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- Complex physiotherapy in the treatment of cervical pain in military men
- Assessment of long-term therapeutic adherence to lifestyle modification and the possibility of its correction in the program of rehabilitation and clinical management of obese patients
- Accessibility of rehabilitation services to the population of the mountainous geographical zone
- Evaluation of temporomandibular joint disorders in patients with systemic scleroderma after two years of rehabilitation
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Complex physiotherapy in the treatment of cervical pain in military men

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ABSTRACT

Aim: Study of the effectiveness of complex physiotherapeutic treatment of cervicgia in the MM of the AFU.

Materials and Methods: 45 male MM of the AFU aged 27–62 years, average age 42.3 ± 5.8 years, with pain in the cervical spine were examined. The effectiveness of drug and combined drug and complex physiotherapeutic treatment of cervical pain was evaluated according to the indicators of the NPAD scales, NDI and VAS.

Results: Cervicocranial pain (37.8%) and cervicobrachial pain (33.3%) prevailed in the structure of the pain syndrome in the MM of the AFU. Against the background of the treatment, a significant decrease in the severity of the pain syndrome and complaints was observed in a significant majority of patients. There was a statistically significant decrease in the intensity of the pain syndrome according to the VAS (from 6.8 ± 0.8 points to 5.2 ± 0.5 points in group 1, and from 6.2 ± 0.4 points to 4.8 ± 0.6 points in group 2). There was also a trend towards normalization of indicators on the NPAD scales (from 61.8 ± 3.6 points to 57.3 ± 4.1 points in group 1 and from 62.2 ± 4.1 points to 50.2 ± 3.8 points in group 2) and NDI (from 36.7 ± 3.2 points to 29.1 ± 4.3 points in group 1 and from 37.5 ± 3.8 points to 25.3 ± 3.2 points in the 2nd group).

Conclusions: 1. Cervical pain syndrome of the spine in MM of the AFU most often manifests itself in the form of cervicocranialgia and cervicobrachialgia. 2. Drug treatment of cervicgia demonstrates an effective reduction in pain intensity according to VAS, especially when combined with physiotherapeutic treatment. 3. Complex physiotherapeutic treatment in combination with drug therapy in MM of the AFU leads to regression of pain syndrome and improvement of quality of life and reduction of disability according to the diagnostic scales of NPAD and NDI.

KEY WORDS: cervicgia, physiotherapy, military men, VAS, NPAD, NDI

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INTRODUCTION

The issue of diagnosis and treatment of pain syndromes caused by spine pathology is one of the most common problems of modern medicine. This issue became extremely acute precisely in the conditions of wartime, when almost every second patient turns to the doctor with complaints of back pain [1].

Pain is a kind of feeling that arises as a result of strong irritations of the nervous system and is one of the most common diseases in the world. Estimates of the prevalence of vertebrogenic pain syndromes in Europe vary from 32.9% to 70% [2, 3].

Dorsalgia is pain and a feeling of muscle tension or stiffness in the back. May involve the cervical, thoracic, or lumbar spine and radiate along one or both upper extremities to the trunk or along one or both lower extremities. Dorsalgia can be: vertebrogenic, which is associated with spine pathology, and non-vertebrogenic, which is caused by stretching of muscles and ligaments, psychogenic factors, somatic diseases. The cause of dorsalgia can be intervertebral hernias, osteoporosis, scoliosis, a sedentary lifestyle or working in the wrong position, physical exertion and overstretching of the back muscles, hypothermia, back injuries, deficiency of group B vitamins, etc. [1].

Degenerative – dystrophic lesions of the cervical spine (CS) initiate motor and sensory disorders, neurological deficits, pain syndrome, etc. [4]. The latter is a medical problem, actuality which progressively in recent years grows: in ten years it's the frequency increased by 21% [5] and can reach 41% [6, 7].

Musculoskeletal and connective tissue disorders rank third in the incidence structure among the adult population of Ukraine with a steady upward trend [8]. Up to 350,000 cases of primary osteoarthritis are registered annually in Ukraine, of which more than 60% are of working age [8]. Primary disability due to diseases of the musculoskeletal system occupies the third place in the structure of primary disability of both the adult population (more than 11%) and the population of working age (13%) [9].

The incidence and prevalence of diseases of the musculoskeletal system increases with age [10]. Annually, 39 million people (0.5%) worldwide suffer from spondylolisthesis, 403 million (5.5%) people have symptomatic disc degeneration and 103 million (1.4%) people worldwide suffer from spinal canal stenosis [11].

