or very low physical capacity, 36,5% average and 15,7% high. After treatment there were no more cases of low or very low capacity. Most patients (68,4%) have achieved average capacity level (Table 6). Table 7 presents the correction factor for age groups. Physical capacity assessed by Astrand test on cycle ergometer have improved to some extent among all patients, but in statistical analyses the differences between averages turned out not significant. Assessment of physical capacity before and after treatment is presented by Figure 2.

DISCUSSION

Long COVID Syndrome occurs in 45-50% of people who have recovered, usually after at least 4-6 weeks after resolving the acute symptoms [6, 7]. It has been also observed that at least 1 symptom may occur even after 2 years among 59% patients treated in hospital and 62% of outpatients [10]. Kedor et. al. have researched patients with long-term syndromes which have emerged after 6 weeks since the acute phase resolved [6]. These authors state that the main part in pathomechanism of such syndromes is played by

**Figure 2.** Assessment of physical capacity VO_2 max/l/min in Long COVID Syndrome before and after treatment (averages, standard deviations)

vascular disorders and inflammatory reactions in central nervous system caused by the virus infection.

It is hard to predict who will develop the Long COVID Syndrome. It is believed that among individuals who suffer damage to immune system during the virus infection, the organism keeps fighting pathogens despite the acute symptoms have resolved. It is possible that cytokines triggered during the acute infection in order to fight inflammatory condition later damage the mitochondria, hence the majority of patients suffer muscular weakness or additional endothelium damage. Cognitive disorders are the result of acute virus infection leading to impaired blood supply to the brain. Additional factor damaging the brain tissue is the post-infection vascular hypercoagulation [17]. The latest references contain observations indicating that Long COVID-19 occurs most frequently among people not physically active [18].

Table 7. Correction factor for age groups

Age (years)	Factor
15 – 24	1,1
25 – 34	1,0
35 – 39	0,87
40 – 44	0,83
45 – 49	0,78
50 – 54	0,75
60	0,66
55 – 59	0,71

People who have recovered suffer thrombotic complications, inflammation and exacerbation of comorbidities. Cytokine storm, brain stroke, acute inflammatory reaction cause numerous malfunctions of central nervous system, including cognitive and behavioral problems [5, 15, 19-21].

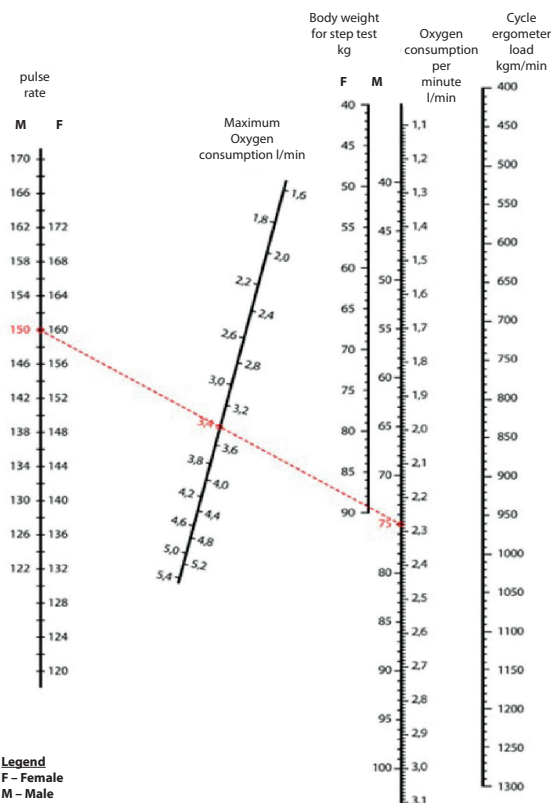
There are very many symptoms within the Long COVID spectrum. The most frequent are: fatigue and physical weakness, shallow breath and dyspnea, muscle-joint pain, cognitive disorders and depression, impaired taste and smell, chest pain, palpitations, sleep disorders, diarrhea, atopic dermatitis, hair loss [5, 7, 8, 21, 22]. Over 20% of patients had a decrease in physical capacity [7, 22].

In our research the chronic fatigue syndrome was the most frequent, as its symptoms were observed in case of each patient. According to numerous research outcomes, there is high probability that cytokine storm

and brain stroke during infection cause disorders in neurotransmitter activity, leading to impairment of many intracellular processes, therein the production of energy within mitochondria [20]. Fatigue symptoms were associated to impairing physical capacity in the course of Long COVID Syndrome. It is probable that one of its reasons is the hypercoagulation emerging during infection. Prasannan et. al. have proven that 55% of individuals with incorrect exercise test results had blood coagulation disorders, which further cause damage to endothelium function in capillary vessels. This makes it reasonable to implement anti-coagulation treatment among those patients [17]. Significant damage to endothelium resulting from infection was also underlined by other authors [15]. Fatigue usually goes in pair with reducing physical capacity. In our research nearly 50% of patients with Long COVID Syndrome had weak physical capacity. „Post-COVID fog“ meant disorders of concentration, orientation, impairing memory and causing mental confusion [5, 14,19].

One of the reason of such disorders is damage to micro-circulation of brain tissue resulting from long-term hypoxia, persistent inflammation and hypercoagulation. In 78% of patients we have observed increased muscle-joint pain related to infection, which probably proves prolonged inflammatory process among people who have recovered from the acute infection. Anxiety disorders and depression were present among 15% of patients, what we relate to changes in central nervous system and stressful situations during pandemic restriction time [1]. Taste and smell disorders were frequent symptoms in our research material (30%). Other authors have observed similar frequency of this symptom. In accordance with many authors' opinion, these symptoms are caused by the infection of epithelium in upper airway mucous membrane, where many ACE2 (Angiotensin-converting enzyme 2) receptors are located. These have high affinity to COVID-19 virus, hence it can easily penetrate respiratory system [17, 19]. Diarrhea among several patients probably proves the disorder in intestinal flora, which is observed in COVID-19 virus infection. As the infection and resulting inflammatory reaction cause damage to bacterial flora, it is necessary to implement relevant diet. In our program we have taken this important factor into account. Apart from symptoms of Post-COVID infection, a number of other illnesses emerge, especially cardio-vascular disorders and diabetes [23].

Pharmacological treatment of Long COVID Syndrome is symptomatic and has little effectiveness. However properly programmed non-pharmacological treatment does not only minimize ailments, but also improves life quality and influences ethiopatogenetic factors of these illnesses. Along with this, non-specific immunity is increased, and it has a positive influence on intestine bacterial flora. According to our observations resolving ailments and an improvement in physical capacity and mental condition during treatment in health-resort is achievable after 14-20 days. 10 out of 33 patients (1/3

**Figure 3.** Astrand-Ryhming normogram for physical capacity test [16].

of all) reported resolution of all symptoms, and they have been discharged with no Long COVID Syndrome symptoms. Other patients reported resolution of several symptoms and the other ailments became less severe. In references analyzed, where physical therapy outside health-resort was undertaken, the results were also good [5, 24-26], but seem less spectacular. In health-resort we have a chance to implement the wider range of procedures (not limited to physical- or kinesiotherapy) such as balneotherapy, hydrotherapy, climatic therapy and diet. Wide range of therapeutic methods is useful for treating patients with multiple and various symptoms, such as in case of Long COVID Syndrome. Many authors underline the specific role of kinesiotherapy in treating Long COVID Syndrome [27, 28]. Physical capacity in nearly 50% of our patients before treatment was either low or

very low. After treatment most of them achieved the average level of capacity. Statistical analysis of VO_2 max did not show statistically significant difference between the state before and after treatment. It seems that this was caused by low number of patients [19] capable of taking the cycle ergometer exercise test.

CONCLUSIONS

Treating patients with Long COVID Syndrome in health-resort conditions is very effective and beneficial, it provides complementary care for people with multimorbidity

Properly prepared program of health-resort treatment of Long COVID Syndrome allows not only for improving patients' life quality, but also increases their non-specific immunity and regulates gut microbiome, which may prevent future infections.

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CONFLICT OF INTEREST

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***Contribution:**

A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical review of the article, F – Final approval of article

THE ROLE OF ALTERNATIVE METHODS OF SKIN PROTECTION AGAINST ULTRAVIOLET RADIATION

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ABSTRACT

Aim: Ultraviolet radiation is the main threat to the skin. Excessive exposure to the ultraviolet radiation can lead to various conditions, but most of all, it causes accelerated photoaging of the skin. The most common method of protection against ultraviolet radiation is use of cosmetic products with the sunscreen.

Assess suitability of natural resources for protection from the ultraviolet radiation.

Materials and Methods: The study was conducted at Passage Cosmetics Laboratory S.A. in Gałkówek Duży. The test method was the measure the absorption of different natural resources, including cocoa butter, shea butter, coconut oil, sunflower oil, olive oil, sweet almond oil and macadamia oil. Measurements were made using the UV-VIS spectrophotometer, in accordance with ISO 24443: 2012 method.

Results: The following results were obtained for the tested raw materials: SPF 12 for cocoa butter and for shea butter, SPF 7 for coconut oil, SPF 6 for olive oil and sunflower oil, and SPF 5 for sweet almond oil and for macadamia oil.

Conclusions: All tested oils and vegetable butters have a low SPF factor and constitute to a sunscreen with a low degree of protection. The in vitro measurements of shea butter, as well as cocoa butter showed a higher level of absorption. Natural raw materials have sunscreen properties, but the level of protection is not to be a safe sunscreen.

KEY WORDS: ultraviolet radiation, sunscreen, spectrophotometer

INTRODUCTION

Skin is the largest and extremely important organ with a very complex structure. Unfortunately, it is exposed to many dangers.

The appearance of the skin is influenced by many external factors, including: environmental pollution, improper diet, stress, inadequate care, excessive exposure to solar radiation. However, the worst effects on a skin is due to exposure to ultraviolet radiation [1], which penetrates the skin in proportion to its wavelength [2-4]. UVB radiation with a wavelength of 320-290 nm has little effect on the human skin, while UVA radiation with a wavelength of 320-400 nm penetrates into the deeper layers of the dermis [4].

Accelerated photoaging, skin and eye diseases are also among afore mentioned negative effects of ultraviolet violation. The ultraviolet radiation is absorbed by the cells of a human body, which causes a series of biochemical reactions.

In the first place, the direct absorption of photons damages ultra-violet-absorbing cellular structures such as hemoglobin or melanin, thus protecting other cells. Their damage initiates a photoinduced reaction that is characteristic of deoxyribonucleic acid damage [5, 6]. The second stage involves the so-called photosensitizers, i.e. substances that break down into free radicals under

the influence of ultraviolet radiation, causing a lot of damage in the body. Free radicals, in turn, activate metalloproteinases, which destroy collagen and elastin fibers, thus accelerating skin aging (photoaging) and worsening its condition [5, 6].

Skin often exposed to ultraviolet radiation changes in a different way - the epidermis becomes thicker, the number of mast cells and fibroblasts increases, as well as tangled and amorphous elastic fibers that replace collagen fibers, and blood vessels dilate and begin to twist. Aging skin, however, naturally manifests itself as a thin epidermis, which cell count decreases in proportion to age. Elastic fibers of naturally aging skin become slightly thicker, and collagen fibers stabilize due to cross-linking. The blood vessels remain unaffected [5-6].

In order to protect the skin from the harmful effects of ultraviolet radiation, the first sunscreen was invented in 1928, which contained the photoprotectors benzyl salicylate and benzyl cinnamate. Over time, the variety of sunscreen substances has increased to such an extent that they can be classed as the chemical filters which acts as isomers (absorb ultraviolet radiation and converts it into heat energy thanks to carboxyl group) and physical filters, which, unlike chemical ones, do not penetrate into epidermis, but only create a protective film on it, which reflects and scatters UVB and UVA radiation [7].

AIM

The aim of the study was to assess suitability of natural resources for protection from the ultraviolet radiation

MATERIALS AND METHODS

The study was conducted at Passage Cosmetics Laboratory S.A. in Gałkówek Duży. Prior to the study, a written consent from the management of the plant was obtained for the study.

Natural raw materials such as following vegetable butters and oils were analyzed for absorption of ultraviolet radiation: cocoa butter, shea butter, coconut oil, olive oil, sunflower oil, sweet almond oil, macadamia oil.

The study was based on the measurement of the absorption of selected raw materials, as well as the determination of the spectrum of a given sample in the wavelength range from 290 nm to 520 nm. It also involved comparison of the absorption level of the tested sample with the zero measurement as well as making a comparison to a reference preparation which was chosen as cosmetic glycerin. The absorption spectrum was determined using a spectrophotometer in accordance with ISO 24443:2012 standard, standard PMMA (poly methyl methacrylate) plates – a polymer from which acrylic glass is made – with preparations applied in the optical path.

Measurements were made using a UV-Vis Spectrophotometer and polymer plates at the following wavelengths: 290-320 nm, 320-340 nm and 340-520 nm, corresponding to type B, type A and HEV ultraviolet radiation, respectively.

Before using the spectrophotometer, it was necessary to check the correct functioning of the device by performing a zero measurement. For this purpose, a 100% permeability reference sample was prepared by spreading 15 µL of glycerin on the rough side of the substrate plate. The transmittance of ultraviolet radiation through the reference plate was then determined.

The sunscreen product was applied by weight to the rough PMMA plate in an amount of 1.3 mg per cm² of the plate. The sunscreen had to be applied as a large number of small droplets of roughly equal volume.

After application and checkweighing, the product was immediately spread over the entire surface with light strokes of the fingertips.

The prepared sample was allowed to equilibrate for at least 15 minutes in the dark at room temperature to facilitate film formation.

The plate with the preparation was placed in the light path of the ultraviolet radiation source of the measuring device.

RESULTS

For all tested raw materials, the level of absorption of ultraviolet radiation was at a similar level and showed that vegetable oils can be a sunscreen with a low degree of protection. The results showed that for individual vegetable oils, the level of SPF - sun protection factor (sun protection factor) was:

- SPF 12 for cocoa butter (Figure 1, Table 1),
- SPF 12 for shea butter (Figure 2, Table 1),
- SPF 7 for coconut oil (Figure 3, Table 1),
- SPF 6 for olive oil (Figure 4, Table 1),
- SPF 6 for sunflower oil (Figure 5, Table 1),
- SPF 5 for sweet almond oil (Figure 6, Table 1),
- SPF 5 for macadamia oil (Figure 7, Table 1).

Table 1. Average absorption of the tested raw materials in the UVB range

Name	Average UVB absorption range	SPF level
Cocoa butter	1,216 A	SPF 12
Shea butter	1,212 A	SPF 12
Coconut oil	0,673 A	SPF 7
Olive oil	0,568 A	SPF 6
Sunflower oil	0,563 A	SPF 6
Sweet almond oil	0,533 A	SPF 5
Macadamia oil	0,498 A	SPF 5

Source: Elaboration based on own research

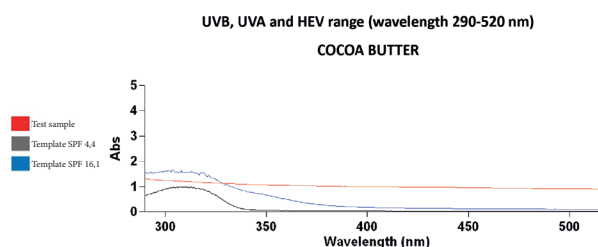


Figure 1. Absorption of cocoa butter (wavelength 290-520 nm)

Source: Elaboration based on own research

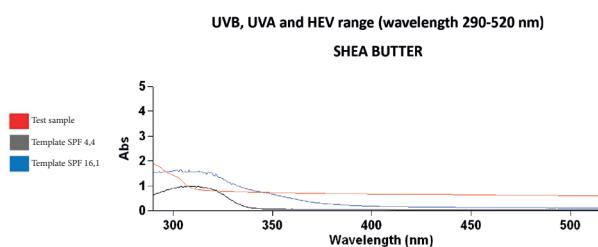


Figure 2. Absorption of shea butter (wavelength 290-520 nm)

Source: Elaboration based on own research

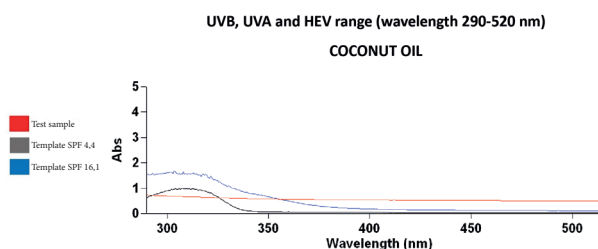


Figure 3. Absorption of coconut oil (wavelength 290-520 nm)

Source: Elaboration based on own research

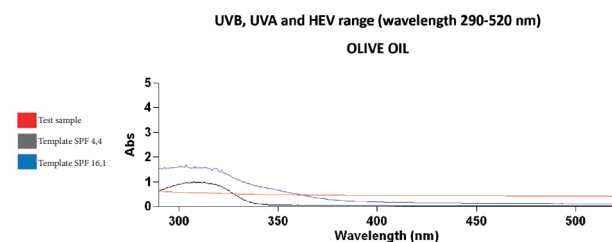


Figure 4. Absorption of olive oil (wavelength 290-520 nm)

Source: Elaboration based on own research

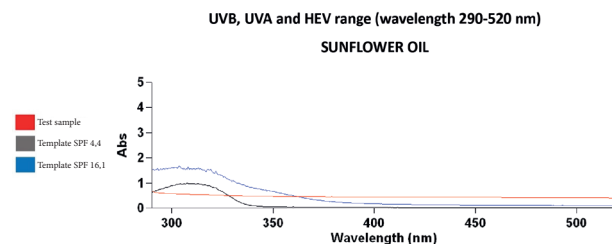


Figure 5. Absorption of sunflower oil (wavelength 290-520 nm)

Source: Elaboration based on own research

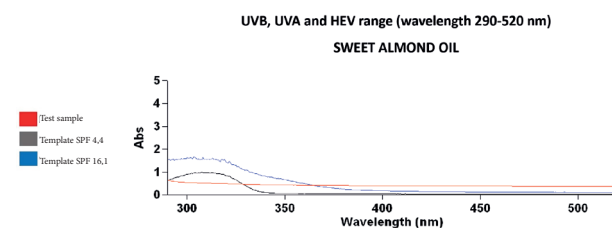


Figure 6. Absorption of sweet almond oil (wavelength 290-520 nm)

Source: Elaboration based on own research

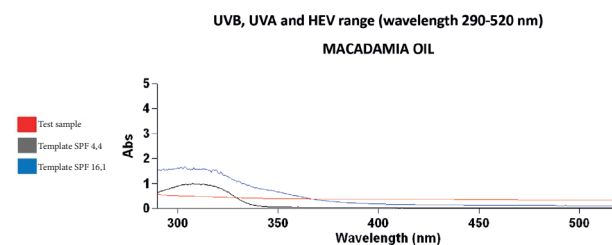


Figure 7. Absorption of macadamia oil (wavelength 290-520 nm)

Source: Elaboration based on own research

DISCUSSION

In the literature on the subject, there are numerous studies on natural raw materials that have radiation protection properties. However, few authors give the exact level of SPF protection, and if it is specified in the work, there is often no data that would substantiate this result.

In this work, the suitability of the aforementioned individual raw materials was assessed for protection against ultraviolet radiation.

The ability to absorb ultraviolet radiation characteristic of cocoa butter is described, among others, by Bartnikowska and Bojarowicz [7] and Piejko [8]. Unfortunately, in both cases, the exact level of radiation absorption by means of the SPF factor was not given.

Own observations carried out using cocoa butter show that its SPF level is 12. However, so far the study on the level of ultraviolet radiation absorption of this raw material has not been carried out by other researchers. Despite the inability to compare the results to other authors, it can be considered that the SPF 12 result for cocoa butter is highly probable.

Zynda [9] mentions the protective properties of shea butter against adverse weather conditions, including ultraviolet radiation. However, the author did not provide precise information on the level of protection mentioned above.

Piejko [8], describing individual natural filters, mentions shea butter, pointing to its poor sun protection. Just like Zynda [9], Piejko does not specify the exact SPF level.

Bojarowicz and Bartnikowska [7] also mention shea butter in their work as one of many natural ingredients characterized by the ability to absorb ultraviolet radiation.

Abd-Azis et al. [10], as a few, mention the scope of protection provided by shea butter. The research shows that the SPF level was in the range of 6-10. The test was carried out according to the Qian method, described in [11], using a quartz glass. The measurement was performed using an Agilent Technologies Cary 60 UV-Vis spectrophotometer. 2 mg of the preparation per 1 cm² was evenly applied to the quartz slide, and then waited 20 minutes until it was dry. Only after this time the level of absorption of the tested preparation was measured.

In own research, the level of ultraviolet radiation absorption by shea butter indicates SPF 12, which is very similar to the research data from the study by Abd-Azis et al. [10].

Kluczniak et al. [12] and Kryczyk-Poprawa et al. [13] refer to the results of research conducted by Kaur and Sarah [14]. In their study, water-alcoholic solutions with diluted oils were prepared, the level of absorption of which was then measured using a UV spectrophotometer in the range of 290-320 nm. The results of the study showed that the SPF values of non-volatile oils were in the SPF range of 2-8, while for volatile oils the SPF level was in the range of 1-7. The sun protection level of coconut oil in this study was equal to SPF 7.119, which confirms the results of own research, in which coconut oil also received an SPF score of 7.

In his work, Stanisiz [15] describes the use of various types of oils as preparations protecting against ultraviolet radiation. However, he noted that their level of protection is quite low. The absorption coefficient of olive oil was only 0.27 A. However, the author did not specify how the study was conducted.

Kaur and Saraf [14] for olive oil using the in vitro method on water-alcohol solutions of diluted oils obtained a result of 7.549 SPF. In own research, a very similar result was obtained for olive oil, i.e. 6 SPF.

Angkasa et al. [16] conducted a study to measure the level of SPF in products with the addition of various concentrations

of sunflower oil. The prepared preparations were applied to the glass, and then the absorption level was measured using a UV-Vis spectrophotometer at the wavelength of 290–400 nm. The blank in this study was the one with 96% ethyl alcohol. They determined the exact SPF value using the Mansur equation. Studies have shown that sunflower oil significantly increases the SPF value. The measurement of the preparation without the addition of oil gave a result of SPF 21.26, while with the addition of 1% sunflower oil the SPF was 26.03.

Arianto [17], on the other hand, created a nanoemulsion consisting of an oil phase that had 5% sunflower oil in sorbitol and a water phase made of methylparaben and propylparaben dissolved in demineralized water and Tween 80. In this way, she made three nanoemulsion formulas with different concentrations of Tween 80 and sorbitol. Formula one consisted of 38% Tween 80 and 22% sorbitol. Formula two with 36% Tween 80 and 24% sorbitol. The third one with 34% Tween 80 and 26% sorbitol. Then, 1 gram of nanoemulsion was weighed and dissolved in 96% ethanol, and then examined with a spectrophotometer at a wavelength of 290–320 nm. The measurement was made for each of the formations. The results showed that the emulsion with sunflower oil showed a higher level of radiation absorption than the pure emulsion. Each of the nanoemulsions showed a level of protection at the level of SPF 5, which confirms the results of own research – SPF 6.

Sweet almond oil is primarily known for its anti-aging properties, but its ability to protect against ultraviolet radiation has been supported by, among others, Kaur and Saraf [14]. In the study, the SPF value was 4.659, which is

comparable to the research in this study, where the SPF value for sweet almond oil was 5.

Kryczyk-Poprawa et al. [13] as well as Montenegro and Santagati [18] also mention the sun-protective effect of almond oil. In their work, however, they rely on research conducted by aforementioned Kaur and Saraf [14], who created water-alcoholic solutions with diluted oils.

Bartnikowska and Bojarowicz [7] and Naveed et al. [19] mention protection against ultraviolet radiation as one of the many features of macadamia oil. However, this has not been supported by accurate research results.

In works [20–23], the authors unanimously define the level of protection of macadamia oil as SPF 6. However, they do not provide either research or sources from which they obtained accurate information. Nevertheless, this result is confirmed by the sun protection index of macadamia oil, which in this study obtained SPF 5.

The results of own research, carried out using a UV-Vis spectrophotometer using polymer plates, are similar to the results of other authors who performed these tests using other research methods. Observations also confirmed that vegetable oils and butters have sunscreen properties. However, further research seems necessary.

CONCLUSIONS

All tested oils and vegetable butters have a low SPF factor and constitute to a sunscreen with a low degree of protection. The *in vitro* measurements of shea butter, as well as cocoa butter showed a higher level of absorption. Natural raw materials have sunscreen properties, but the level of protection is not to be a safe sunscreen.

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CONFLICT OF INTEREST

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RESTORATION OF MOTOR AND PSYCHOMOTOR SPHERES IN CHILDREN WITH AUTISM

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ABSTRACT

Aim: To determine the effectiveness of restoration of motor functions and peculiarities of psychomotor development in preschool children with autism spectrum disorders in the conditions of a rehabilitation establishment.

Materials and Methods: The interest of specialists in the problem of teaching children with autism is due to a significant increase in the number of this category of children in recent years and insufficiently effective solutions to urgent issues of recovery, rehabilitation, corrective and developmental influence on the motor and psychomotor sphere of autistic children. Children of the middle group aged 5-6 took part in the study. The diagnosis of all children participating in the study is a mild or moderate degree of autism with combined developmental disorders. Rehabilitation classes were held in both groups at physical education classes, but in the main group, they were held at every class. Such classes took place during the walk and were recommended to parents for classes at home. During physical education classes in the control group, the corrective component was partially used.

Results: The state of psychomotor skills was determined by four tests assessing sensorimotor coordination, static and dynamic coordination, reciprocity of movements, and spatial orientation. It was noted that 85% of examined children with autism have impaired reciprocal coordination of movements and disorder of spatial organization of actions; 90% of children have impaired sensorimotor coordination of movements. In 100% of children, disorders of static and dynamic coordination of movements were found.

Conclusions: This study made it possible to identify a low level of psychomotor development in children with autism, which indicates the need and importance of further development of motor development problems and indicates some approaches to the organization of motor control examination of children with autism.

KEY WORDS: children with autism spectrum disorders, motor functions, psychomotor development

INTRODUCTION

Autism spectrum disorder (ASD) is a spectrum of psychological characteristics that describes a wide range of abnormal behaviour and difficulties in social interaction and communication, as well as severely restricted interests and often repetitive behavioural acts. Children's autism leads to abnormal development of all areas of the psyche. The norm-typical course of the child's development is not only disrupted and delayed, but also distorted, and the child's motor development turns out to be distorted. This is manifested in the fact that the child is more successful in spontaneous motor activity than in arbitrary motor activity. This happens when you have to act according to instructions and consciously control your movements. The observation showed that in children with autism, the formation of gross and fine motor functions is delayed. In addition, the skills of household adaptation, assimilation actions, ordinary and necessary for life, with objects are noted as underdeveloped. In the development of basic movements in children with disorders of the autistic spectrum, a heavy abrupt is noted, as well as impulsive running with a special rhythm, with stereotypical freezing, interspersed, with a wide swing of both hands, on tiptoe. The motor functions

of children with ASD can be sluggish or, on the contrary, tensely stiff, the actions of the hands and feet are poorly coordinated, mechanistic, and have a lack of plasticity. There is also insufficient coordination of movements in jumping, which is manifested in the impossibility of pushing off with two legs simultaneously. Exercises related to maintaining balance and spatial orientation are also difficult for children.

In autism spectrum conditions there are critical issues related to particular environmental sensitivities. In general, in children, there is a weak reaction to the help of an adult during learning, resistance when providing help, as well as difficulties in imitating the movements of an adult. It affects the development of children with autism, promotes the harmonious growth of motor qualities, and mitigates, corrects, and compensates for motor and intellectual disorders [1].

Children with autism quite diligently hide their inner world from the surrounding environment, and always avoid eye contact, there is also a lack of contact both with peers and with parents and close relatives. Accordingly, the disorder of communicative behaviour in this category of children prevails, the underdevelopment of brain structures, which in turn regulate the emotional and motivational sphere of the psyche, as well as the underdevelopment of socio-

volitional functions. Already in the 2nd-3rd year of a child's life, the most pronounced symptoms of autism are clearly defined manifestations of communication disorders. This is manifested by a rather high selectivity of perception; an autistic child reacts more to contact stimuli than to auditory and visual ones.

Psychomotor development is one of the most important indicators of a child's psychophysiological health. Normative functioning of psychomotor processes is of great importance for the formation of language as one of the components of higher mental functions, various behaviour patterns, and such human-specific movements as bipedalism and manipulation of various tools of labour.

Pathological development of psychomotor function has a negative impact on the development and formation of the personality as a whole. Disorders of the psychomotor sphere are most pronounced precisely in disorders of the autistic spectrum. Children are characterised by reduced psychophysical tone; severe disorders of fine motor skills of the fingers; disorder of praxis (dyspraxia); psychomotor clumsiness; difficulties in coordination and purposefulness of arbitrary movements are observed; there is motor disinhibition and increased excitability or, on the contrary, muscle hypotonia; disturbance of orientation in the surrounding space and visual-motor coordination. Despite the fact that the study of psychomotor skills is one of the most important components of the comprehensive development and education of children with autism spectrum disorders, only a few scientific works are devoted to the study of this topic.

For schoolchildren in this category, a disorder of praxis is characteristic – the ability to perform purposeful movements and actions. Praxis includes planning and implementing a sequence of movements based on visual and visual-spatial representations, orientation of the body in space, etc. A distinctive feature of a child with autism is the poverty of facial expressions and gestures, and the absence of "body language", which manifests itself in the inability to respond adequately when in contact with other people. Research [2] found that when using pharmacotherapy in a complex rehabilitation programme, the work of those parts of the brain that are responsible for language and the desire to communicate improves. The improvement is characterised by the following: the vocabulary expands, phrases and sentences appear, diction improves, and the ability to learn increases.

Disorders on the part of the psychomotor sphere led to difficulties in the formation of domestic adaptation skills and the assimilation of ordinary actions with objects necessary for everyday life. No less important manifestations of autism can also be a significant decrease in the threshold of pain sensitivity, precisely because children with early childhood autism do not feel pain when they are injured; isolation, gradual retreat into oneself, into one's own world of one's own experiences; physical anomalies (retardation in growth, pathological changes in internal organs, disproportionality of the skeleton, etc.); decrease in interest in the sound of the human voice, when it increases; absolute ignoring of appeals;

there is a delay or complete lack of speech development; insufficient flexibility, disorder of the intonation side of speech, its stereotypes in the use of phrases and words; lack of creativity and imagination in thinking; sleep and eating disorders; fairly frequent and unexpected outbursts of anger and aggressiveness; coldness in communication, even with the dearest people (parents, brothers, sisters); lack of affection for relatives and friends, their complete ignoring is possible; avoidance of peers; indifference to the interests of others; the maximum absence and complete disregard for the empathy of others.

The motor sphere is the part of the nervous system that is responsible for all body movements. Regarding the motor sphere of children with autism, it has significant differences and is characterised by stereotyped movements, significant disorders of gross and fine motility of movements, as well as difficulties in the formation of the simplest household skills and objective actions. Children with autistic manifestations are characterised by distortions of the main basic actions: impulsive running with a distorted and trembling rhythm, excessive movements of the limbs, irregularity of cyclic movements during movement, and spread arms that do not participate in the process of motor activity. Plasticity is absent, and complicated exercises with the ball, which are due to disorders of sensorimotor coordination and fine motility of the upper limbs, and movements are quite sluggish and stiff. In general, the development of psychomotor skills is influenced by quite a few factors, primarily maturation, and learning.

One of the significant disorders of the motor sphere in a child with early childhood autism is the manifestation of a disorder of muscle tone. At a fairly early age, tone disorders in children with autism and children with cerebral paralysis are often confused, so children may not be given correct diagnoses. The psychomotor development of pre-schoolers is characterised by a certain differentiation of small motor movements and movements related to self-care. Important results of this age category are the acquisition of certain skills: riding a swing independently, the child's ability to dress oneself, also tie shoelaces, brushing teeth, jumping over a puddle or an obstacle, combing one's hair independently, and eating neatly enough. Unfortunately, regarding the category of children with early childhood autism, they do not have such abilities and skills in preschool age. In rehabilitation institutions, quite a lot of attention is paid to self-care skills, and social and household skills in order to maximally help children to be independent as much as possible, according to their capabilities.

The main and very important in the work of speech therapists, defectologists, psychologists, and other specialists of educational institutions dealing with such children, as well as their parents, is rehabilitation work, which in turn is aimed at the formation of internal adaptive mechanisms of behaviour, which encourages the social adaptation of a child with autism, and the most important thing is interaction with adults and establishing emotional contact.

The occupational therapy component in the work of specialists in the category of children with early childhood

autism in pre-schoolers is based on game principles. All aspects of a child's education, upbringing, and development take place in a game form. For a positive result, it is quite important in working with children with autism to use games with a clear sequence of their implementation, and mandatory speech accompaniment of every detail in the game. Also characteristic of our category of children is that the same game must be repeated quite a lot, and every time all aspects of the game must be repeated. In no case is it recommended to start with story role-playing games because we have to take into account the speech abilities of a pre-schooler with autism. But for better consolidation of skills, it is effective to repeat and verbally constantly accompany the rules of the game every time, and over time it can become a certain ritual for the child before starting a lesson with a correctional teacher. Even if at first glance it may seem that all the repetition and verbal support do not give any result, this is not the case, pre-schoolers with autism have the characteristics of taking a very long time to get used to and accept certain new aspects of their behaviour, their daily routine, but over time, children are always included in game activities and in classes in general, but very slowly.

Thus, children with autism spectrum disorders have various disorders of psychomotor development, which are clearly interconnected with both motor and psychological disorders.

Before starting the rehabilitation work, it is necessary to determine the key needs of the child with whom we will work, accordingly to determine such aspects as speech, imagination, as well as the level of social interaction of the child with others. One of the important stages at the beginning of working with a child is that it is quite important to encourage the child to study, and only then, after one's desire to learn, we can expect the result of the assimilation of new knowledge. Undoubtedly, creating a psychological atmosphere for the child's positive mood in the classroom takes a significant position in correctional rehabilitation work, it also contributes to establishing contact, and reducing the child's anxiety, and sometimes it is necessary to start with self-care skills. Such elementary skills are not always formed in a child when parents turn to specialists, these can be quite simple skills, taking off outerwear and hanging it in the closet, and washing hands before starting the lesson. But all these aspects are quite individual in working with each child.

There is such a feature in children with autistic spectrum disorders, they need to know clearly what tasks they will perform in class, their clear sequence, and it is equally important for them to understand why they need to perform certain tasks. When they understand the sequence of the task that lies before them, they can see the meaning in it, and accordingly perform it, you can use reminders in which there will be step-by-step instructions for successful completion, and spontaneity and the addition of any tasks are contraindicated, since the child can refuse to perform them completely.

For example, you can depict a diagram that reflects the necessary sequence of actions of a child when preparing for a walk, you can draw and hang it on the cabinet in which the child's belongings are stored. In the room where classes are held with children with autism spectrum disorders, you can place certain posters with behaviour during the class, certain key events that the child learns in one or another period, for example, self-care skills in the room where the toilet is located, there may be pictures with instructions on how to behave in the room when the child wants to go to the toilet, after which it is necessary to wash one's hands, dry hands, dress neatly and only then leave.

Quite effective types of gaming activities for children with autism are games in which the child can immediately see the final option, for example, puzzles, mosaics, as well as certain puzzles with a mandatory result that is presented on the box, these types of games are quite understandable for children with early childhood autism, and looking at the picture, they usually perform everything correctly, and accordingly, the performance evokes positive emotions in them.

No less important for a child with early childhood autism is one's workplace, where a child works during classes with a specialist. In its creation, it is important to involve the child so that the child can observe certain actions of the correctional teacher or another specialist who works with the child. There is such a feature in the child's workplace, for example, on the surface of the table, you can make certain marks where what should be located behind the desk, which allows the child to better orient oneself in the workplace. All details are important for pre-schoolers with autism, even from which side the task will be placed for the child and where the child will put it after completion. You can also involve the child to prepare for the lesson, take together the toys with which the lesson will be held, accordingly, after the lesson, you can gather all the elements that were used during the lesson and arrange everything in their places.

Physical assistance to the child is no less important in working with a child with early childhood autism, the child can be fully accompanied during the lesson, even with the help of a specialist, to perform elementary tasks, write with the child's hand, draw, circle along the contour, help pick up a pencil, a pen with the mandatory verbal accompaniment of all actions.

In the conditions of a rehabilitation institution, all types of activities and assistance provided to a child with early childhood autism are very important, but the most key aspect is the establishment of physical contact with the child. This category of children has an increased level of anxiety, and establishing physical contact helps reduce the child's anxiety, although this process is quite difficult due to the characteristics of a child with early childhood autism.

Psychomotor development of pre-schoolers with early childhood autism is of key importance in the development of children in this category. Improvement of psychomotor skills will encourage children with autism to better physical training, strengthening of motor characteristics of the child,

psychological and social aspects of development. As we mentioned above, the entire development of a child in preschool age takes place in the form of the game, so we can conclude that during the game, children's orientation in space improves significantly, their physical condition reaches a higher level, and their volitional qualities also change. During movement games, orientation in space, the ability to maintain one's posture, understanding and direction of one's body movements are significantly developed. To improve psychomotor development, more movement games should be used in classes, which in turn will contribute to the improvement of psychomotor development in the future.

Various psychomotor disorders are characteristic of children with autism, which are manifested, on the one hand, in motor delay, and on the other hand, in the appearance of stereotyped, monotonous movements in the form of bending and extending fingers, waving hands, pulling, jumping, spinning around, tiptoeing, etc.

To improve the psychomotor skills of pre-schoolers in the conditions of a rehabilitation institution, a fairly large number of games for children can be offered. For example, to offer the child to repeat how animals walk, how birds fly, that is, to create a certain kind of imitation and help the child repeat certain movements. Of course, it is important to verbally accompany all the steps, usually, children can observe the teacher for a long time at first, what the teacher shows, and what talks about, and only then start to repeat within the limits of their capabilities.

Another feature of a child with early childhood autism is that children get physically tired quickly, so their individual programme usually defines the time elements of classes and the need to change the types of activities. Classes must be regular, and the child must not miss them, if possible, which in turn stimulates the child to a certain ritual and repetition of classes in an entertaining way, over time the child's motor sphere will improve. Sometimes, to better establish emotional contact with the child, you can compromise, if the child does not like some aspect of the game, you can replace it with one that suits the child.

The absence of timely and correctly implemented rehabilitation and correctional work leads to the social maladaptation of children with autism. Individual features of intellectual, psychological, and motor development of a child with autism are the basis for creating an individual programme of physical rehabilitation. Because it is in rehabilitation institutions that children with psychomotor disorders will be provided with timely and comprehensive assistance, which will be based on all aspects for the further development of the child and its maximum inclusion in society in the future. Also important in working with a child with early childhood autism is the involvement of parents as active participants in the education, upbringing, and development of the child. Only with constant cooperation you can achieve a positive result in the future, the understanding of the parents and acceptance of the child is an important aspect, the child should feel the support of the family.

AIM

The objective of the research is to determine the effectiveness of restoring motor functions and peculiarities of psychomotor development in preschool children with autism spectrum disorders in the conditions of a rehabilitation institution.

MATERIALS AND METHODS

An analysis of scientific and methodical literature, educational and periodical literature, regulatory documents, and informational Internet sites was carried out to obtain information on the causes of autism in children, diagnosis of this disease and ways of rehabilitation, the use of methods for assessing the psychomotor development of children with ASD.

The experiment was characterised as comparative, based on the analysis of the obtained data of the participants of the main group by accumulating and comparing them with the data of the control group. The observation was characterised as direct and open. It was carried out during individual and group classes and while testing pupils.

The study was conducted on the basis of the Kherson Regional Centre for Complex Rehabilitation of Children with Disabilities of the Kherson Regional Council. Children of the middle group aged 5-6 took part in the study. The diagnosis of all children participating in the study is a mild or moderate degree of autism with combined developmental disorders. Rehabilitation classes were held in both groups at physical education classes, but in the main group, they were held at every class. Such classes took place during the walk and were recommended to parents as home classes. In the control group, corrective games in physical education classes were not conducted regularly.

The analysis of individual medical records of pupils was carried out to select research participants with similar diagnoses. The diagnosis of ASD and associated diseases were recorded by specialists at the rehabilitation centre.

Testing included the diagnosis of methods of activity (intellectual development) and assessment of the level of formation of psychomotor processes. In the first stage of the research, an analysis of the necessary literature was carried out. Consultations of educators, physical culture instructors, and parents were received. In the first classes, it was determined that the children are united by the lack of directed interest in toys, refusal of contact, weakening of oriented activities, and fear of a new environment. In order to establish contact, it is necessary to create conditions for weakening or removing anxiety, fear, instilling a sense of security, and producing stable spontaneous activity at a level accessible to the child. It is necessary to establish contact with the child only in accessible activities.

Children with ASD, being unable to communicate at a normal level for their age, show preservation of early forms of influence.

In the second stage of the study, the intellectual and psychomotor development of the study participants was tested. The teacher actively included each child and the group of children in general in the game activity. The

teacher's efforts were aimed at trying to reduce disordered activity, eliminating obsessions, limiting egocentric speech production, or, conversely, stimulating speech activity.