In the case of degenerative-dystrophic changes in CS and in the clinical manifestation of the disease, complaints of varying degrees of pain prevail in patients. In fact,

a similar clinical picture affects more than half of the world's population, and its prevalence in industrialized countries is 60-80% [12].

Physiological cervical lordosis takes part in the process provides cushioning of the spine when walking and running processes chewing, breathing, vocalization, eye movements, etc. [13]. Its pathological deformation, especially at the level between segments C₅, C₆ and C₇, leads to significant clinical consequences: painful reflex phenomena disorders, paresis and paralysis upper and lower limbs [14, 15]. The above accompanied by a number of related diseases from violation blood supply to the brain, vegetative symptoms dysfunctions cervical and higher level [13, 16].

Back pain is currently one of the most common syndromes among military men (MM) of the Armed Forces of Ukraine (AFU). In the conditions of being at the front, back pain occurs in military personnel mostly as a result of increased physical load on the spine, in particular, as a result of wearing protective equipment. Almost half of the MM of the AFU, who sought neurological help for back pain, associated the occurrence of pain with wearing a body armor. This was especially true of men over 40 years of age, in whom the development of back pain syndrome is also associated with age-related changes in the body [3]. Among all cases of dorsalgia in the MM, cervical pain occupies a significant place not only due to its prevalence, but also due to the significant impact on the general condition of patients, in particular, on cerebral functions. The prevalence of cervical pain in the MM of the pain syndrome of the cervical spine requires the development of new methods of pain syndrome treatment.

AIM

Study of the effectiveness of complex physiotherapeutic treatment of cervicgia in the MM of the AFU.

MATERIALS AND METHODS

On the basis of the Center of Physiotherapy and Rehabilitation in Tyachiv, 45 men of the MM of the AFU aged 27-62 years, average age 42.3 ± 5.8 years, with pain in the cervical spine were examined. Inclusion criteria: cervicgia lasting more than 3 months, consent to participate in the study. Exclusion criteria: presence of malignant neoplasms, acute infectious, rheumatological and neurodegenerative diseases, heart failure, allergies, presence of indications for neurosurgical intervention.

All patients underwent a clinical and neurological examination and magnetic resonance imaging (MRI) of the cervical spine. Degenerative changes in the intervertebral discs (IVD), hypertrophy of the facet joints, stenosis of the spinal canal, herniated IVD and others were detected during MRI. Analysis of the intensity of the pain syndrome in dynamics was carried out according to the visual analog scale (VAS), as well as functional indicators according to the NPAD and NDI scales [17-19]. VAS is a horizontal line 10 cm long, anchored with word descriptors at each end (0: no pain, 10: most severe possible pain). Patients they ask paint vertical mark through the horizontal line, which is best,

reflects pain level VAS is widely used a tool evaluations with proven reliability and validity. The NPAD consists of 20 items divided into 4 dimensions; neck problems; pain intensity; emotions and cognition; and interference with life activities. The item score ranges from 0 (no pain or limitation of activity) to 5 (extreme pain or maximum limitation). The overall NPAD score ranges from 0 to 100 points. The NDI consists of ten items: pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleep and rest. Each item contains six different statements expressing a progressive level of pain or activity limitation. The item score ranges from 0 (no pain or limitation) to 5 (as much pain as possible or maximum limitation). The total NDI score ranges from 0 to 50 points.

All patients were treated according to the current clinical protocol "Guideline 00398. Pain in the neck and shoulder joint" [20]. In order to objectify the effect of physiotherapeutic treatment on the severity of the pain syndrome, all patients were divided into 2 groups. 1 group (24 patients) received treatment according to the clinical protocol (nonsteroidal anti-inflammatory drugs, muscle relaxants, B vitamins). Patients of the 2nd group (21 patients), in addition to treatment according to the protocol, received complex physiotherapy treatment (CPT) aimed at the cervical spine: stretching the spine (spinal traction device V5), electrophoresis with karipain (B-500 device), shockwave therapy (Shock Master-2500 shockwave therapy device), point myostimulation therapy (point myostimulation device Shaper); equipment manufactured by the Health Time company (Ukraine). The duration of one CPT session is 45 minutes. Volume of treatment: 10 sessions.

The research was carried out in compliance with modern bioethical requirements in accordance with the ethical standards of the Declaration of Helsinki (1975) with amendments of 2005, as well as the "Convention on the Protection of Human Rights and Dignity in the Application of Biology and Medicine: Convention on Human Rights and Biomedicine" [21] in agreement with the commission in bioethics of Odessa National Medical University.