The state of psychomotor skills was determined by four tests assessing sensorimotor coordination, static and dynamic coordination, reciprocity of movements, and spatial orientation. The test results were evaluated on a 10-point scale (from 0 to 10 points).

ASSESSMENT OF THE LEVEL OF FORMATION OF PSYCHOMOTOR PROCESSES IN CHILDREN

The state of general motor skills was evaluated using the diagnostic tasks of M. I. Ozeretsky, M. O. Gurevich.

ASSESSMENT OF STATIC BALANCE

Task. Maintain balance for at least 6-8 seconds (average level, satisfactory result) in the "stork" position: standing on one leg, bending the other in the knee so that the foot touches the knee joint of the supporting leg, hands on the belt. The child must maintain balance and prevent trembling of the limbs.

ASSESSMENT OF DYNAMIC BALANCE

Task. Overcome a distance of 5 m by jumping on one leg, and pushing a box of matches in front of you with the toe of your foot. The deviation of the direction of movement should be more than 50 cm.

PROPORTIONALITY OF MOVEMENTS

Task. Cutting circles from paper. Time is limited: 1 min. for the right hand and 1.5 minutes for the left. The number of circles cut from the stencil is evaluated without taking into account the quality of the work

MOVEMENT SPEED

Task. Stacking 20 coins by one in a box in 15 seconds. The number of coins transferred to the box during the specified time is counted.

RESULTS

The state of psychomotor skills was determined by four tests assessing sensorimotor coordination, static and dynamic coordination, reciprocity of movements, and spatial orientation. The test results were evaluated on a 10-point scale (from 0 to 10 points).

The motor profile of the studied children is presented in Figure 1.

Figure 2 shows the motor profile of children with autism in comparison with the motor profile of healthy 5-6-year-old pre-schoolers. The figure shows a significant deviation in all indicators not only from the age norm but also from the indicators of 5-6-year-old children.

Figure 3 presents psychomotor disorders of children with autism, expressed as a percentage of the total number of examinees.

It was noted that 85% of examined children with autism have impaired reciprocal coordination of movements and a disorder of spatial organisation of actions; 90% of children have a disorder of sensorimotor coordination of

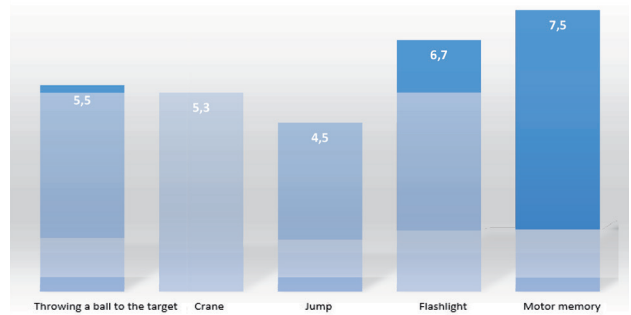


Figure 1. Psychomotor profile of children with ASD

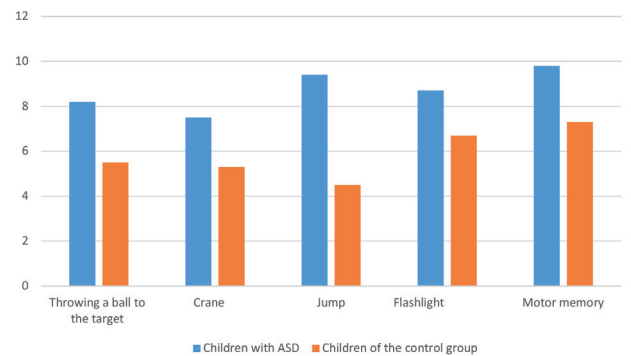


Figure 2. Psychomotor development of children with ASD in comparison with children of the control group

Note: "Throwing the ball at the target" – sensorimotor coordination; "Crane" – static coordination; "Jump" – dynamic coordination; "Flashlight" – reciprocity of movements; "Motor memory" – spatial orientation

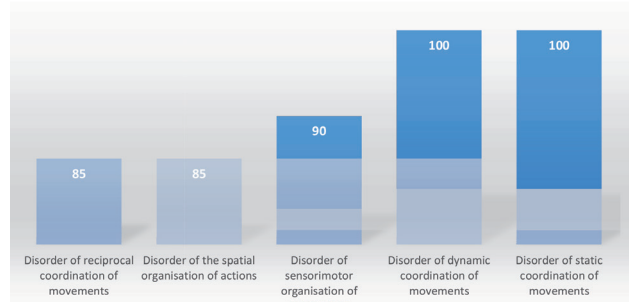


Figure 3. The ratio of motor disorders sphere in children with ASD

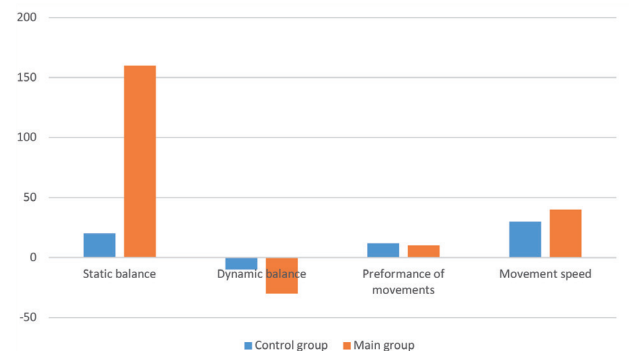


Figure 4. Increase in test results of control and main group children

movements; In 100% of children, disorders of static and dynamic coordination of movements were found.

Figure 4 presents a diagram illustrating the progress in the development of the motor sphere of children of the control and main groups.

The highest increase in results was observed in children of both age groups in the "static balance" test. Children of the main group increased more than twice in comparison to the original data. Small changes occurred in both groups when performing the proportionality test (within 10%). In two tests ("Dynamic balance" and "Speed of movements"), the results were higher in the children of the main group.

DISCUSSION

But after researching the problems of the psychomotor development of children with early childhood autism in the conditions of a rehabilitation institution, concluded that the issue is still not sufficiently studied and needs more advanced study. The leading and key aspect in working with the category of pre-schoolers with early childhood autism in the conditions of a rehabilitation institution is precisely the maximum socialisation of the child and independence in the future. Analysis shows that early therapy has a positive effect on the emotional and social development of a child with autism. It is physical exercises aimed at reducing muscle tone that minimise inappropriate behaviour and lack of emotions [3].

Socialization of children with intellectual disabilities is effectively carried out through extracurricular forms of work. At the same time, specific competencies are formed, which are so necessary for the education and socialization of children [4]. The authors of this work came to the conclusion that it is the individualization of this program that gives the highest result in the process of socialization of children with psychophysical disabilities.

In practice, we have verified that individual rehabilitation programmes and an individual approach in general for each child with autism are quite effective. This is exactly the approach that shows in his work [5]. The author notes that individualised educational programmes accelerate the psychosocial and psychophysical development of this category of children.

Individual rehabilitation programs (IPR) are quite effective in the conditions of sanatorium-resort facilities for patients with various nosologies. This approach is positively reflected in the improvement of indicators of the functioning of the body's physiological systems [6]. Therefore, there is a need to implement IPR for children with autistic spectrum disorders in sanatorium-resort facilities. This question needs to be studied in detail in further research. We assume that this will have a positive effect on the physical and social condition of children with this nosology.

Established that musical and rhythmic classes contribute to better coordination and development of correct posture. This allows a child with autism to understand and express emotions, and to balance the functions of higher nervous activity [7, 8]. In addition, rhythmic music lessons improve social communication, behaviour, and increase the intracerebral mechanisms of children with autism [9].

It was established that psychomotor science has a complex structure and includes sensory, motor, and cognitive-intellectual components of movement control. Categories of psychomotor abilities are distinguished, such as coordination of movements (accuracy of movements, interaction of macro- and micro-movements, coordination of movements of the left and right hand); sensorimotor coordination (audio-visual-motor); spatial coordination (study of the body scheme, body space); rhythmicity (tempo-rhythm).

CONCLUSIONS

Evaluation of the motor sphere regarding the formation of motor skills at the beginning and after the end of the experiment, statistically significant differences in the performance of tasks were established in children of the age of the control group only in the form of static balance tests. The children of the main group had statistically significant improvements that were established in three tests out of four. In the test for the proportionality of movements, positive dynamics were noted in the children of both groups, but no noticeable improvements were found. This can be explained by the rather complex content of the task for children with this nosology.

A theoretical model of the system of measures for restoring the psychomotor development of children with autism spectrum disorders using physical education tools was developed, which made it possible to determine indicators, methods, and means of diagnosing psychomotor indicators; means of physical education for correction and forms of work included in the complex correction and rehabilitation programme. It was established that statistically significant differences in the results after the end of the experiment in children of the control and primary groups are found in the results of three tests out of four, although at the beginning of the experiment, no such differences were established.

This study revealed a low level of psychomotor development in children with autism, which indicates the need and importance of further research on the problems of the development of the motor sphere and indicates some approaches to the organisation of the examination of motor skills of children with autism.

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The Authors declare no conflict of interest

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METHOD OF CORRECTING NONSPECIFIC IMMUNITY IN PATIENTS WITH ORAL CANCER

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ABSTRACT

Aim: To evaluate the antioxidant-prooxidant system of oral fluid, indicators of antimicrobial protection and bacterial contamination of the oral cavity in patients with cancer of the oral cavity and oropharynx at the stages of surgical treatment with topical lysozyme in the form of mucosa-adhesive phytogel.

Materials and Methods: The study was performed in 38 patients (20 men and 18 women) with stage I-III oral cancer. The average age of patients was 56.5 years (from 33 to 75 years). The normal group included 10 people without changes in the mucous membrane of the oral cavity. Catalase, urease, lysozyme and malonic dialdehyde (MDA) activity were determined. The antioxidant-prooxidant index (API) was calculated and the degree of dysbiosis. The study was performed on day 2 of hospitalization and day 14 of treatment. In the experimental group, the correction of local immunity was performed.

Results: The conducted biochemical studies of oral fluid of patients with tumors of the oral cavity demonstrate the high effectiveness of the proposed local treatment. Thus, under its influence in the oral cavity of patients found a decrease in the intensity of lipid peroxidation (MDA content), reduction of microbial contamination (urease activity) and the degree of dysbiosis with a simultaneous increase in nonspecific antimicrobial protection (lysozyme activity) and antioxidant system.

Conclusions: Topical application of muco-adhesive phytogel Lysozyme in patients with tumors of the oral cavity in the postoperative period indicate its antimicrobial and antioxidant efficacy, increase local immunity.

KEY WORDS: oral cancer, dysbiosis, lysozyme, regeneration

INTRODUCTION

The high frequency of tumors of the oral cavity and oropharynx with involvement in the process of neighboring anatomical structures requires a comprehensive approach to the implementation of extended and combined surgical interventions with replacement of defects with flaps, radiation and chemotherapy. This leads to an increase in the frequency of local infections, which in turn can lead to failure of postoperative sutures, the formation of growths and fistulas [1, 2].

In addition, the surgical method of treatment of neoplasms of the mouth and oropharynx remains the main in the specialized treatment of tumors. The choice of radical surgery is due to the need for rapid and complete removal of the tumor in the oral cavity with its final histopathological examination. The healing process of postresection wounds is influenced by the state of the microbiota and factors of local immunity of the oral cavity.

According to the literature, the frequency of wound infections in the surgical treatment of tumors of the mouth and oropharynx is within significant limits and ranges from 22.7 to 73.0% [3]. The development of infectious complications complicates the rehabilitation of patients. It leads to a deterioration in quality of life and delays the start of anticancer therapy.

Lysozyme, as one of the important factors of nonspecific immunity, has found wide application in medicine as

a therapeutic and prophylactic agent [4]. Lysozyme-containing drugs and hygiene products for use in dentistry have been developed [5-7].

Therefore, the study of bacterial contamination, lysozyme levels of mixed saliva before and after surgery is relevant for preventive measures in the postoperative period.

AIM

The aim of the study to evaluate the antioxidant-prooxidant system of oral fluid, indicators of antimicrobial protection and bacterial contamination of the oral cavity in patients with cancer of the oral cavity and oropharynx at the stages of surgical treatment with topical lysozyme in the form of mucosa-adhesive phytogel.

MATERIALS AND METHODS

The study was performed in 38 patients (20 men and 18 women) with stage I-III oral cancer. Patients were treated at the Podolsk Regional Oncology Center in the Department of Head and Neck Tumors. The average age of patients was 56.5 years (from 33 to 75 years). Patients were stage I-III diagnosed with cancer of the tongue (28.9%), cancer of the mucous membrane of the alveolar process of the mandible (28.9%), cancer of the mucous membrane of the bottom of the mouth (11.1%), cancer of the mucous membrane of the lower lip (4.4%), cancer of the cheek mucosa (4.4%), cancer of the mucous membrane of the

hard palate (2.2%). Patients with stage IV were not included in the study, they needed only palliative treatment.

In 25 patients there was a primary tumor, in 5 patients - recurrence or continuation of tumor growth, which was preceded by chemotherapy (n = 2), radiation therapy (n=3), complex treatment (n=3).

Patients did not take antimicrobials 30 days before the study. All patients underwent removal of the tumor with postoperative closure defects by local tissues or regional flaps.

In the postoperative period, patients were divided into two groups of 19 patients each. The experimental group was corrected for local immunity by topical application of mucosa-adhesive phyto gel lysozyme. Oral gel applications were done daily for 14 days twice a day after meals.

To determine the indicators of the norm, a group of norms was created, which included 10 people, without changes in the oral mucosa. The average age was 29.9 years (26 to 33 years) and was represented by both sexes (6 men and 4 women).

Lysozyme – mucose-adhesive phyto gel, which includes lysozyme from egg white (5mg/ ml), prebiotic inulin (2%), edible gelatin (1%), mint extract (10%), sodium benzoate (20 mg/ml), sweetener (1 mg/ml), calcium citrate (40 mg/ml), distilled water [9]. Normative and technical documentation (TU, TI) was developed for lysozyme and the permission of the Ministry of Health for its use for prophylactic purposes was obtained [10].

The activity of catalase, urease, lysozyme and malonic dialdehyde (MDA) content were determined [11-14].

According to the ratio of catalase activity and MDA content, the antioxidant-prooxidant index (API) was calculated, and according to the ratio of relative activities of urease and lysozyme, the degree of dysbiosis was determined by A.P. Levitsky [13, 15].

Saliva collection was performed in the morning in a centrifuge tube with a funnel on an empty stomach.

For five minutes, the patient spat oral fluid (saliva) into a test tube. It was then centrifuged at 2500 g for five minutes. Saliva volume was measured, supernatant was collected in clean plastic containers (epindorphs) and frozen until examination. The study was performed on day 2 of hospitalization and day 14 of treatment.

Statistical processing of the obtained data was performed using a mathematical statistical method on a PC using Excel software from Microsoft Office 2003, STATISTICA 5.5 (owned by CNIT VNMU named after MI Pirogov, licensed № AXXR910A374605FA) according to Student's criteria. Differences between groups were considered statistically significant at $p < 0.05$ [16].

RESULTS

Table 1 presents the results of a study of the antioxidant-prooxidant system of oral fluid in patients with tumors of the mouth and oropharynx before and after treatment. The activity of oral catalase of patients before treatment of both groups (control and experimental) was reduced by 2 times. This indicates a low degree of antioxidant protection, as catalase is considered a marker of the state of this system. The analysis showed that topical application of mucosa-adhesive phyto gel lysozyme contributed to a significant increase in catalase activity in patients of the experimental group by 65.5% ($p_1 < 0.001$), although its level did not reach normal. Increased activity of catalase in the oral fluid of patients indicates a pronounced antioxidant properties of the treatment. In contrast to the control group, where catalase activity almost did not change only after surgical treatment.

The results of determining the content of malonic dialdehyde (MDA) in the oral fluid of patients presented in table 1 indicate a significant (2.7 times) increase in this marker in oral oncology (experimental and control groups). The local treatment in the experimental group helped to reduce the level of MDA by almost 2.5 times ($p_1 < 0.001$).

Table 1. Indicators of antioxidant-prooxidant system of the oral cavity in patients with oral oncopathology ($M \pm m$), $n=8$ before and after treatment (experimental and control group) and without oral pathology ($M \pm m$), $n=10$

Groups	Indicators		
	Catalase activity, mcat / l	MDA content, mmol / l	API index
Normal	$0,31 \pm 0,02$	$0,12 \pm 0,01$	$25,83 \pm 1,12$
Experimental	Before treatment	$0,15 \pm 0,01$ $p < 0,001$	$0,32 \pm 0,012$ $p < 0,001$
	After treatment	$0,24 \pm 0,01$ $p < 0,001$ $p_1 < 0,001$	$0,14 \pm 0,011$ $p < 0,001$ $p_1 > 0,2$
Control	Before treatment	$0,12 \pm 0,01$ $p < 0,001$	$0,38 \pm 0,013$ $p < 0,001$
	After treatment	$0,16 \pm 0,01$ $p < 0,001$ $p_1 < 0,001$	$0,28 \pm 0,012$ $p < 0,001$ $p_1 < 0,001$

Note: p – indicator of the reliability of differences with the norm; p_1 – the significance of differences between before and after treatment

In the control group after treatment, the rate exceeded the norm by 3 times. MDA is a by-product of lipid peroxidation (LIP). The decrease in its level can be explained by the effective inhibition of the floor, due to the activation of antioxidant protection (from data on catalase activity) after the proposed treatment. The ratio of antioxidant and prooxidant systems, which reflects the antioxidant-prooxidant index (API), was sharply reduced (5.5 times, $p < 0.001$) and shifted towards the activation of the prooxidant system in patients with oral tumors, found in the initial study groups. After treatment in the experimental group, API in patients' oral fluid increased 3.7 times, but remained below normal values ($p < 0.001$). In the control group, this figure also increased, but only 2.2 times.

Table 2 shows the results of determining the indicators of antimicrobial protection and bacterial contamination of the oral cavity in patients with tumors of the oral cavity. The level of activity of lysozyme – the main antimicrobial factor of the oral cavity in the oral fluid of patients with oral cancer at the beginning of the study was 2.3 times lower than normal ($p < 0.001$). After treatment, the activity of lysozyme in the experimental group increased by 65.3% ($p_1 < 0.001$) compared with the value of this indicator before treatment. This may indicate a stimulation of the production of nonspecific antimicrobial factor of the oral cavity, ie a well-defined antimicrobial effect of the prescribed local treatment. In the control group after tumor removal there was a decrease in lysozyme activity twice ($p_1 < 0.001$) from baseline and 4 times less than normal ($p < 0.001$).

The increase in the number of microorganisms in the oral cavity can be judged by the level of activity of the enzyme urease. It is synthesized by most pathogenic and opportunistic microbiota. According to Table II, the level of urease activity in the oral fluid of patients before treatment was 3.7 times higher than the normal level of this indicator ($p < 0.001$). This indicates high bacterial contamination of the

oral cavity in patients with tumors of the oral cavity. After a course of local treatment, urease activity decreased by 68.1% ($p < 0.001$) in the experimental group. This indicates a decrease in bacterial contamination of the oral cavity by increasing the protective properties of the proposed treatment ($p > 0.2$). In the control group, urease activity decreased by 44.1% only after surgery.

Calculated by the ratio of urease and lysozyme activity, the degree of dysbiosis (DD) of the oral cavity (table II) shows that in individuals with tumors of the oral cavity, this marker was 14.7 times higher than in healthy individuals ($p < 0.001$). The local treatment contributed to a significant reduction in diabetes in the oral cavity of patients in the study group. But this figure was 2.5 times higher than the normal level ($p < 0.001$ and $p_1 < 0.001$). In the control group, the degree of dysbiosis decreased after surgical treatment, but exceeded the norm by 7 times.

DISCUSSION

Thus, biochemical studies of the oral fluid of patients with tumors of the oral cavity demonstrate the high effectiveness of the proposed local treatment. Thus, under its influence in the oral cavity of patients with oncopathology found a decrease in the intensity of lipid peroxidation (MDA content), a decrease in microbial contamination (urease activity) and the degree of dysbiosis with a simultaneous increase in nonspecific antimicrobial protection (catalase and API activity).

In the oral cavity there are favorable conditions for the development of beneficial, pathogenic and opportunistic microorganisms. Microorganisms that grow in the oral cavity depend on many factors of the macroorganism, environmental impact, social and behavioral habits. Intensive accumulation and dissemination of pathogenic microorganisms creates the preconditions for the development of the inflammatory process, the formation of autoimmune processes, chronic diseases of various organs and systems [17].

Table 2. Status of antimicrobial protection and bacterial contamination of the oral cavity in patients with oral oncopathology ($M \pm m$), $n=38$ before and after treatment (experimental and control group) and without oral pathology ($M \pm m$), $n=10$

Groups	Indicators			
	Lysozyme activity, units / ml	Urease activity, mk-cat / l	Degree of dysbiosis (DD)	
Normal	0,112 ± 0,009	0,093 ± 0,008	1,00 ± 0,14	
Experimental	Before treatment	0,048 ± 0,004 $p < 0,001$	0,342 ± 0,017 $p < 0,001$	14,71 ± 1,31 $p < 0,001$
	After treatment	0,093 ± 0,008 $p < 0,001$ $p_1 < 0,001$	0,109 ± 0,009 $p > 0,2$ $p_1 < 0,001$	2,55 ± 0,18 $p < 0,001$ $p_1 < 0,001$
Control	Before treatment	0,052 ± 0,004 $p < 0,001$ $p_1 < 0,001$	0,349 ± 0,017 $p < 0,001$	14,65 ± 1,31 $p < 0,001$
	After treatment	0,028 ± 0,002 $p < 0,001$	0,197 ± 0,012 $p < 0,001$ $p_1 < 0,001$	7,04 ± 0,88 $p < 0,001$ $p_1 < 0,001$

Note: p – indicator of the reliability of differences with the norm; p_1 – the significance of differences between before and after treatment

Sufficient significance of dysbiosis in the course of diseases of the gastrointestinal tract has been described [18]. In addition, the microbiological picture of the oral cavity and its correction in diabetes mellitus is described [19]. There are also data on the composition of the microbiota about tumors of the oral cavity [20]. However, there is no data on how this affects healing.

A feature of our study was the study of some indicators of nonspecific immunity and its correction in the postoperative period. After removal of the tumor, the level of lysozyme decreases, which adversely affects wound healing. And the proposed local treatment significantly increases the level of lysozyme.

CONCLUSIONS

1. In patients with cancer of the mouth and oropharynx reduced catalase and antioxidant-prooxidant index ($p < 0.001$). This indicates a violation of nonspecific resistance.
2. High levels of urease and the degree of dysbiosis ($p < 0.001$) indicate bacterial contamination of the oral cavity in patients with oncopathology.
3. Decreased level of oral lysozyme ($p < 0.001$) indicates a violation local immunity.
4. Topical application of muco-adhesive phyto-gel Lysozyme in patients with tumors of the oral cavity in the postoperative period indicate its antimicrobial and antioxidant efficacy, increase local immunity.

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PSYCHOPHYSIOLOGICAL UNLOADING WITH COMPLIANCE TAKING INTO ACCOUNT: AEROAPIPHYTOTHERAPY RESOURCE

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ABSTRACT

Aim: To reveal the method of psychological relief of a person and its effectiveness in the process of aeroapiphytotherapy, taking into account compliance.

Materials and Methods: The pedagogical experiment lasted during 2020-2022 in Poltava region. The study involved 50 people who were divided into 2 groups: EG (25 people), CG (25 people), including representatives of different ages from 12 to 72 years, all of them complained of physical fatigue, lack of mood, apathy, emotional imbalance – irritability, lack of self-regulation during the experience of traumatic situations. The research methods were as follows: analysis of special and scientific literature, pedagogical observation, pedagogical experiment, pedagogical testing, methods of statistical data processing

Results: The results of our research indicate the effectiveness of the method of psychological relief of patients who complained of physical, psychological overload, lack of mood, apathy, emotional imbalance – irritability, aggression towards others, uncontrolled experiences of traumatic situations.

Conclusions: The proposed method of psychological relief, which helps to prevent psychological problems, correction of psychological state, provides psychological health through optimal use of psychophysiological reserves of the human body and reserves of aeroapiphytotherapy, has a number of significant differences from traditional: the method differs in that at each successive stage is aeroapiphytotherapy.

KEY WORDS: psychophysiological unloading, healthy lifestyle, aeroapiphytotherapy, compliance

INTRODUCTION

Today, during significant economic, socio-political changes, everyone to some extent gets into certain traumatic situations. Therefore, the need for a healthy lifestyle, in particular, psychophysiological relief, is extremely important. American and Russian scientists reveal the need to improve the health of the population, taking into account the world practices of physical, health and sports activities, including psychological training, and the need for good rest to improve performance and health [1]. The need for psychological relief of the human body is associated with a fairly common manifestation of burnout – a state of emotional, mental and physical exhaustion caused by chronic stress [2]. Italian and Spanish scientists in their research evaluated the role of fatigue and its consequences in the choice and accuracy of programs in football, noting among many factors the importance of physiological and psychological to build a model of a productive player [3]. Interesting in scientific terms is the study of Finnish and Australian scientists on the understanding of pleasure and anxiety in Finnish physical

culture, it is important to meet the basic psychological needs of man [4]. Hungarian scientists emphasize that the physical one's self-concept is an important determinant of healthy psychological functioning [5]. It is important to learn personal and social responsibility during physical education, which reduces aggression [6]. Researchers have studied the socially significant values of students aimed at maintaining and promoting health. It is determined that maintaining and strengthening health play a special role in educating students and realizing the personal potential of future professionals [7]. In the work of researchers on modern approaches to the problem of forming the values of a healthy lifestyle, the model of forming the values of a healthy lifestyle of students in the process of physical education is substantiated, developed and tested. According to the results of the study, the need to change approaches to the modernization of the educational process in physical culture for higher education institutions [8]. Maintaining a healthy lifestyle is possible through the use of apitherapy resources. Apitherapy is the science of treating and preventing

human diseases with the help of bee products [9]. Foreign researchers are also discussing the healing properties of honey, including antimicrobial, anti-inflammatory and antioxidant properties. The beneficial effect of honey in gastrointestinal disorders, cardiovascular diseases, diabetic ulcers, cancer, as well as in pediatrics, animal health and welfare, etc. is considered. The potential of honey for possible new therapeutic applications is analyzed. Researchers consider apitherapy as a kind of animal therapy which functions are: psychophysiological; psychotherapeutic; rehabilitation; that she is the undisputed leader in the healing fauna [10]. The use of apitherapy, in particular honey, is widely used by Asian countries such as Sri Lanka, India, Nepal and Pakistan in their traditional treatment systems. Many researchers have obtained scientific confirmation of most traditional requirements (eg, use in diabetes, diarrhea, inflammation, gastrointestinal and cardiovascular diseases) for the use of honey using scientifically controlled experiments. The advantages of using honey in the medical system of Ayurveda are revealed [11]. Informative are the studies of propolis, collected in Ethiopia, its antioxidant, wound healing, antibacterial, physicochemical properties, and its use in traditional medical practices [12]. Given that propolis is actively used in medicine, the peculiarities of the pharmacological effects and chemical composition of propolis produced in America [13]. Also studied the functional, medicinal properties of Brazilian propolis, its chemical composition [14].

The research was conducted by scientists at the Lithuanian University of Health Sciences among students of the intensive 3-year MPharm course. The most popular choices for «disease prevention» were «honey» for family members (28%) and propolis (16%) or «royal jelly» (13%) for pharmacy patients [15]. The study of one of the promising methods of apitherapy – beehive therapy in Ukraine was carried out by Yarovy (Sumy), who patented this type of rehabilitation, Balash (Nizhyn) – the author of a mobile mini-couch, Zuev (Zaporozhye region), in the apiary of which with the participation of a scientist from the Department of Nanophysiology Zhulinskyi (Zaporizhzhya Medical University) were the first clinical examinations and the results of the positive effects of bee colonies on the human body. Among the positive effects of apitherapy sessions were noted microvibration massage coming from the hive, as well as a special ionic composition of the hive air with constant work of the bee family [16]. Our proposed method of aeroapiphytotherapy can be used in everyday life to provide psychophysiological relief, energy and information balance of the human body and belongs to the field of health psychology, therapy, biology, energy and information metabolism, beekeeping. The effectiveness of our proposed method depends on customer compliance. Considerable attention is paid to the psychology of therapeutic interaction, moral and ethical principles of working with patients, which are considered not only as objects of diagnosis and therapy, but also as subjects with a complex psychological world that respond individually to disease and microcommunity [17, 18]. Research on established syntagmatic constructions used by the

speaker, which program not only certain external patterns of behavior but also the internal picture of lifestyle, thus influencing health, is scientifically important. Scientists define psycholinguistic hygiene – as the «purity» of thoughts, as a quality of thought that causes the harmonization of mental states [19].

Today, a significant number of factors that affect patient compliance are determined, among them related to therapy, the patient's personality traits, as well as economic and social factors [20]. According to the pharmaceutical encyclopedia, compliance is the patient's willingness to follow the recommendations of a doctor or pharmacist, his honesty and willingness to treat [9]. Compliance is considered as a system of ideas, beliefs, motivations and actions of the patient, which ensures the process of compliance with the therapeutic regimen [21]. In the case of the method of psychological relief, which is considered – it is a clear system, the implementation of all successive actions by the client. And this is possible due to a responsible attitude to their own health.

AIM

The aim of the study is to reveal the method of psychological relief of a person and its effectiveness in the process of aeroapiphytotherapy, taking into account compliance.

The tasks are: 1) to reveal the method of psychological relief, which helps prevent psychological problems, correction of psychological state (stress, emotional imbalance, aggression, hypochondria, etc.), provides psychological health through optimal use of psychophysiological reserves of the human organism and reserves of apiphytotherapy; 2) presentation of the results of the study of the effectiveness of the method of psychological relief.

MATERIALS AND METHODS

The pedagogical experiment lasted during 2020-2022 in Poltava region. The study involved 50 people who were divided into 2 groups: EG (25 people), CG (25 people), including representatives of different ages from 12 to 72 years, different professions (athletes, teachers, librarians, engineers, economists, etc.), all of them complained of physical fatigue, lack of mood, apathy, emotional imbalance – irritability, lack of self-regulation during the experience of traumatic situations.

The research procedure included: a statement study № 1 using the above-mentioned methodological tools; formative research, using in the experimental group (EG, 25 people) the method of psychological unloading (anti-stress protection), which is a sequence (system) consisting of a set of psychological, aromatic, visual, sound, biophysical effects on the human body combined in a series of aeroapiphytotherapeutic sessions including a course of apimicrovibromassage for 50-60 minutes for 7-10 days. The control group (CG) consisted of 25 people with whom traditional interviews were conducted, the method of psychological relief was not used; statement study №2 to determine the effectiveness of the method of psychological relief.

A set of research methods was used to solve the set tasks: analysis of special and scientific literature; pedagogical observation; pedagogical experiment; pedagogical testing; methods of statistical data processing. In particular, research methods were used: the author's questionnaire «Psychophysiological balancing of the human body» is designed to: find out the opinion of respondents about the psychophysiological balance of their body; determining the opinion of respondents on the effectiveness of the method of psychological relief in the process of aeroapiphytotherapy; test «Feeling, activity, mood» (FAM) (V.A. Doskin, N.A. Lavrentyeva, V.B. Sharay, M.P. Miroshnikov) to assess the psycho-emotional response of a person to stress, to identify individual characteristics and biological rhythms of psychophysiological functions.

The results obtained in the process of empirical research were systematized using a simple grouping, which consists of ordering or classification on a single basis. The sign by which they are grouped is denoted by x . Each individual value of the feature is denoted by $x_1, x_2, x_3, \dots, x_k$, and the number of values of k . Absolute numbers, which show how many times a value of a feature x occurs, are called frequencies and denote $f_1, f_2, f_3, \dots, f_k$, respectively. The relative frequency is called the fraction of the values of the feature in the total number of studies and denote $\omega_1, \omega_2, \omega_3, \dots, \omega_k$. The relative frequency is calculated by the formula: $\omega = f / n$ (n is the number of subjects), and expressed as a percentage. Mathematical calculations obtained by combining in groups (m) frequencies are correlated with a number of values that fall into a particular group. The arithmetic mean is the fraction of the sum of all the values of the attribute by the number of measurements. It is denoted by \bar{x} . The formula for the calculation has the form: $\bar{x} = (x_1 + x_2 + x_3 + \dots + x_n) / n = (1 / n) * \sum x_i$, where x_1, \dots, x_n is the value of the feature; n is the number of measurements (or tested). To confirm the validity of the comparison between the experimental and control groups, the Student's t -test was calculated for independent samples. Ethical aspects of publishing materials are taken into account.

RESULTS

Method of psychological unloading (anti-stress protection), which is a sequence (a system based on the principles of combination therapy and patient compliance), consisting of a set of psychological, aromatic, visual, sound, biophysical effects on the human body combined in a series of aeroapiphytotherapeutic sessions including a course of apimicrovibromassage for 50-60 minutes for 7-10 days. The complex of influences (measures) is carried out in a specially equipped room – api house. The material equipment of which is: internally built-in beehives of the couch, in which mesh holes are installed at the level of the location of the head, chest, lumbar region and legs of the patient. The same openings are located in the side parts of the beds, the important function of which is to saturate the air of the room with aromas of honey, propolis, wax and other products of the bee

family; various medicinal herbs available in the room (in particular, mint, lemon balm, thyme), used in the preparation of phytonutrients and natural flower honey; the floor of the api house is covered with meadow grasses with admixtures of medicinal herbs (mint, lemon balm, thyme), which creates a special aeroapiphytoclimate and promotes micro massage of the feet; pillows are filled with meadow grasses with admixtures of medicinal herbs (mint, lemon balm, thyme), which creates a special aeroapiphytoclimate; special enlarged mesh holes located in the area of the patient's head, through which a person can observe the behavior of bees in the hive; window openings of the room through which a person can observe the work of bees in the apiary; the inner walls of the room are treated with wax mixed with propolis; electric kettle, washbasin with water, towel [22]. The method is aimed at psychological relief, which helps to prevent psychological problems, correction of psychological state (stress, emotional imbalance, aggression, hypochondria, etc.), provides psychological health through optimal use of psychophysiological reserves of the human body and reserves of apiphytotherapy. The method of psychological relief is effective for people who have no contraindications to the effects on the body of bee products. The content of the method of psychological relief is a sequence of procedures (measures, effects): micro massage of the feet with hay, which includes meadow grasses with admixtures of medicinal herbs (mint, lemon balm, thyme). The patient should walk 5-7 times on a floor 2 m long covered with grass; consumption of phytonutrients, the temperature of which does not exceed 30°C, from medicinal herbs, in particular, from mint, lemon balm, thyme with natural flower honey; application (mask) on the face and neck. The application is performed by the patient. It contains natural flower honey and drone homogenate in a ratio of 5:1. (drone homogenate is a milk from larvae, a thick, yellowish, peculiar to taste liquid, one of the most valuable biologically active products of bees, containing proteins, vitamin D, enzymes, microelements). During the application of the massage of the face, neck, as well as micro massage of the extremities of the patient's hands; lying on the hive-couch for 50-60 minutes (preferably on a hard surface of the hive) in which mesh holes are installed at the level of the head, chest, lumbar region and legs of the patient, and in the side parts of the couches saturation of indoor air with aromas of honey, propolis, wax and other beekeeping products. Important during lying down are microvibrations, which are created by swinging the wings of bees and act as a vibrating massage, which in turn has a positive effect on the psychophysiological system of the body [22].

Evaluation of the effectiveness of the method of psychological relief was carried out in a specially equipped room – a house in the Poltava region. The study involved 50 people, who were divided into 2 groups: EG (25 people), CG (25 people). In particular, according to the results of the ascertaining research (KD1) the following data were obtained. EG subjects noted ($\omega_1 - \omega_4, \%$), $k=4$: lack of mood

(56.2%), irritability (52.3%), manifestations of aggression (58.4%), lack of self-regulation in resolving traumatic situations (57.2%). Whereas in the CG respondents: lack of mood (51.7%), irritability (47.9%), manifestations of aggression (51.2%), lack of self-regulation in resolving traumatic situations (59.8%). The first, control, (CG) consisted of 25 people with whom traditional interviews were conducted, the method of psychological relief was not used. The second, experimental group (EG) consisted of 25 people who underwent a set of aeroapiphytotherapeutic sessions, including a course of apimicrovibromassage, using the method of psychological relief. After a set of measures, under the influence of the method of psychological relief, based on the results of the survey of patients EG noted (ω_1 – ω_4 , %), $k=4$: improved mood (96.2%), disappearance of irritability (91.1%), reduced manifestations aggression (84.2%), there is self-regulation in resolving traumatic situations (73.8%). Whereas in the surveyed CGs: improved mood (49.8%), disappearance of irritability (37.9%), reduced aggression (41.2%), there is self-regulation in resolving traumatic situations (36.8%).

At the stage of the ascertaining study of CD2 in EGs, which were noted (ω_1 – ω_4 , %), $k=4$: mood increase by 40.0% more people with positive dynamics, while in CG by 1.9% increased persons with negative dynamics, disappearance of irritability, by 38.8% more people, in CG – by 10.0% decreased persons with positive dynamics, reduction of aggression by 25.8% more, while in CG by 10.0% increased with negative dynamics, the presence of self-regulation in resolving traumatic situations by 16.6% more people with positive dynamics, in the surveyed CG by 23.0% increased the number of people with negative dynamics.

According to the results of the test «Feeling, activity, mood» (FAM) (V.A. Doskin, N.A. Lavrentyeva, V.B. Sharay, M.P. Miroshnikov) to assess the psycho-emotional response of a person to stress, to identify individual features and biological rhythms of psychophysiological functions. When processing the results of the study, the scores were listed in points from 1 to 7. It is taken into account that the poles of the scales are constantly changing. The average score of the scale is 4. Scores exceeding 4 points indicate a favorable condition of the subject. Scores below 4 points indicate an unfavorable condition of the subject. Estimates of the condition lying in the range of 5.0-5.5 points indicate that the condition of the subject is normal. The study takes into account that in the analysis of the functional state of the subject is important not only the values of individual indicators of FAM, but also their ratio.

At the stage of ascertaining study of health in the experimental group (EG) received data: 72.0% (18 people) – unfavorable condition of the subjects, 28.0% (7 people) – a favorable condition of the subjects, in the control group 76.0% (19 people) – unfavorable condition of the subjects, 24.0% (6 people). According to the results of the observational study of activity in the experimental group (EG) received data: 80.0% (20 people) – unfavorable condition of the subjects, 20.0% (5 people) – favorable condition of the subjects, in the control group 72.0%

(18 people) – unfavorable condition of the subjects, 28.0% (7 people). During the ascertaining study of mood in the experimental group (EG) received data: 48.0% (12 people) – unfavorable condition of the subjects, 52.0% (13 people) – favorable condition of the subjects, in the control group 72.0% (18 people) – unfavorable condition of the subjects, 28.0% (7 people). At the ascertaining stage, the state of the norm was not determined by any of the indicators.

According to the results of the formative study of health in the experimental group (EG) received data: 44.0% (11 people) – a favorable condition of the subjects, 56.0% (14 people) – a normal condition, while in the control group 36.0% (9 people) – unfavorable condition of the subjects, 56.0% (14 people) in a favorable condition, 8.0% (2 people) – normal condition. To confirm the validity of the comparison between the experimental and control groups, the Student's t-test was calculated for independent samples. The arithmetic mean was calculated by the formula: .

$$M_x = \frac{\sum X_i}{n}$$

Received data: $M_1 = 4.56$ (EG); $M_2 = 3.72$ (KG). According to the calculations of the standard deviation by the formula:

$$\sigma_x = \sqrt{D_x} = \sqrt{\frac{\sum(x_i - M_x)^2}{n-1}}$$

$\sigma_1 = 0.42$ (EG); $\sigma_2 = 0.67$ (KG). Calculate the degrees of freedom: $df = M_1 + M_2 - 2 = 48$. We calculate the Student's t-test:

$$t_e = \frac{|M_1 - M_2|}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

Received data: $t_e = 5.6$. According to the table of critical values t of the Student's criterion, it is determined that the value is $5.6 > 3.505$, respectively, the significance level is < 0.001 . If the significance level is < 0.05 , it can be concluded that there are differences in the results between the groups.

According to the results of the formative study of activity in the experimental group (EG) received data: 60.0% (15 people) – a favorable condition of the subjects, 40.0% (10 people) – a normal condition, while in the control group 32.0% (8 people) – unfavorable condition of the subjects, 64.0% (16 people) in a favorable condition, 4.0% (1 person) – the norm. To confirm the validity of the comparison between the experimental and control groups, the Student's t-test was calculated for independent samples. The arithmetic mean was calculated: $M_1 = 4.4$ (EG); $M_2 = 3.72$ (KG). According to the calculations of the standard deviation according to the formula obtained data: $\sigma_1 = 0.5$ (EG); $\sigma_2 = 0.53$ (KG). Calculate the degrees of freedom: $df = M_1 + M_2 - 2 = 48$. We calculate Student's t-test: $t_e = 4.85$. According to the table of critical values of Student's t-test, it is determined that the value is $4.85 > 3.505$, respectively, the significance level is < 0.001 . If the significance level is < 0.05 , it can be concluded that there are differences in the results between the groups.

According to the results of the formative study of mood in the experimental group (EG) received data: 40.0% (10 people) – a favorable condition of the subjects, 60.0% (15 people) – a normal condition, while in the control group 36.0% (9 people) – unfavorable condition of the subjects, 52.0% (13 people) in a favorable condition, 12.0% (3 people) – the state of the norm. To confirm the validity of the comparison between the experimental and control groups, the Student's t-test was calculated for independent samples. The arithmetic mean was calculated: $M1 = 4.6$ (EG); $M2 = 3.76$ (KG). According to the calculations of the standard deviation according to the formula obtained data: $\sigma_1 = 0.5$ (EG); $\sigma_2 = 0.64$ (KG). Calculate the degrees of freedom: $df = M1 + M2 - 2 = 48$. We calculate the Student's t-test: $t_e = 4.9$. According to the table of critical values of Student's t-test, it is determined that the value is $4.9 > 3.505$, respectively, the significance level is < 0.001 . If the significance level is < 0.05 , it can be concluded that there are differences in the results between the groups.

DISCUSSION

Based on the results of a study conducted as part of the international research project «Student Health», it was determined that many students demonstrate a low level of health culture, much lower level of medical awareness and ways to maintain health [23, 24]. In the study of the impact of social stressors on the mental health of students found that the higher the values of positive factors such as mood, psychological climate, relationships with others, the ability to optimize mental status under stress, mental well-being, harmonious relationships, the higher the integrated indicator mental health of students [25]. Romanian and Ukrainian authors confirm the influence of the specifics of the attitude to the disease on the satisfaction with physical therapy among orthopedic patients at the outpatient level. At the same time, constructive changes in the system of physical therapy, increasing the role of physiotherapist and taking into account the psychological characteristics of the patient in managing the process of physical therapy have a positive effect on satisfaction [26]. The research on physical and mental health of the person in the modern information environment deserves attention. The article examines the problem of the relationship between human health and information technology, physical and mental health disorders due to information and psycho-emotional stress. Adherence to information hygiene standards is a factor of protection against the negative effects of information and communication technologies on humans, maintaining their physical and mental health [27, 28]. Interesting in scientific terms is the technology of learning with the use of music in the training of rugby players aged 16-17. The obtained data confirm the expediency of using music in the training of young athletes for the development of general and special endurance [29]. Researchers have studied the restoration of mental capacity of student-athletes (engaged in boxing and kickboxing)

under the influence of psychological methods. The study found that the subjective assessment of athletes' own condition depends on the stage of competitive activity. This assessment is very favorable in the pre-competition and competitive periods. In the pre-competition period there is an unconscious weakening of mental capacity. Weakening of mental capacity in the competitive period is functional in nature and can be reduced in the post-competitive period. Scientists have concluded that the use of art-therapeutic techniques leads to the fact that athletes become more relaxed and resilient [30, 31]. Noteworthy is the research on personality-oriented psychotherapy of emotional disorders in somatogenic in the practice of modern medical psychology. The author noted that the internal picture of the disease is a complex psychological phenomenon, it is very variable, depends on a significant number of factors and occurs in all cases of patients, both minor and severe chronic [32]. Important in scientific terms is an empirical study based on the results of which it is established: patients with somatic diagnosis, experiencing in the majority, mental states of the asthenic type; emotional states that accompany somatic diseases are not directly related to a specific diagnosis and in this sense can be considered nonspecific; patients with somatic diagnosis tend to be more attentive to their own emotional states, more clearly differentiating them, which indicates the greater importance of these conditions, compared with almost healthy people [32].

A study on knowledge and experience in apitherapy among future physicians, which concluded that such knowledge is limited. The researchers noted that there is a need for a more detailed study of apitherapy and the impact on human health [33]. The study of the role of apitherapy for human health shows that among the products used by athletes as ergogenic substances, in recent years, attention is drawn to royal jelly and honey [34].

CONCLUSIONS

Thus, a theoretical analysis of the problem of apitherapy shows that there are a number of literature sources that relate to the use of bee products for medical purposes. Scientific substantiation of psychological and psychophysiological unloading by means of aeroapiphytotherapy is insufficient. Studies by foreign and domestic scientists confirm the great importance of the internal picture of health, patient compliance for the effectiveness of treatment and rehabilitation procedures.

The results of our research indicate the effectiveness of the method of psychological relief of patients who complained of physical, psychological overload, lack of mood, apathy, emotional imbalance – irritability, aggression towards others, uncontrolled experiences of traumatic situations. The proposed method of psychological relief, which helps to prevent psychological problems, correction of psychological state (stress, emotional imbalance, aggression, hypochondria, etc.), provides psychological health through optimal use of psychophysiological reserves of the human body (taking

into account the principles of combination therapy and client compliance) and reserves of aeroapiphytotherapy, has a number of significant differences from traditional: the method differs in that at each successive stage is aeroapiphytotherapy. During all consecutive procedures, people are in the apiphytoclimate of the room, which contributes to the psychophysiological balance of the body; while lying on the hive-couch provides apivibromassage, which contributes to the self-correction of the functions of internal organs, optimization of metabolic processes, energy and information balance of the body; the biological magnetic

field of the bee family helps to equalize the disturbances of the human electromagnetic field; easily reproducible, accessible, harmless, characterized by high opportunities for psychological relief compared to traditional methods. Important for the effectiveness of the proposed method is the compliance of patients, which causes harmonization of mental states, provides psychological relief.

Prospects for our further scientific research are to study the effectiveness of the method of psychological relief by aeroapiphytotherapy, on a compliance basis, for patients of different ages at different times of the year.

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THE IMPACT OF SMOKING ON DISEASES OF THE ORGANS AND SYSTEMS OF THE FEMALE BODY

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ABSTRACT

Aim: To investigate the negative impact of tobacco smoking on women's health.

Materials and Methods: The research involved 100 women who visit beauty salons. The research was conducted in 2020-2022. Research methods: bibliosemantic method, method of system analysis and generalization, medical and sociological method (questionnaire), mathematical and statistical method. The survey was anonymous, conducted according to the authors' questionnaire and carried out with the prior consent of all research participants.

Results: The characteristics of modern tobacco products for women's smoking, the negative impact of smoking tobacco products on the main systems of the body of women were summarized, the level of well-being of women in the process of smoking was found out and the negative consequences of smoking on their health were revealed, the signs of improvement of women's health after their quitting smoking were characterized.

Conclusions: The body of women is more susceptible to the toxic effects of tobacco, the impact of which leads to poisoning of their body and significant negative consequences for all systems and health in general. The female body is more favorable for the development of tobacco addiction. Women's refusal to smoke makes it possible to reduce the risk of developing diseases and improve their health.

KEY WORDS: health, women, smoking, tobacco

INTRODUCTION

Tobacco smoking has more than 500 years of history. Tobacco smoke is a type of air pollution that is hundreds of thousands of times more polluting than any metallurgical or chemical plant, yet people deliberately inhale such air. It is figured up that in an absolutely clean atmosphere, a smoker's body is exposed to such a toxic effect as if he or she were in conditions where pollution is thousands of times higher than any norm. Inhaling tobacco smoke is four times more harmful than car exhaust directly from the exhaust pipe. Tobacco smoke, in addition to a weak drug i. e. nicotine, contains about 200 particularly poisonous substances such as carbon monoxide, benzpyrene (a strong carcinogen) and many others [1, 2]. In recent decades, tobacco has become much more poisonous due to the fact that tobacco leaves are extremely hygrosopic and actively absorb harmful impurities from the air, aerosols, the amount of which is increasing. Such an atmosphere, which is created by a smoker, is not found

in any super-polluted industrial center. Tobacco smoking is especially dangerous for the female body. However, until recently, the impact of smoking on the health of the female population was underestimated. Now researchers emphasize the significant differences in the consequences of this addiction for the population of women. It is proved that physiological and psychological characteristics of the female body increase the risk of developing tobacco dependence, because the female body is more sensitive to the toxic effects of tobacco, which leads to poisoning of their body [3].

Tobacco smoking negatively affects all biological systems. In the international classification of diseases referred to as "Mental and Behavioral Disorders Caused by Tobacco Use" even have their own "F17" code [4]. According to statistics, tobacco smoking increases the risk of malignant tumors up to 30%, with 90% of all cases being lung cancer. It is also worth noting that the second most serious disease that occurs in women due to smoking is breast cancer [5].

AIM

The aim is to investigate the negative impact of tobacco smoking on women's health.

MATERIALS AND METHODS

The research was conducted in 2020-2022 at Zhytomyr Medical Institute of Zhytomyr Regional Council and Zhytomyr Ivan Franko State University. The research involved 100 women who visit beauty salons in Kyiv and Zhytomyr.

Research methods: bibliosemantic method, method of system analysis and generalization, medical and sociological method, mathematical and statistical method. The bibliosemantic method was used to conduct an analytical review of scientific information sources. 18 sources on the topic of the article from the scientometric databases PubMed, Scopus, Web of Science Core Collection and others were analyzed. The method of system analysis and generalization was used to analyze scientific information, summarize modern tobacco products for smoking, the negative impact of smoking on the main systems of the body of women, characterize the signs of improvement of women's health after their quitting smoking (according to time criterion), discuss the results of the research and formulate conclusions. The medical and sociological method was used to conduct a survey of female visitors to beauty salons. The survey of women was conducted according to the author's questionnaire, which was aimed at finding out their well-being in the process of smoking and the negative impact of smoking on their health. The questionnaire was assessed by the experts in this field (3 professors and 5 associate professors) and was approved by the Academic Council of Zhytomyr Medical Institute of Zhytomyr Regional Council (Protocol No.8 dated 27.08.2020). The survey was anonymous. The mathematical and statistical method was used to process the experimental data obtained.

This research complies with the ethical standards of the Act of Ukraine "On Higher Education" No.1556-VII dated 01.07.2014 and the Letter from the Ministry of Education and Science of Ukraine "On the Academic Plagiarism Prevention" No.1/11-8681 dated 15.08.2018. Also, this research followed the regulations of the World Medical Association Declaration of Helsinki. Informed consent was received from all individuals who took part in this research.

RESULTS

We summarized the characteristics of modern tobacco products for smoking based on the study and processing of a number of literature sources. Cigarettes are industrial tobacco products for smoking, which is a cylinder of cigarette paper filled with tobacco. Cigarettes can be with or without a filter. Cigarillos are smoking tubes rolled from tobacco leaves and filled with cut tobacco. They may contain flavors. They look like thin cigars. Cigars are a tobacco product in the form of a twist of dried tobacco leaves, which has a cylindrical or close to cylindrical shape. Unlike cigarettes, they do not have a paper wrapper and are much larger. Cigarettes (roll-up cigarettes) are tobacco products for smoking, consisting of a paper sleeve filled

with tobacco. They are non-industrial products rolled directly by the consumer. Tobacco for smoking pipes is a collective name for some types of tobacco, which are usually used for the manufacture of mixtures and undergo special processing stages for their further use for smoking in a pipe. Specially prepared tobacco leaves (or a mixture of leaves) are hookah tobacco, which should be of a certain consistency, may contain flavors and additives and is used in hookahs. Smokeless tobacco is a collective name for a group of tobacco products intended for use in a way other than smoking i. e. sucking, chewing or sniffing. When smokeless tobacco is used, nicotine enters the bloodstream through the mucous membrane of the nose or mouth. Soda or lime is often added to smokeless tobacco products in order to facilitate the penetration of nicotine into the body. These products may also contain flavors. Tobacco for sucking or chewing (snus or naswar) and tobacco for sniffing (snuff) are used in Ukraine. All of the above tobacco products are regulated by the current legislation of Ukraine.

According to the World Health Organization [1], 1.5 million people die every year from the use of tobacco products. Smoking causes particular harm to the female body. Among women who smoked 26 or more cigarettes a day for 20 years, 80% died of coronary heart disease. In this group, the risk of fatal attacks was 5.4 times higher than among non-smokers. Even one to four cigarettes a day increase the risk of coronary diseases by 12.4 times [6]. Smoking is absolutely unacceptable for pregnant women as it leads to abnormal development of the child, the appearance of anomalies, including genetic ones, premature abortion, etc. in 100% of cases. Passive smoking causes great harm when a non-smoker is forced to inhale air poisoned with tobacco smoke [7].

When smoking, dry distillation and incomplete combustion of dried tobacco leaves occurs, regardless of whether they are used in natural form (rolled into a tube), in a cigarette or in a pipe. During slow combustion, smoke is released, which is an unhomogeneous (heterogeneous) mixture consisting on average of 60% of various gases and 40% of microscopic tar droplets (aerosols). In addition to nitrogen (59%) and oxygen (13.4%), the gas fraction of smoke contains carbon monoxide (IV) (13.6%), carbon monoxide (II) (4%), water vapor (1.2%), hydrogen cyanide (0.1%), nitrogen oxides, acrolein and other substances. The aerosol fraction of the smoke includes water (1.4%), glycerin and alcohols (0.1%), aldehydes and ketones (0.1%), hydrocarbons (0.1%), phenols (0.003%), nicotine (0.002%), etc. [8].

Harmful substances contained in tobacco smoke and affecting the human body are divided into 4 groups according to their main action: 1) carcinogenic substances; 2) irritants; 3) poisonous gases; 4) poisonous alkaloids. Carcinogenic substances include aromatic hydrocarbons, benzpyrene, phenols, organic compounds (nitrosamine, hydrazine, vinyl chloride, toluidine, etc.), inorganic compounds of arsenic and cadmium, radioactive polonium, stannum. Irritants: unsaturated aldehyde i.e. propenal (acrolein), carbon monoxide (II). Poisonous gases are carbon monoxide (II),

hydrogen sulfide, hydrogen cyanide, etc. Poisonous alkaloids consist of 12 in total (nicotine, nornicotine, nicotirine, nicotheine, nicotimine, etc.). Nicotine is one of the most powerful poisons known to us that affect the nervous system. When burning a cigarette, it is destroyed only partially, by about 25%. The nicotine content in the smoke of the main stream of a cigarette is from 0.4 to 3 mg i.e. only 20% of the total amount of nicotine in a cigarette. About 5% remains in the cigarette butt and the remaining 50% gets into the air in the room where people are smoking [9].

The experts [10] claim that physical and psychological dependence on nicotine develops much faster than on alcohol. The main reason for the emergence and development of "tobacco" cough are tar drops that have settled in the lungs. The substances contained in tobacco smoke cause inflammation of the epithelium covering the respiratory tract, which leads to increased release of secretions and mucus associated with coughing up sputum. The massive spread of smoking is one of the main causes of the widespread cardiovascular diseases. It is proved that smokers are 2-3 times more likely to develop heart attack and pre-infarction condition, angina and other heart diseases. Mortality caused by these diseases is much higher in smokers. The life of smokers is 4.6-8.3 years shorter than that of non-smokers, and the reduction in life expectancy depends on the age at which a person started smoking. It is proved that more than 50% of all diseases that cause death of smokers are cardiovascular diseases. More than 80% of patients suffering

from chronic gastric and duodenal diseases are heavy smokers. It is proved that smoking has a negative impact on the treatment of ulcers.

Thus, summarizing the data of the literature analysis, we characterized the main consequences of the negative impact of tobacco smoking on women's health (Table 1).

Given the above, it was found that women who abuse tobacco smoking have not only the "baggage" of acquired diseases, but also look much older than their peers. This indicates that the woman's body does not have sufficient reserves to counteract the poisonous effects of nicotine, which affects her appearance and health.

Depending on the time, the following health consequences for smokers (active and passive), including women, associated with smoking are distinguished: immediate consequences (shortness of breath, tachycardia, increased blood pressure, etc.); long-term consequences (myocardial infarction, lung cancer, permanent disability, etc.); risks for those present (increased risk of lung cancer and cardiovascular diseases in the wife or husband, etc.). It should be noted that the consumption of tobacco products with low nicotine content or the use of other forms of nicotine does not eliminate these risks.

It is important to point out the negative health consequences of hookah smoking. Hookah does not pass the proper stages of sterilization, which causes the risk of transmission of hepatitis A, tuberculosis, herpes, influenza, etc. The main danger of hookah smoking is fatalities, which occur even among passive smokers.

Table 1. Consequences of the negative impact of tobacco smoking on women's health

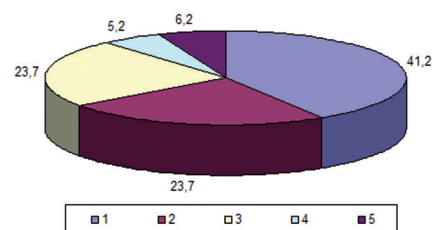
System	Characteristics of the impact of smoking
Nervous system	It is characterized by neurotic manifestations in the form of headache, dizziness, increased irritability, decreased working capacity, insomnia and stress.
Cardiovascular system	There is an increase in blood pressure, the development of coronary heart disease, angina, stroke, etc. In addition, blood clotting processes are activated, which leads to thrombosis.
Respiratory system	Systematic exposure of tobacco smoke on the vocal cords results in chronic inflammation (typical for smokers coarsening of the voice, which is especially noticeable in women). Chronic tracheitis and bronchitis, severe asthma attacks, lung cancer develop. Smoking also leads to hypoxia (impaired respiratory function of the blood). There is a tendency to recurrence of respiratory infections.
Digestive system	The following symptoms occur: bad breath, the tongue is covered with a gray coating, increased salivation, heaviness and pain in the pancreas, heartburn, nausea. Nicotine disrupts the process of gastric juice secretion and its acidity. Gastric and duodenal ulcers develop, which are difficult to treat.
Endocrine system	Nicotine negatively affects the endocrine glands that produce hormones and affect metabolism in the body (pituitary gland, thyroid and parathyroid glands, adrenal glands). Smoking enhances the function of the glands, which leads to an acceleration of metabolism.
Reproductive system	Risks of amenorrhea, bleeding, menstrual irregularities, early menopause increase (respectively, such women age faster). Smoking by pregnant women in 100 % of cases leads to abnormal development of the child, the appearance of anomalies, premature abortion, intrauterine death of the fetus. It also negatively affects the health of the child, which is manifested by lagging behind in mental and physical development and infertility among women who smoke.
Sensory organs	Vision: the eyes systematically tear, redden, the edges of the eyelids swell, quickly get tired while reading, flashing and double vision appears, intraocular pressure increases. In addition, chronic inflammation leads to a decrease in visual acuity and even blindness. Hearing: hearing acuity decreases. Taste: the sharpness of taste sensations decreases, often smokers do not distinguish the taste of bitter, sweet, salty, sour.
Appearance	The first to suffer from tobacco smoke is the tooth enamel, which deteriorates and turns yellow, teeth fall out, there is a specific smell from the mouth, gum nutrition is impaired, periodontal disease develops. Nails turn yellow, skin condition deteriorates (gray color, skin elasticity and firmness is lost), early wrinkles appear. In addition, hair becomes dull and loses its shine.

Table 2. Tools and methods to promote women's smoking cessation (n=100, %)

Answer options	Value
You have quit or tried to quit smoking without help	47.9
Nicotine replacement medicines (for example, chewing gum, lozenges or inhaler containing nicotine), other medicines	5.2
Electronic cigarettes or any similar devices	20.8
Support from a doctor or other health care professionals, special services to support smoking cessation	0
Alternative treatments (such as acupuncture or hypnosis)	1
Chewing tobacco (snus) or snuffing tobacco (snuff)	2.1
Smokeless cigarettes (not e-cigarettes)	4.2
Smoking cessation telephone support line	2.1
Online stop smoking support services	1
Other option	15.3
I have not quit smoking	17.4
I do not smoke	2
I have not used anything	1
Desire to become a mother	1
Support of a friend	1
On my own	1
First I switched to electronic cigarettes, and a day later I gave up tobacco altogether	1
The book referred to as "The Easy Way to Quit Smoking"	1
I smoke very rarely, so I did not try to quit smoking	1

To confirm the above conclusions of many scientists on this issue, we conducted an anonymous survey of female visitors to beauty salons in Kyiv and Zhytomyr. It was found that more than half of the respondents (84.0%) have experience of smoking; 25.0% of women smoke systematically, 34.0% smoke periodically, 23.0% do not smoke, and 7.0% have not smoked at all, while 11.0% had smoked before. It was found that 81.0% of all women surveyed are aware of the harmful effects of smoking; 83.0% of respondents have knowledge of the impact of tobacco smoking on the main systems of the human body (cardiovascular, digestive, nervous, reproductive, respiratory, endocrine, etc.); 70.0% of respondents consider their own level of awareness and informedness of the impact of tobacco products on human organs and systems to be sufficient. The results of the survey on self-assessment of female smokers' well-being are shown in Figure 1. According to the data, more than half of the respondents rated their health as "good" – 41.2% or "satisfactory" – 23.7%. Another 23.7% of respondents said that the state of their well-being is "bad", and only 5.2% rated it as "very bad". The results of the survey show that women are aware of the consequences of tobacco smoking, but despite this, they continue to support this addiction.

During the survey, women also had the opportunity to indicate whether they currently have complaints or chronic diseases caused by smoking. The following complaints were identified: cough, headache, high blood pressure, increased pulse rate, sleep problems, increased salivation, irritability, slight shortness of breath, digestive system disorders, as well as nervous tension and psychological problems. Among chronic diseases women mentioned the following:

**Figure 1.** Women's assessment of their own well-being during the smoking period, (n=100, %)

(1 – good condition; 2 – satisfactory; 3 – bad; 4 – very bad; 5 – hard to answer)

respiratory system diseases (chronic bronchitis, tonsillitis, bronchial asthma), cardiovascular diseases (hypertension, vegetative-vascular dystonia). At the same time, a significant proportion of respondents reported no consequences of tobacco smoking.

Table 2 shows the methods and tools used by female smokers to quit tobacco smoking. In this case, respondents could choose several answers or offer their own option.

Table 3 demonstrates the characteristic signs of women's health improvement after they quit smoking (by time criterion).

This table confirms that there is no dependence between the smoking experience of a smoker and the state of his or her health after quitting tobacco products.

DISCUSSION

Today, smoking has become a pandemic not only in the medical aspect, but also psychological, economic and social. Tobacco smoking is an acquired vicious habit of

Table 3. Improvement of women's health after quitting smoking (by time criterion)

Time without smoking	Signs of improved health
20 minutes	Heart rate decreases.
12 hours	The level of carbon dioxide in the blood decreases to normal.
From 2 weeks to 3 months	The risk of heart attack decreases, lung function improves.
From 1 to 9 months	Coughing and shortness of breath are reduced.
1 year	The additional risk of cardiovascular diseases is twice less than in smokers.
5 years	The risk of stroke is reduced to the level of a non-smoker.
10 years	The mortality rate from lung cancer is about half that of a smoker. The risk of cancer of the mouth, throat, esophagus, bladder, kidneys and pancreas is reduced.
15 years	The risk of developing pathologies of the cardiovascular system returns to the level of risk of a non-smoker.

inhaling smoke from smoldering dried tobacco leaves. The most important component of tobacco smoke is nicotine. Regular use of nicotine causes tobacco dependence. Prolonged and frequent tobacco smoking causes significant harm to the health of smokers and non-smokers around them. According to statistics, 5.4 million people die annually from tobacco-related diseases; that is, 1 in 10 deaths in the world is caused by the use of tobacco products [1, 6].

A large organized fight against smoking in many countries has led to a decrease in the number of smokers. Nevertheless, regardless of this, the number of smokers among young people and women continues to increase. In parallel, the risk of disease increases not only for smokers themselves, but also for the future generation [11]. Smoking causes great harm to everyone, but especially to the younger generation, whose body is in the process of puberty, so smoking can negatively affect their future children. Smoking is not only a personal problem of each individual separately, but also an acute social problem with which the future of all mankind is connected. Smoking and its impact on the human body are becoming social and medical problems today. It is proved that tobacco smoking is a great danger to health and leads to various diseases that cause premature death. It turns out that lung cancer mortality among smokers is 20 times higher than among non-smokers. In addition, smokers are 13 times more likely to suffer from angina (heart disease) and 10 times more likely to suffer from gastric ulcer [2, 5].

According to the scientists [4, 9], cigarette smoking has immediate and long-term effects on the human body. The immediate effect is a consequence of an increase in the level of adrenaline in the blood and consists in an increase in heart rate by 30%, blood pressure – by 5-10 mm Hg, slowing of peripheral circulation, which causes a decrease in the temperature of the upper and lower extremities. Long-term health effects are associated with resins, which contain 43 carcinogens and cocarcinogens and cause malignant diseases; carbon monoxide and oxidizing gases, which contribute to the development of cardiovascular diseases; irritants and hydrogen cyanide, which cause bronchitis and emphysema [12].

Smoking causes 30% of all cancer deaths and 90% of all lung cancer cases [13]. The increasing prevalence of smoking among women has led to the fact that in some countries lung cancer has overtaken breast cancer as the leading cause of death from oncological diseases in women. There is a chronic irritation of the mucous membrane of the larynx, inflammation of the vocal cords develops, they thicken and coarsen under the influence of tobacco smoke. This leads to a change in voice timbre (rough smoker's voice), which is especially noticeable in young women. Children of smokers have significantly worse immunological indicators and therefore they are more prone to frequent viral and bacterial infections [14].

The experience of many countries that have achieved significant success in reducing morbidity and mortality from chronic non-communicable diseases has proved that reducing the prevalence of smoking has a significant positive impact on health indicators [15]. The results obtained extend the findings of many scientists [16-18].

CONCLUSIONS

It was found that the problem of tobacco products consumption by women is relevant and requires attention, because their body is more susceptible to the toxic effects of tobacco, which leads to serious consequences for women's health. Women who abuse tobacco smoking not only have a number of acquired diseases, but also look much older than their peers. This indicates that the woman's body does not have sufficient reserves to counteract the poisonous effects of nicotine, which affects her appearance and health. There is no correlation between a woman's smoking experience and her health after quitting tobacco products. That is, stopping smoking at any time, regardless of smoking experience, will not only reduce the risk of developing diseases, but can also return the health of a former smoker to the level of a person who has never smoked. It is also worth noting that a conscious attitude to health is a real factor that will contribute to improving the health of not only women, but also the nation as a whole.

Prospects for further research are aimed at identifying the age dynamics of health indicators of women who abuse smoking.

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PSYCHO-EMOTIONAL STATE AND HEALTH LEVEL OF LAW ENFORCEMENT OFFICERS IN THE PROCESS OF THEIR PROFESSIONAL TRAINING

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ABSTRACT

Aim: To investigate the level of psycho-emotional state and health of newly certified law enforcement officers in the process of their professional training.

Materials and Methods: The research involved first-time certified police officers of different categories (n = 104) who studied at the initial professional training courses in 2019. In addition, we investigated the dynamics of police officers' health indicators during their initial professional training courses and in the process of their service for one year, depending on the type of previous professional activities (2019-2021, n=112).

Results: It was found that newly certified police officers of the 3rd category (police officers of a body, establishment, institution) have the worst level of psycho-emotional state and health indicators. Most police officers are characterized by a high level of anxiety and a low to below average level of health. At the end of the research, 58.1% of police officers had a below average level of health, 21.4% had a low level of health, and no police officers of the 3rd category had a high level of health. It is important to note that the level of health of police officers involved in the research has not changed in the course of one year of their service.

Conclusions: The negative impact of the new conditions and peculiarities of training and service activities during the initial professional training courses on the psycho-emotional state and health of newly certified police officers has been proved.

KEY WORDS: police, law enforcement officers, professional training, psycho-emotional state, health, initial professional training

INTRODUCTION

According to the Law of Ukraine "On the National Police" (2015), the formation of skills and abilities necessary for law enforcement officers to effectively perform their duties is carried out during professional training (vocational education). Professional training of law enforcement officers is carried out in stages and includes the following components: initial professional training; training in higher educational institutions with specific learning environment; postgraduate education; service training [1].

The initial stage of professional training i.e. initial professional training is the most important in the service activities of each law enforcement officer [2, 3]. The initial professional training courses have been organized for law enforcement officers to ensure the effective completion of this stage [4]. The Law of Ukraine "On the National Police" (2015) stipulates that persons who are first recruited to the police are required to undergo the initial professional training courses (lasting up to 6 months). The initial professional training of police officers is aimed at developing special skills and abilities necessary to perform the tasks of a particular position. Mastering the course takes place in accordance

with the developed and approved in the prescribed manner professional program of the initial professional training of police officers who are first recruited to the police. According to the scientists [5], the initial professional training is the foundation of further professional activities of a police officer.

The analysis of the origin of initial professional training courses showed that newly recruited law enforcement officers have a great information overload during this period, restructuring the daily regime in accordance with the requirements of service activities. It was found that it is difficult for newly certified law enforcement officers to adapt to the new conditions of service in the police, because yesterday's civilians find themselves in new conditions of training and service activities, new life situations, accompanied by a significant restructuring of mental and physiological states. Another drawback that reduces the effectiveness of the initial professional training courses for newly certified law enforcement officers is the low level of health of candidates for service [6, 7]. All this negatively affects their psycho-emotional state and health during their professional training.

AIM

The aim is to investigate the level of psycho-emotional state and health of newly certified law enforcement officers in the process of their professional training.

MATERIALS AND METHODS

To achieve the aim of the research, we organized and conducted research in two stages. At the first stage (2019) we analyzed the psycho-emotional state and the level of health of first-time certified police officers of different categories ($n=104$) who studied at the initial professional training courses of the National Academy of Internal Affairs (Kyiv, Ukraine) in 2019 (the first initial professional training courses in 2019 for 6 months). Depending on the nature and specifics of service, all permanent personnel of the National Police are divided into three categories: the 1st – police officers of the special police unit ($n=32$); the 2nd – police officers of the territorial (separate) unit of the police body ($n=37$); the 3rd – police officers of the structural executive office of the National Police, executive offices of territorial (interregional) bodies of the National Police, the Main Directorate of the National Police, institution (establishment) ($n=35$).

At the second stage (2019-2021) we studied the dynamics of physical health indicators of police officers of the 3rd category during their initial professional training courses (the second initial professional training courses in 2019 for 6 months) and in the course of their service activities (for 1 year) depending on the type of previous professional activities ($n=112$): the 1st group – persons who served in the Armed Forces of Ukraine before certification ($n=49$); the 2nd group – persons who were certified immediately after graduation from civilian higher educational institutions ($n=41$); the 3rd group – persons who served in the Armed Forces of Ukraine, but worked in various industries for some time before being certified to the police ($n=22$). Police officers of the 3rd category ($n=35$) who took part in the first stage of our research, did not participate in the second stage.

Research methods: analysis and generalization of literature sources, pedagogical observation, testing, methods of mathematical statistics. The psycho-emotional state of police officers was determined according to the following methodologies: "WAM" (well-being, activity, mood), "Assessment of situational anxiety". The physical health of police officers was assessed according to the express method by H.L. Apanasenko, which is based on

anthropometric indicators (body length, body weight, vital lung capacity, hand dynamometry) and the functional state of the cardiorespiratory system (heart rate, arterial blood pressure, duration of recovery processes) [8].

The procedure for organizing the study was previously agreed with the committee on compliance with Academic Integrity and Ethics of the NAIA. The topic of the study was approved by the Academic Council of the NAIA (No. 7 dated 29.07.2019). Informed consent was received from all participants who took part in this study.

RESULTS

The analysis of the indicators of well-being, activity and mood using the "WAM" methodology showed that the police officers of the 3rd category have the worst indicators. The analysis showed that on a 9-point scale, the level of emotional states of police officers of the 3rd category is insufficient for the effective performance of training and service tasks at the stage of their initial professional training (Table 1). The study of situational anxiety in newly certified police officers during their preparation at the initial professional training courses showed that the worst value was found in police officers of the 3rd category (47.05 points), but no significant difference between the indicators of all three categories was found ($p>0.05$). At the same time, the indicators of anxiety in police officers of the 3rd category are assessed as "high level of anxiety".

The analysis of the health status of police officers of different categories who entered the training showed that the lowest value was found in law enforcement officers of the 3rd category (-3.41 ± 0.42) points. The level of health of officers of the 2nd category is higher by 0.74 points and amounts to (4.15 ± 0.37) points, but no significant difference was found between them ($p>0.05$). The highest level of physical health was recorded in police officers of the 1st category – it is (7.02 ± 0.39) points and is significantly higher compared to the level of health of police officers of the 2nd category by 2.87 points ($p<0.001$), and of the 1st category – by 3.61 points ($p<0.001$) (Figure 1).

According to the express methodology by H.L. Apanasenko, the level of health of law enforcement officers of the 3rd category is assessed as "low"; the 2nd – as "below average"; the 1st – as "average". The study of the health status of newly certified law enforcement officers showed that the worst initial level of health was found in police officers of the 3rd category, which indicates the

Table 1. Indicators of psycho-emotional state of first-time certified police officers of different categories ($n=104$), points

Studied indicators	Categories			Significance of the difference		
	3 rd ($n=35$)	2 nd ($n=37$)	1 st ($n=32$)	p3-p2	p2-p1	p3-p1
Well-being	5.06 ± 0.28	5.23 ± 0.26	5.89 ± 0.25	>0.05	>0.05	>0.05
Activity	6.27 ± 0.26	6.32 ± 0.25	6.82 ± 0.27	>0.05	>0.05	>0.05
Mood	6.14 ± 0.26	6.20 ± 0.27	6.95 ± 0.24	>0.05	>0.05	>0.05
Situational anxiety	47.05 ± 1.54	46.80 ± 1.46	46.32 ± 1.48	>0.05	>0.05	>0.05

Legend: p3-p2, p2-p1, p3-p1: the significance of the difference between the indicators of police officers of different categories, determined by Student's t-test

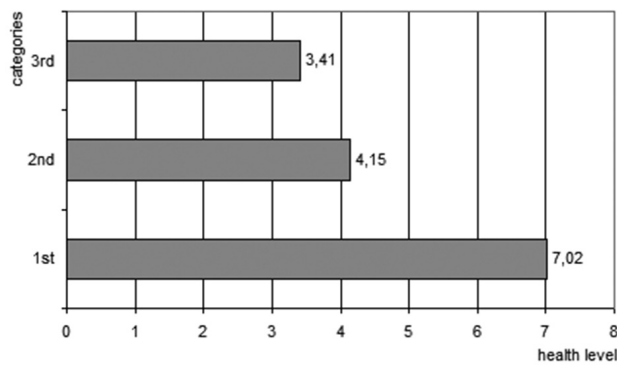


Figure 1. Health level of first-time certified police officers of different categories (n=104), points

Table 2. Initial level and health level of police officers after the first year of their service depending on previous type of professional activities (n=112), points

Groups of police officers	n	Initial level	After the first year of service	p
1st group	49	4.28±0.33	4.36±0.37	>0.05
2nd group	41	3.75±0.41	3.81±0.44	>0.05
3rd group	22	2.84±0.62	3.02±0.65	>0.05

Legend: n – number of police officers; p – the significance of the difference between the indicators of police officers of different groups before and after one year of their service, determined by Student's t-test

need to find ways to improve it in the process of initial professional training in order to accelerate the process of their adaptation to new conditions of training and service, improve their health, and increase the efficiency of their further service activities.

The analysis of the health status of police officers of the 3rd category depending on the previous type of professional activities revealed that the initial level of police officers of the 1st group is the highest and makes 4.28 points (Table 2). This value is higher than that of police officers of the 2nd group by 0.53 points ($p>0.05$) and by 1.44 points ($p<0.05$) than that of police officers of the 3rd group. The difference between the health levels of police officers of the 2nd and the 3rd groups is 0.91 points, but is not significant ($p>0.05$). The studies of the dynamics of physical health have shown that the values of police officers of all groups have improved, but remain virtually unchanged during the initial professional training courses and service activities during the first year of their service. No significant difference was found between the initial and final data ($p>0.05$).

Such a state of health of police officers is insufficient for the effective performance of the tasks of service activities and requires finding ways to improve it.

DISCUSSION

The scientists [9-11] consider the process of training police officers to effectively perform their professional

activities as a gradual and consistent transition from theoretical knowledge and understanding of the basic patterns in interactions, rules and conditions of activity to the formation of appropriate skills and abilities. The scientists [12-14] note that professional training (vocational education) of future police officers is a social and pedagogical process through which the social order for a specialist i.e. a law enforcement officer capable of effective performance of the tasks and functions assigned to him or her as a representative of the law is indirectly manifested.

However, according to many scientists [15, 16], the low or insufficient level of health of candidates for service in the National Police does not allow to fully ensure the effective progress of the stages of professional training. The analysis of literature sources [3, 17] made it possible to determine that the main reasons for the low level of health of candidates for service in the National Police are: a decrease in living standards in the country; insufficient efficiency of the functioning of the system of physical education in higher educational institutions; increased nervous and psychological stress as a result of hostilities in Ukraine and socio-economic instability of society; insufficient motor activities; the consequences of the Chernobyl tragedy and others.

The scientists [18] argue that the service activities of police officers of the 3rd category is accompanied by a significant number of negative factors, including: irregular duration of the working day and week, hypokinesia and physical inactivity, nervous and emotional tension, mental overload and stress. The influence of these negative factors causes a complex of functional disorders that affect the functions of the cardiovascular, nervous, respiratory, musculoskeletal systems and leads to metabolic disorders. The systematic action of these factors can cause various diseases of the main systems of the body and deterioration of the health of police officers in this category.

The results obtained in our research significantly complement the findings of our previous researches [3, 5, 6, 11] and the works of many scientists in this field [8, 12, 13, 19].

CONCLUSIONS

According to the results of the conducted research, it was found that the level of psycho-emotional state and health indicators of the first-time certified police officers of the 3rd category is the worst. Most police officers are characterized by a low and below average level of health. At the end of the research, the level of health was below average in 58.1% of police officers; low – 21.4%; average – 16.9%; above average – only 3.6%; no police officer had a high level of health. It is important to note that the level of health of the respondents remained virtually unchanged in the course of one year of their service. The research shows a significant negative impact of new unusual conditions and peculiarities of training and service activities on the psycho-emotional state and health of newly certified police officers in the course of

their initial professional training courses. Moreover, the current program of initial professional training courses is not effective enough to improve the health of newly certified police officers, which necessitates finding ways to improve it in order to accelerate the process of their

adaptation to new conditions of training and service, to increase the efficiency of their further service activities.

Prospects for further research. It is planned to study the psychophysical state of newly recruited police officers.

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INDEPENDENT PHYSICAL EXERCISES AS THE MAIN MEANS OF MAINTAINING STUDENTS' HEALTH DURING THEIR DISTANCE LEARNING

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ABSTRACT

Aim: The aim is to study the influence of independent physical exercises of different focuses on the health indicators of students during their distance learning.

Materials and Methods: The research was conducted during 2020-2021. The research involved 188 students (103 men and 85 women) of the first instructional years of technical specialties. Of these, 131 students regularly performed physical exercises during their distance learning, and 57 did not perform physical exercises at all.

Results: It was found that students who regularly engaged in physical exercises during distance learning did not significantly deteriorate their health indicators and correspond to age norms. At the same time, strength training sessions have a positive effect on body mass index and strength index, while endurance training sessions have a positive effect on body mass index, vital index, and index of Robinson. Students who did not exercise showed a significant deterioration in all health indicators.

Conclusions: It was found that distance learning resulted in a significant decrease in students' physical activity. It was found that students who did not exercise on their own had an increase in body weight, which can cause many diseases. It was proved that regular independent physical exercises are one of the main means of maintaining and promoting the health of students during their distance learning.

KEY WORDS: students, health, independent physical exercises, distance learning

INTRODUCTION

The rapid spread of COVID-19 coronavirus disease in 2019-2020 forced most higher educational institutions (HEIs) in many countries to switch to distance learning, which involves obtaining education without the physical presence of students in the HEIs. Students of Ukrainian HEIs are no exception.

The negative factors of students' transition to distance learning are lack of social component of education, i. e. lack of real contact with instructors and colleagues; significant limitation of opportunities to work with real laboratory facilities and samples of equipment (for technical specialties); significant limitation of motor activities, as there is no need to change the workplace, classroom, building, etc. Scientists [1, 2] identify the following negative factors of distance learning: violation of daily routine and nutrition, which results in a significant increase in body weight, obesity, and other negative health consequences; irrational organization of the workplace and prolonged sitting, which leads to overloading of the spine and the entire musculoskeletal system of students; hypodynamia and hypokinesia, which leads to a decrease in energy consumption, worsens metabolism, the activity of the main body systems; exceeding the norm of daily use of

computers, tablets, etc. by ten times which negatively affects students' eyesight; monogeny, information, intellectual and emotional overload of students, the need to process a large amount of perceived information per unit of time, attention span which results in stress and negatively affects the mental health of students.

According to experts [3, 4], independent and regular exercise of various focuses is one of the most effective means of promoting health during forced distance learning caused by COVID-19. Firstly, physical exercises, increasing the amount of students' motor activities, ensure the effective functioning of the cardiovascular system, blood circulation, respiratory system, and other life support systems of the body; strengthening the muscles of the whole body and, in particular, the back, which helps to improve blood supply to the brain and, accordingly, increase the success of learning. Secondly, physical exercises help improve the psycho-emotional state of students, reduce stress and irritability, improve mood as well as well-being, and reduce fatigue due to the abundance of online information and the need to process, analyze, and memorize it. Thirdly, according to scientists [5], exercise promotes the production of certain hormones that reduce the possibility of the SARS-CoV-2 coronavirus attack and complications of COVID-19, as well

as reduces inflammation and cell death during infection. It was found that patients who were constantly inactive (less than 10 minutes per week for exercise) had a higher risk of hospitalization than those who exercised 150 minutes or more per week [6].

Depending on the impact of the development of certain physical qualities of a person, exercises can have a different focus. For example, according to scientists [7], aerobic exercises for endurance development are the most effective for promoting human health during independent training. From the physiological point of view, endurance is characterized as the ability to perform work for a long time at the required level of intensity, as the ability to fight fatigue. Endurance allows you to perform work that places high demands on the cardiovascular, respiratory, and central nervous systems for a long time. The studies [8] show that when a certain level of endurance development is achieved, changes occur at the functional level in the body, primarily in the main life support systems (cardiovascular, and respiratory). The development of endurance allows to effectively form reserves of adaptation of the organism and ensures their high efficiency, to form perfect mechanisms of regulation of vascular tone in conditions of nervous and emotional stress and thus ensure the prevention of cardiovascular diseases. According to scientists [9], recreational jogging and walking are universal means of increasing motor activities. The authors emphasize the positive changes in health as a result of physical exercises aimed at developing endurance, namely: increasing the body's resistance to adverse environmental factors, normalizing body weight, and strengthening the musculoskeletal system.

Regarding the positive impact of strength exercises on students' bodies, scientists [10] prove that as a result of systematic training, the volume of the heart muscle gradually increases, and the network of blood vessels that feed it increases; changes also occur in the blood composition (the number of red blood cells, hemoglobin increases); the chest circumference and lung capacity increase; the activity of the central nervous system and mental performance improves; and concentration increases. Strength exercises help to eliminate body structure defects, ensure the good functional condition of the musculoskeletal system and cardiorespiratory systems, and promote a good mood.

AIM

The aim is to study the influence of independent physical exercises of different focuses on the health indicators of students during their distance learning.

MATERIALS AND METHODS

The research was conducted during 2020-2021 at the Department of Health and Sports Technologies of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Kyiv, Ukraine). The research involved 188 students (103 men and 85 women) of the first instructional years of technical specialties. Of these, 131 students (73 males and 58 females) regularly performed

physical exercises during their distance learning (main group), and 57 did not perform physical exercises at all (control group (C)).

Research methods include analysis and generalization of literary sources on the research topic, questionnaires, medical and biological methods and statistical methods. The questionnaire allowed us to find out whether students were engaged in physical exercises at all and to divide students into groups depending on the focus of the training sessions. It was found that 51 men and 17 women were engaged in strength exercises during their distance learning (group "Strength" (S)), and 22 men and 41 women were engaged in aerobic endurance exercises (group "Endurance" (E)). Students' health level was assessed by body weight, height, vital capacity of the lungs (VCL), hand dynamometry, pulse, and blood pressure. In addition, we determined body mass indices (BMI, the ratio of body weight to height), life index (LI, the ratio of VCL to body weight), strength index (SI, the ratio of hand strength to body weight) and index of Robinson (IR, the ratio of the product of pulse and systolic blood pressure to 100). These indicators were assessed twice: at the beginning of the distance learning program (March 2020) and after its completion (September 2021).

The significance of the difference in the results of the students was determined during the studying based on the Student's test. The significance for all statistical tests was set at $p < 0.05$. All statistical analyses were performed with the SPSS software, version 21, adapted to medical and biological researches. This research followed the regulations of the World Medical Association Declaration of Helsinki. Informed consent was received from all students who took part in this research.

RESULTS

The results of the comparative analysis of students' health indicators who independently engaged in strength training, and aerobic endurance exercises and those who did not engage in physical exercises at all during their distance learning are presented in Table 1 (men) and Table 2 (women).

The analysis of the studied indicators of male students before the start of distance learning showed that the indicators of all groups did not differ significantly ($p < 0.05$). After completing the distance learning program, the S group significantly improved the SI ($p < 0.05$), and the rest of the indicators did not change significantly ($p > 0.05$). The IR improved significantly in the E group ($p < 0.05$), and the rest also improved, but not significantly. All indicators deteriorated in the C group, with significant deterioration in the BMI, SI, and IR ($p < 0.05-0.01$), and insignificant deterioration in the LI ($p > 0.05$).

A similar trend was observed among female students: those students who exercised independently during distance learning had improved or unchanged health indicators, while those who did not exercise had significantly deteriorated. This confirms the conclusions of many scientists about the decline in health among students who lead a sedentary lifestyle and the importance of physical activities in their daily routines.

Table 1. Comparison of health indicators of male students before and after completing distance learning (n=103)

Groups	n	Stages of distance learning		Significance of the differences	
		Beginning	End	t	p
BMI. kg/m ²					
S	51	23.7±0.19	24.1±0.21	1.41	>0.05
E	22	23.5±0.28	23.8±0.29	0.74	>0.05
C	30	23.8±0.26	24.4±0.28	3.40	<0.01
LI. ml/kg					
S	51	55.9±0.93	56.1±0.95	0.15	>0.05
E	22	56.4±1.23	56.9±1.19	0.29	>0.05
C	30	55.8±1.20	53.7±1.24	1.22	>0.05
SI. %					
S	51	58.3±0.89	61.3±0.85	2.44	<0.05
E	22	57.4±1.07	55.8±1.14	1.02	>0.05
C	30	56.2±1.11	52.7±1.17	2.17	<0.05
IR. c.u.					
S	51	89.6±1.07	88.7±1.02	0.61	>0.05
E	22	89.1±1.32	85.3±1.24	2.10	<0.05
C	30	89.5±1.27	93.6±1.30	2.26	<0.05

Table 2. Comparison of health indicators of female students before and after completing distance learning (n=85)

Groups	n	Stages of distance learning		Significance of the differences	
		Beginning	End	t	p
BMI. kg/m ²					
S	17	22.1±0.32	22.4±0.31	0.67	>0.05
E	41	21.8±0.23	21.6±0.20	0.66	>0.05
C	27	22.3±0.26	23.2±0.28	2.23	<0.05
LI. ml/kg					
S	17	46.2±1.42	46.7±1.37	0.25	>0.05
E	41	46.5±1.25	48.1±1.27	0.90	>0.05
C	27	46.3±1.33	44.5±1.32	0.96	>0.05
SI. %					
S	17	39.8±1.42	42.5±1.34	1.38	>0.05
E	41	38.1±1.12	38.4±1.08	0.19	>0.05
C	27	39.3±1.25	36.9±1.29	1.34	>0.05
IR. c.u.					
S	17	88.5±1.44	88.1±1.38	0.20	>0.05
E	41	87.8±1.20	84.7±1.18	1.84	<0.05
C	27	88.2±1.23	92.5±1.25	2.45	<0.05

DISCUSSION

Scientists [11] have proven that the quality of the educational process directly depends on the health of students. The sedentary lifestyle of students during their distance learning negatively affects the fitness of the heart, which is the main muscle that pumps blood. Moreover, this, in turn, can result in diseases of the circulatory system: vasoconstriction, vegetative-vascular dystonia, hypertension, and myocardial weakness. As a result of inactivity, blood circulation slows down, which leads to a decrease in the supply of oxygen to all organs and systems. Decomposition (oxidation) products do not have time to be removed from the body. The body does not have time to renew itself during intense mental stress and, as a result, the quality of assimilation of new material and the speed of its processing deteriorate [12]. In addition, the sedentary

lifestyle of students negatively affects the state of their musculoskeletal system and, in particular, the spine. This leads to pathologies such as osteochondrosis, scoliosis, and stoop. Untrained back muscles spasm, which causes pain in the back and other parts of the body, depending on the part of the spine where the spasms occur. Moreover, prolonged sitting at a computer weakens the tone of blood vessels, causes edema, venous stasis, and leg heaviness, and provokes venous dilation in the lower extremities [4].

Independent physical exercises, the weekly volume of which should be from 3 to 6 hours or more, take the first place among the many recommendations of scientists to reduce the negative impact of a sedentary lifestyle on students during their distance learning [2, 5]. At the same time, scientists [6] note that a greater number (volume) of physical exercises means a lower risk of developing

severe COVID-19. Experts recommend moderate-intensity exercises, with almost half of the sessions being aerobic. More than this, even daily 30-minute walks are enough to help the body fight various diseases. The researchers also found that people who rarely exercised were hospitalized twice as often due to COVID-19 than people in the most active group (who exercised regularly).

The positive effect of aerobic exercises (in particular, recreational jogging, as one of the most affordable physical exercises for independent training) aimed at developing endurance has been emphasized by many scientists [7, 8]. Thus, recreational jogging reduces blood cholesterol levels and thus helps prevent atherosclerosis; increases the stroke volume of the heart, which increases the lumen of the heart vessels and after several years of running practice, their lumen becomes twice as large; improves blood circulation in the lower extremities due to muscle contractions and active pushing of blood towards the heart (muscle pump), which helps prevent varicose veins; after jogging, the arteries of the leg muscles and skin capillaries remain dilated for a long time, which helps to normalize blood pressure; during running, an average of 700 kilocalories is consumed in one hour, respectively, 2100 kilocalories are consumed in 3 hours of slow jogging [9].

The works of many scientists [10, 13] note that strength exercises contribute to promoting the level of health; aesthetic self-improvement due to the proportionality and symmetry of muscles and the overall harmonious development of all muscle groups; correction of the body structure, including the elimination of its defects, recovery from injuries, increasing working capacity; formation of a harmonious physique. Strength exercises have a beneficial effect on the muscles and osteo-ligamentous apparatus of a person; help to improve the proportionality of the body; form a relaxed, correct posture. In addition, correct posture not only makes the body attractive but also creates favorable conditions for the functioning of internal organs. Scientists [14] have found that neuroses, psycho-emotional overload, and difficulties in adapting to the conditions of educational and professional activities in people with a low level of strength development occur five times more often than in people with a well-developed muscular system. Strength exercises also contribute to the development of other physical qualities (speed, flexibility, coordination of movements), and improve physical working capacity [15, 16]. Strength exercises performed with bending and

vigorous straightening of the body significantly contribute to strengthening the muscles of the back, torso, and abs i. e. the formation of a muscle "corset" that allows you to "pump" blood around the spine and improve all internal organs [14].

The above suggests that regular independent performance of physical exercises of various focuses during distance learning will contribute to the development of physical qualities, maintaining a high level of functional capabilities of all body systems of students and their overall health. In addition, switching students to physical exercises will help to restore their psycho-emotional state during the intense study, and improve their well-being, mood as well as success in learning the material.

The results obtained in our research confirm the findings of many scientists regarding the positive impact of physical exercises on promoting people's health who lead a sedentary lifestyle. This category of people includes university students during forced distance learning. It has been found that, regardless of the focus of physical exercises, their regular performance helps to maintain the indicators of the main systems of the students' body at a sufficient level, and normalize their body weight, which ensures the prevention of most diseases.

CONCLUSIONS

It was found that students who regularly engaged in physical exercises during distance learning did not significantly deteriorate their health indicators and correspond to age norms. At the same time, strength training sessions have a positive effect on body mass index and strength index, while endurance training sessions have a positive effect on body mass index, vital index, and index of Robinson. Students who did not exercise showed a significant deterioration in all health indicators.

It was found that distance learning resulted in a significant decrease in students' physical activity. It was found that students who did not exercise on their own had an increase in body weight, which can cause many diseases. It was proved that regular independent physical exercises are one of the main means of maintaining and promoting the health of students during their distance learning.

Prospects for further research are aimed at the scientific substantiation of the program of independent physical exercises for students during their distance learning.

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INTRODUCTION OF THE PACKAGE OF MEDICAL SERVICES «COMPREHENSIVE REHABILITATION ASSISTANCE TO ADULTS AND CHILDREN IN STATIONARY CONDITIONS» IN HEALTH CARE INSTITUTIONS OF UKRAINE: MATERIAL AND TECHNICAL REQUIREMENTS

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ABSTRACT

The aim: To investigate the conditions for the introduction of the package of medical services “Comprehensive rehabilitation assistance to adults and children in stationary conditions” and to directly study and analyze the requirements for equipment.

Materials and Methods: The specification and conditions for the purchase of medical services under the program of medical guarantees under the package “Comprehensive rehabilitation assistance to adults and children in stationary conditions” were used as the materials of the study. The following methods were applied in the course of the study: bibliosemantic, of content analysis, of structural and logical analysis.

Conclusions: It was established that in order to introduce the package of medical services “Comprehensive rehabilitation assistance to adults and children in stationary conditions”, health care institutions of Ukraine must be provided with equipment that is functionally divided into four groups: equipment to ensure effective patient care, medical equipment, rehabilitation equipment and household equipment.

The results of the study indicate the formation of a network of high-quality comprehensive rehabilitation institutions in Ukraine.

KEY WORDS: rehabilitation assistance, stationary conditions, introduction, equipment

INTRODUCTION

The system of rehabilitation assistance to the population is actively developing in Ukraine. The development of the system is determined at the legislative level [1]. Its introduction is accompanied by the development of the regulatory framework [2, 3], the training of specialists [4,5] and the provision of modern equipment [6].

The need for rehabilitation assistance to the population of Ukraine is growing due to the serious medical consequences of Ukraine’s war against Russian aggression [7, 8].

In accordance with paragraph 139-10 of the Procedure for implementing the program of state guarantees of medical care for the population in 2022, approved by the Resolution of the Cabinet of Ministers of Ukraine dated 29.12.2021 №1440, the NHSU concludes contracts for a new package of medical services “Comprehensive rehabilitation assistance to adults and children in stationary conditions” [9].

Thus, a network of high-quality comprehensive rehabilitation facilities is being formed in Ukraine. According to the Ministry of Health of Ukraine, at the end of 2022, 38 healthcare institutions meet the requirements for this package of medical services.

AIM

To investigate the conditions for the introduction of the package of medical services “Comprehensive rehabilitation assistance to adults and children in stationary conditions” and to directly study and analyze the requirements for equipment.

MATERIALS AND METHODS

The specification and conditions for the purchase of medical services under the program of medical guarantees under the package “Comprehensive rehabilitation assistance to adults and children in stationary conditions” were used

as the materials of the study. The following methods were applied in the course of the study: bibliosemantic, of content analysis, of structural and logical analysis.

For the application of these materials and methods during the study, permission was obtained from the ethical commission of Uzhhorod National University. Protocol dated 08.02. 2023 № 6/2.

REVIEW

In accordance with the established goal, the requirements under the program of medical guarantees "Comprehensive rehabilitation assistance to adults and children in stationary conditions" for material and technical provision of health care institutions were studied and analyzed.

At the beginning of the study, the requirements as for the organization of the provision of relevant services were studied. These requirements are as follows:

1. The presence of an inpatient department for rehabilitation in the post-acute rehabilitation period.
2. Ensuring the possibility of conducting laboratory tests in the institution or on the terms of rent, contract and other conditions of use.
3. Providing the possibility of conducting instrumental examination in the institution or on the terms of lease, contract and other conditions of use.
4. The presence of an assistive technology room.
5. Availability of room for physical therapy – a hall (halls) of physical therapy and an office (offices) for the provision of individual rehabilitation assistance in physical therapy.
6. Availability of room for ergotherapy – ergotherapy hall and office (offices) for individual rehabilitation assistance in ergotherapy.
7. Availability of an office for the provision of individual rehabilitation assistance in speech therapy.
8. The presence of an office for the provision of individual psychological assistance.
9. Availability of room for the selection and adjustment of rehabilitation aids.
10. The presence of a manipulation room, including for invasive medical interventions.
11. The presence of a dressing room in the institution at the place of rehabilitation assistance.

The next step of the study showed that at the place of provision of medical services depending on the direction of rehabilitation in a health care institution, it is mandatory to have the internal networks of the department connected to an autonomous backup source of power supply in accordance with regulatory technical documents and to have the functioning centralized oxygen supply system with a source of medical oxygen (central oxygen point and/or oxygen-gasification station, and/or oxygen concentrator/s), or the operating oxygen concentrator capable of maintaining an oxygen flow rate of at least 10 l/min.

Next, we divided the equipment the availability of which is necessary in a health care institution for concluding an agreement with the National Health Service of Ukraine for the provision of inpatient rehabilitation assistance to the population in stationary conditions, into four functional groups: equipment to ensure effective patient care, medical equipment, rehabilitation equipment and household equipment.

For each specified group, we studied the issue of the list and purpose and the required amount of equipment. According to the specification for the package of medical services, all calculations were made for a department with a capacity of 30 rehabilitation beds. At the first stage, a list of equipment necessary to ensure effective patient care was formed (Table 1).

Table 1. Necessary equipment to ensure effective patient care

Name and purpose of the equipment	Required quantity
Anti-decubitus mattresses	At least 20 (in case of rehabilitation assistance to children – at least 5)
Functional bed	At least 20 (in case of rehabilitation assistance to children – at least 5)
Device for raising the patient in bed	Requirements are not defined
Anti-decubitus pillows	At least 20 (in case of rehabilitation assistance to children – at least 5)
Toilet chair	At least 6
Shower chair	At least 3

Table 2. Necessary medical equipment

Name of the equipment	Required quantity
Multichannel electrocardiograph	Requirements are not defined
Portable defibrillator with synchronization function	Requirements are not defined
Aspirator	Requirements are not defined
System for monitoring the physiological parameters of one patient (non-invasive BP, HR, ECG, SpO ₂ , t)	2 systems
Standardized tests and non-standardized therapeutic evaluation kits	Requirements are not defined
Tonometer and/or pediatric tonometer with cuffs for children of different ages	At least 6
Pulse oximeter	At least 10
Glucometer	Requirements are not defined
Non-contact thermometer	Requirements are not defined

The analysis of the data provided in Table 1 indicates that the list of necessary equipment includes the equipment necessary to ensure effective care for patients with disabilities.

Taking into account the presence in the rehabilitation departments of patients who need monitoring the state of health and the provision of emergency medical care, the list of necessary equipment includes medical equipment (Table 2).

Thus, the list of needed medical equipment includes equipment that is necessary to diagnose possible urgent conditions that may occur in patients during rehabilitation measures and to ensure the provision of emergency medical care before the arrival of the relevant specialists. It should be noted that most of the equipment specified in Table 2

does not require special maintenance and is simple and easy to use.

Basing on the tasks assigned to the inpatient departments for the comprehensive rehabilitation of patients, we have allocated the equipment necessary for the comprehensive rehabilitation of patients into a separate group (Table 3).

Special equipment for rehabilitation purposes, which is included in the list as mandatory equipment, can also be divided into several groups: rehabilitation systems, rehabilitation simulators, rehabilitation equipment, aids. The analysis indicates that all the basic means that are needed for effective comprehensive rehabilitation of patients are included as necessary.

Table 3. Special equipment for rehabilitation purposes

Name and purpose of the equipment
Wide couch with height adjustment – at least 4
Assistive technologies to ensure mobility of various types and sizes – wheelchairs, sticks, crutches, walkers, means of alternative communication (communication boards, books, devices);
Orthoses, bandages, slings;
Tools for positioning of different shapes and sizes;
Balls (fit balls) of different sizes and shapes;
Different types of balancers;
Step platforms;
Exercise bike;
Equipment for functional electrical stimulation;
Swedish wall;
Mechanical and/or automatic rotor for training the upper and lower extremities;
Mechanical and/or automatic rotor for training upper and lower extremities for bedridden patients;
Mechanical and/or automatic rotor for training the ankle and knee joints;
Mechanical and/or automatic rotor for training the wrist and elbow joints;
Mechanical and/or automatic apparatus for training the finger joints;
Rehabilitation treadmills;
Multifunctional rehabilitation complex;
Active rehabilitation module;
A set of rubber harnesses, dumbbells, weights, therapeutic rubber bands, therapeutic plasticine;
Rehabilitation belts to insure patients while walking – at least 8.
Equipment for the restoration of sensory and motor functions of the upper limb (including goniometers, dynamometers, pinch meters, sets of weights on hands of various weights, sets of rings, cones, clothespins, therapeutic plasticine, expanders, elastic tapes, panels with small details, hooks, locks and keys, game materials, etc.);
Verticalizer of different types and sizes;
Adaptive means and materials to develop swallowing, feeding and cooking skills;
Rehabilitation handrails along the hall and/or rehabilitation bars in the physical therapy room;
Rehabilitation bars with obstacles;
Dynamic simulators ladder-bars;
Hemispheric balancing on the platform;
Pillow balancer;
Simulator to increase the strength and volume of movements in the joints of the limbs.

Table 4. Necessary household equipment

Name and purpose of the equipment
Materials and facilities for the restoration and development of gaming, social and self-service skills;
Equipment, materials and means to restore participation in the activities of daily life, including the restoration of cognitive functions (including auxiliary equipment);
Equipment, toys and/or materials for sensory stimulation and motor skills development;
Wall mirror and/or mobile mirror on wheels;
Furniture and materials in the ergotherapy room or other accessible premises that simulate the arrangement of a dwelling to resume participation in the activities of everyday life (cabinets, table, chair, computer, telephone, ironing board, iron, large wall clock, calendar, books, newspapers, magazines, etc.);
Auxiliary equipment for pulling and grabbing, dressing/undressing and adaptive clothing;
Kitchen and kitchen materials to resume participation in the instrumental activity of everyday life (sink, stove, microwave, refrigerator, set of ergotherapeutic dishes, electric kettle).

At the final stage of the study, the list of necessary household equipment was studied and analyzed (Table 4).

The list of household equipment, which is designed to restore the daily skills of an independent quality life, is wide and includes the necessary means for effective rehabilitation treatment.

DISCUSSION

The requirements of a material and technical nature for the introduction of a package of guaranteed medical services "Comprehensive rehabilitation assistance to adults and children in stationary conditions" in health care institutions of Ukraine have been studied. According to the approved requirements, health care institutions should be provided with the following groups of equipment: equipment to ensure effective patient care, medical equipment, rehabilitation equipment and household equipment.

This study is original and conducted for the first time in Ukraine.

It should be noted that the problem of providing health care institutions with medical devices is extremely urgent. Researchers point out that the level of provision of health care institutions affects the quality and effectiveness of the treatment and diagnostic process as a whole [10, 11].

Taking into account the fact that recently the system of comprehensive rehabilitation in Ukraine has begun to actively develop and its development is defined at the legislative level, the problem of providing health care institutions in which rehabilitation assistance is provided with medical devices is becoming relevant for this sector of medical care to the population.

In the process of reforming the health care sector, the

issues of providing health care institutions of specialized and highly specialized medical care with medical equipment were raised at different levels of state and industry management with a positive solution to the problem [12]. The issue of providing medical products to rehabilitation care institutions was raised for the first time in Ukraine at the scientific-and-practical conference with international participation "Medical rehabilitation in Ukraine: current state and directions of development, problems and prospects", which was held in September 2022 [13].

Comparison of the required list of equipment in the package of medical guarantees with the National Classifier of Medical Devices, which was approved in 2019 by the Ministry of Economic Development of Ukraine [14], showed a certain inconsistency between them, which in the future will complicate the process of purchasing medical equipment by health care institutions to fulfill the terms of contracting between health care institutions and the National Health Service of Ukraine for comprehensive rehabilitation of patients.

In the future, it is planned to conduct comprehensive research to study the capabilities of the health care system of Ukraine to expand the list and volume of rehabilitation assistance to the population, as well as to ensure its availability.

CONCLUSIONS

The introduction of a guaranteed package of medical services "Comprehensive rehabilitation assistance to adults and children in stationary conditions" ensures the formation of a network of high-quality comprehensive rehabilitation institutions in the country.

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EFFECTIVENESS OF PREVENTIVE MEASURES IN THE INACTIVE COURSE OF CHRONIC PARENCHYMATIC MUMPS IN CHILDREN*

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SUMMARY

Aim: To study the effectiveness of preventive measures in the inactive course of chronic parenchymal mumps in remission.

Materials and Methods: In the dynamics of precautionary measures, aimed at preventing of exacerbation of chronic processes in the parotid glands, were examined 29 children aged from 2 months to 16 years with inactive mumps in remission and 10 control persons aged from 7 to 15 years.

Results: According to the assessment of the cellular composition of parotid secretion before anti-relapse measures in 9 patients out of 19, it was possible to detect the presence of latent chronic inflammation in symmetrical glands in the absence of classical clinical symptoms and clear secretion. After the completion of the treatment-and-prophylactic complex, the number of inflammatory cells and the degree of its contamination with microorganisms decreased significantly.

Conclusions: The study of the composition of parotid secretion with taking into account of the results of ultrasound examination and sialography in the dynamic monitoring of chronic parenchymal mumps indicate its high diagnostic informativeness and allows a rational approach to planning preventive measures. The methodological approach, which was developed and tested by us and which was used in the active course of mumps, showed its high efficiency and inactive form of the disease, for the first year of observation the number of exacerbations decreased by 10 times, and for 5 years term- by 16 times, which allowed to prolong the remission period and improve the rheological properties of parotid secretion.

KEY WORDS: children, chronic parenchymal mumps, prevention of exacerbations

INTRODUCTION

Large salivary glands are secretory-excretory structures that perform important and diverse functions, affect the general condition of the body, the activity of the digestive system and endocrine status. Age-related anatomical and physiological features of the child's body determine the need to study their morphological structure, clinical manifestations in various nosological forms of the pathological process directly in the salivary glands, and reactive changes in them in various diseases of the maxillofacial area and other anatomical localization. Usually, most often it is a chronic recurrent mumps, which occupies a leading position among all chronic forms of sialadenitis in children [1-4].

The variety and polymorphism of clinical manifestations of mumps often leads to errors at all stages of diagnosis. Therefore, a clear understanding of the characteristic symptoms, features of the disease and glandular function, changes in the amount of parotid secretion, its cellular composition, physicochemical and biochemical properties, the presence of organic disorders in the structural elements of the gland becomes important for correct diagnosis. It is possible to unify the diagnostic algorithm due to the

introduction into clinical practice of modern technologies and their use as special, highly informative research methods in the early stages of the survey [5-8].

Due to the controversial issue of the role of a variety of exogenous and endogenous etiological factors involved in the formation of chronic inflammation, the signs of which can be present in the initial clinical manifestations of mumps, this controversy remains far from resolved. Identification of numerous pathogenetic mechanisms involved in the exacerbation of the pathological process and maintenance of conditions to promote long-term remission, allows to determine the scope of treatment of both symptomatic and pathogenetic direction in all periods of chronic parenchymal mumps [9-11].

Despite the encouraging results obtained recently in the study of individual components of the pathogenesis of mumps, it is not always possible to timely predict the likelihood of exacerbation of disease or determine the duration of the stable remission phase of it. Moreover, the tactical approach to address these issues largely depends on the activity of the inflammatory process in the parotid gland, which determines the severity of functional and

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organic disorders at both local and general levels [12-14]. Early diagnosis plays a particularly important role in the effectiveness of treatment and prevention measures, which prevents significant progression of morphological changes in the future in the structural elements of the parenchyma and duct system, which determines the relevance of our work.

AIM

To study the effectiveness of preventive measures in the inactive course of chronic parenchymal mumps in remission.

MATERIALS AND METHODS

Scientific work was performed by summarizing of the results of 5 years' experience of anti-relapse measures in 29 children with inactive chronic parenchymal mumps, who are registered in the municipal enterprise "Children's City Clinical Dental Clinic of Poltava City Council", which is also the basic medical institution for the Department of Pediatric Surgical Dentistry. The age of patients ranged from 2 months to 16 years, and the control group consisted of 10 practically healthy individuals of primary and secondary school age (7-15 years). According to the International Classification of Diseases to Dentistry and Stomatology, based on the content of ICD-10, this disease is classified as Class 11 (K11).

At the first request for medical care for the diagnosis of recurrent mumps, general methods were used: survey, anamnesis of life and disease, palpation examination. Particular attention was paid to heredity, the nature of pregnancy and child development in the postnatal period, the presence of concomitant somatic diseases and clarified the cause that could provoke clinical manifestations of chronic pathological processes in the parotid glands.

Patients were also probed with the main excretory duct, visually determining the amount and nature of parotid secretion from which smears were made for further study of their cell composition after Romanowski-Giemsa staining. In order to detect structural changes in the anatomical structures of the salivary glands, ultrasound and sialography were performed in direct and lateral projections after the introduction of 76% solution of triombrast into the duct system. The parenchyma of the gland was fine-grained and had a homogeneous structure and a capsule of normal thickness in children of the control group.

To confirm the role of some strains of microorganisms in maintaining the periodic manifestation of the inflammatory process, their species affiliation and quantitative parameters were determined in accordance with the order of the Ministry of Health of Ukraine №236 from 04.04.2012 and recommendations of the European Association for Clinical Microbiology and Infectious Diseases.

Taking into account the final effectiveness of treatment and prevention measures was carried out on the basis of comparing the results of clinical and special research methods obtained in dynamic observation. Statistical processing of digital material was carried out.

RESULTS

Previous publications have highlighted issues related to the specifics of the effectiveness of anti-relapse measures

in the remission phase in the active course of chronic parenchymal mumps in children. The conducted studies clearly showed the high diagnostic informativeness of the study of the cellular composition of parotid secretion in the dynamics of observation, ultrasound diagnosis and sialography. The implementation of a prophylactic complex aimed at preventing exacerbations has significantly reduced the amount of exacerbations and the severity of inflammatory reactions in the parotid salivary gland and achieve longer remission period [14].

Encouraging results from previous studies have prompted us to continue working in this direction, but this has already applied to patients with inactive form of disease. To achieve this goal, a group of 29 patients was formed, who a month after treatment of the next exacerbation underwent an in-depth double examination – at the beginning and after the end of preventive measures. Bilateral parotid glands lesions with clinical manifestations were observed in 10 children (34.5%), and unilateral lesion were observed in 19 children (65.5%).

At the initial period, patients or their relatives had no complaints, but all patients experienced a salty taste in the mouth, especially before eating. Examination of patients did not reveal any visual changes, meanwhile, palpation revealed small foci of compaction within the anatomical location of individual lobes of the gland in 11 cases (37.9%). Enlargement of regional lymph nodes was found only in 9 children (31.0%). The oral mucosa was pale pink and well moisturized, and at the mouth of the duct of the gland there was a slight swelling and redness of the mucosa in 15 patients (51.7%) and in 11 cases (37.9%) there was a gaping duct. When massaging the parotid glands after dilatation of the duct with a salivary tube was obtained parotid secretion of sufficient quantity and normal viscosity in 7 children (21.1%), and in another 22 (75.9%) - the secretion was viscous and had single small whitish crumbs inclusion.

In the study of cell composition in cytograms of parotid secretion, which had whitish inclusions and was taken during the initial examination, in all 22 patients on a low-density protein substrate found a moderate number of scattered leukocytes, single lymphocytes, macrophages and coccal microflora (Figure 1).

During the study of the results of ultrasound diagnostics in all cases the compaction of the gland capsule was observed, and the parenchyma looked heterogeneous due to the alternation of single hypoechoic and echo-compacted areas (Figure 2). A few scattered, small sialectases were discovered on sialograms (Figure 3).

In 9 (47.3%) of 19 patients who did not have clinical manifestations of the disease in symmetrical glands, and their secretion was visually transparent, cytological examination of smears revealed the presence of a small number of inflammatory cells (Figure 4). The performed ultrasound examination revealed single, small and medium-sized sialectases in some lobes of the gland, around which the echo-dense parenchyma was visualized (Figure 5), and the presence of single small sialectases was found on sialograms (Figure 6).

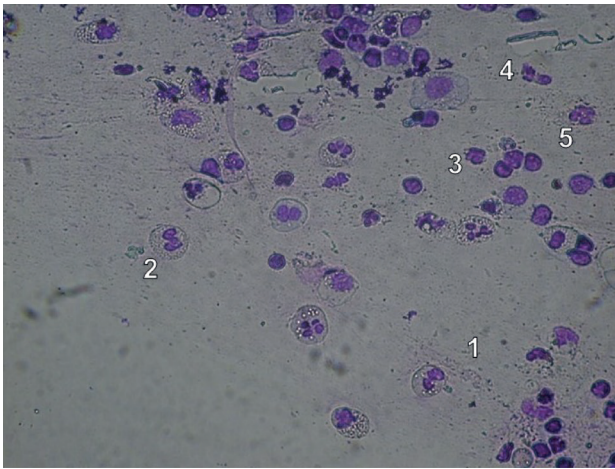


Figure 1. Micrograph of a smear of mumps secretion. On the background of low density protein substrate (1) a moderate number of destroyed forms of leukocytes (2), lymphocytes (3), single macrophages (4) and coccal microflora (5) is determined

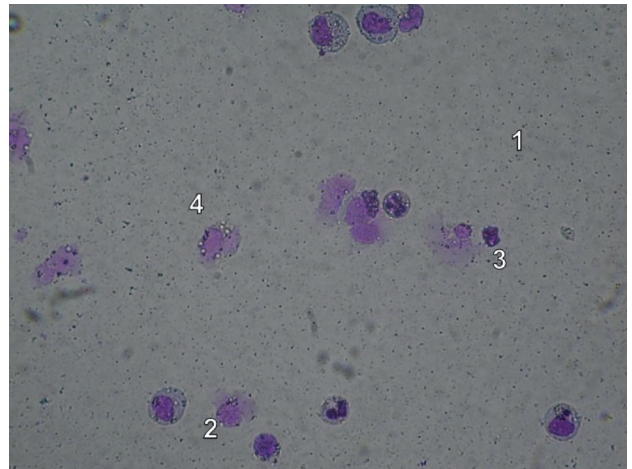


Figure 4. Micrograph of a smear of mumps secretion. On the background of mucus cells (1) a few, partially destroyed neutrophils (2), lymphocytes (3) and coccal microflora (4) is determined

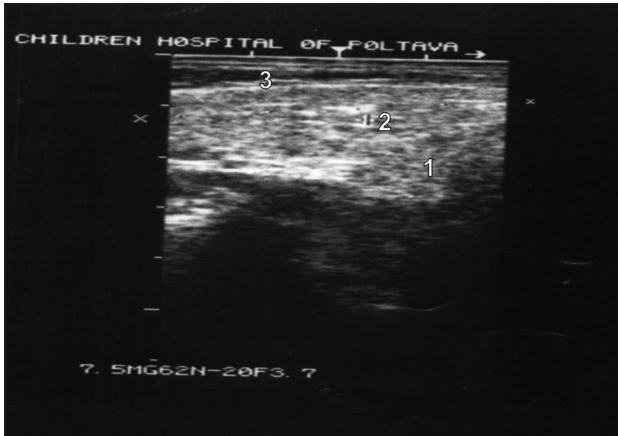


Figure 2. Ultrasound image of the right parotid gland. The image shows a small number of small, scattered sialectases (1), compaction of parenchymal tissues around them (2) and compaction of the gland capsule (3)

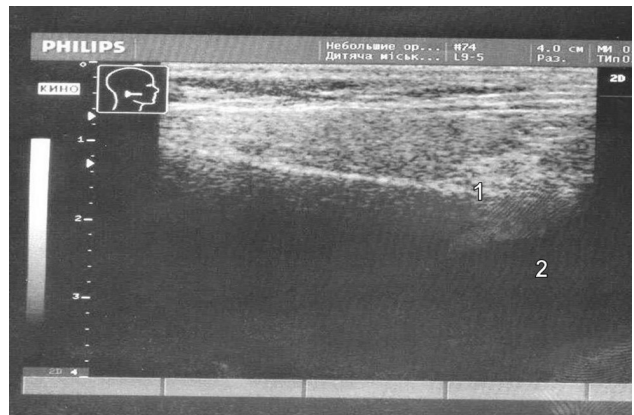


Figure 5. Ultrasound image of the right parotid gland. The image shows a single small sialectases (1) and compaction of parenchymal tissues (2)

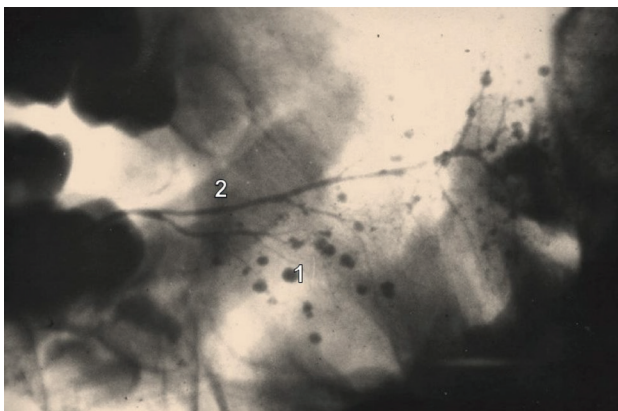


Figure 3. Sialogram of the left parotid gland in lateral projection. In some lobes of the gland, single small sialectases (1) and a slight expansion of the main excretory duct (2) are detected



Figure 6. Sialogram of the right parotid gland in lateral projection. In the parenchyma, single small sialectases (1) and uneven contours of the main duct (2) detected

Microbiological examination of 41 portions of parotid secretion, which was obtained from glands involved in chronic inflammation, revealed representatives of the coccal microflora in the amount from $5 \cdot 10^4$ to $5 \cdot 10^5$ per 1 ml of substrate. Streptococcal vegetation was determined in the analysis of secretion smears: in 8 cases (19.5%) hemolytic, and in 28 (68.3%) non-hemolytic and in 5 cases (12.2%) bacterial growth was not determined.

Given the fact that the proposed amount of treatment and prevention measures used in the treatment of active mumps showed good results, we tested its effectiveness in inactive form of disease.

At the time of completion of the prevention course, children and their relatives had no complaints. Visual examination of the face was symmetrical, and palpation revealed small single compacted areas of the parotid gland only in 3 children (10.3%). The oral mucosa was well moisturized in all children, edema around the mouth of the excretory duct was not found, and ductal yawning was observed in only 5 children (17.2%) with bilateral pathological process. After massaging of the parotid glands, in 21 children (72.4%) were received a clear secretion of normal viscosity, and only in 8 cases (27.6%) secretion had a slightly increased viscosity and included single small whitish flaky inclusions.

During the study of the cell composition of cytograms, it was found that in all patients whose secretions contained inclusions, and in 7 children (24.1%) whose secretions did not include inclusions, there was a low background field density and the presence of single, distinct destructive forms of neutrophils.

At the end of the treatment and prevention course, bacterial inclusions were isolated only from the parotid secretion of 23 glands, which is in 1.6 times less than in the first examination. Quantitative parameters of certain microorganisms in these smears has no significant differences in comparison with baseline level.

During the first year, with this approach to this category of patients, the number of exacerbations decreased by 10 times and in 5 years term – by 16 times. All children showed an improvement in the functional activity of the parotid salivary glands, and periodic exacerbations occurred with less pronounced clinical manifestations.

DISCUSSION

Chronic parenchymal mumps is a leader in all nosological forms of chronic sialadenitis, and it is characterized by a long course of the disease and frequent exacerbations, and therefore it requires significant efforts of doctors, material resources and financial costs. For the correct establishment or confirmation of the clinical diagnosis,

in addition to general methods of examination, special methods are widely used, including the study of the cellular composition of glandular secretions, ultrasound, sialography, conventional radiography. These measures allow for a detailed differential diagnosis, but their informativeness in the literature is still debated, because their importance depends on degree of the activity of the disease [5, 6, 11]. In particular, the study of the cellular composition of parotid secretion, which provides comprehensive information about the severity of the inflammatory process in the dynamics of observation and allows you to monitor the results of treatment, is not often used, especially during the period of remission [14]. In our opinion, it is necessary to use this method of examination more widely in everyday clinical practice in order to make a differential diagnosis of diseases of the large salivary glands of inflammatory nature, specific and nonspecific diseases of soft tissues of the maxillofacial area located in this anatomical area. The results of our work testify of the high informativeness of cytological examination of the cellular composition of parotid secretion, ultrasound examination and X-ray with artificial contrast of the structural elements of the parotid salivary glands. Recent methods allow to obtain high-quality images of both the duct system and parenchyma and to establish the severity of their organic disorders, which may be the key to forming a more targeted pathogenetic effect on the pathological process, determining the type and scope of treatment, which we recorded [6,14].

CONCLUSIONS

Evaluation of the effectiveness of a set of treatment and prevention measures in children with chronic parenchymal mumps should be based on the generalization of dynamic changes in the cellular composition of parotid secretion and its microbiological contamination. The severity of structural disorders in the anatomical components can be successfully established on the basis of ultrasound and sialographic picture. Planning and standardization of the treatment process should be based on functional criteria and structural disorders both in the duct system of the glands and directly in the parenchyma. With this methodological approach for the first year of observation the number of exacerbations decreased by 10 times, and for 5 years term – by 16 times, which is more pronounced than in the active course of the disease. It would be important to develop indications and contraindications to the use of more modern methods of examination, such as magnetic resonance imaging, sialography and endoscopy in order to detail the severity of duct deformities of various orders.

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1st National Scientific Conference

„COMPLEMENTARY DISCIPLINES OF PHYSIOTHERAPY” May 25-26, 2023

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The abstract prepared in Polish should contain from 150 to 250 words. In the case of research work, it should include: the purpose of the study, material and methods, results, conclusions and keywords. For reviews: description and keywords.

The submission* along with the abstract should be sent by e-mail by April 15, 2023.

The Scientific Committee will select the papers for presentation at the Conference.

Report card

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The conference is co-financed from the state budget under the program of the Minister of Education and Science under the name „Excellent Science”, project number DNK/SP/549325/2022 - the amount of funding 49,225.00 PLN, the total value of the project 67,525.00 PLN.

All registered participants are provided with conference materials, the opportunity to participate in workshops, two lunches and coffee breaks; additionally for active participants (speech, poster): dinner on May 25, 2023, overnight stay on May 25/26, 2023, breakfast on May 26, 2023.

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