Statistica 14 software (TIBCO, USA) [22]. Differences between indicators before and after treatment in both groups were considered statistically significant at a value of $p < 0.05$.

RESULTS

According to the MRI data of CS, IVD herniation were observed in 8 (17.8%) patients, protrusions – in 31 (68.9%), stenosis of the spinal canal – in 24 (53.3%), deforming spondyloarthrosis – in 35 (77.8%), spondylolisthesis – in 11 (24.4%), narrowing of the intervertebral openings – in 38 (84.4%), hypertrophy of the posterior longitudinal and yellow ligaments – in 26 (57.8%).

All patients complained of long-term neck pain, which had the character of cervicocranialgia in 17 (37.8%) patients, cervicobrachialgia in 15 (33.3%), cervicothoracalgia in 7 (15.6%), isolated cervicgia in 6 (13.3%). Intensity pain for VAS at the time of application was 6.4 ± 0.5 points. Scored by NPAD was 61.3 ± 4.8 points, for NDI – 37.2 ± 2.4 points.

Table 1. Indicators of the severity of the pain syndrome and functional status in patients with cervical pain in the background treatment.

| | NPAD (points) | | NDI (points) | | VAS (points) | |
|-----------------|---------------|----------------|---------------|----------------|--------------|----------------|
| | To | After | To | After | To | After |
| Group 1 n=24 | 61.8 ± 3.6 | 57.3 ± 4.1 | 36.7 ± 3.2 | 29.1 ± 4.3 | 6.8 ± 0.8 | 5.2 ± 0.5* |
| Group 2 n=21 | 62.2 ± 4.1 | 50.2 ± 3.8* | 37.5 ± 3.8 | 25.3 ± 3.2* | 6.2 ± 0.4 | 4.8 ± 0.6 * |

**p* < 0.05.

Main pain in cervicocranial pain more often localized in the occiput site (11 (64.7%) patients), less often had a diffuse nature (6 (35.3%) patients). Cephalgia mainly had average intensity, mainly in the second in the middle of the day, were accompanied soreness skin covers head during palpation, were associated with irritation pericranial muscles were provoked fatigue, psychophysical voltage

Dizziness was one of the leading clinical syndromes in the examined patients and occurred in 27 cases (60%). Also during the neurological examination, the following were recorded: increased tendon reflexes – in 33 patients (73.3%), numbness in the upper limbs – in 28 (62.2%), weakness in one or two upper limbs – in 9 (20%), muscle atrophy of varying severity – in 7 (15.6%), myalgic syndrome – in 7 (15.6%), fascicular twitching – in 2 (4.4%).

On the background of the treatment, improvement of the condition and reduction of severity of complaints was noted in 17 (70.9%) patients of the 1st group and in 18 (85.7%) patients of the 2nd group. All patients with cervicocranial pain experience regression or reduction in headache intensity. Symptoms of dizziness regressed in 19 of 27 patients (70.4%), symptoms of numbness in limbs in 22 of 28 patients (78.6%), weakness in limbs in 7 of 9 (77.8%).

The dynamics of indicators of the severity of the pain syndrome and functional status by clinical groups against the background of treatment is given in Table 1.

Improvement of indicators on all scales was observed in both clinical groups. According to the VAS scale, the severity of pain syndrome decreased from 6.8 ± 0.8 points to 5.2 ± 0.5 points (*p* < 0.05) in group 1, and from 6.2 ± 0.4 points to 4.8 ± 0.6 b (*p* < 0.05) in the 2nd group. A significant difference between groups was observed when analyzing NPAD and NDI indicators, which reflect the impact of pain syndrome on quality of life and disability. A decrease in indicators on both scales was observed in both clinical groups (from 61.8 ± 3.6 points to 57.3 ± 4.1 points in 1 group, from 62.2 ± 4.1 points to 50.2 ± 3.8 points (*p* < 0.05) in group 2 according to NPAD and from 36.7 ± 3.2 points to 29.1 ± 4.3 points in group 1, from 37.5 ± 3.8 points to 25.3 ± 3.2 points (*p* < 0.05) in the 2nd group according to NDI). The change in indicators on all three scales was statistically significant in patients of group 2.

DISCUSSION

Currently, there are a large number of different schemes for the treatment of pain syndromes of the cervical spine. The basis of most domestic schemes is a combination of massage with manual therapy [23], massage with physical exercises [24], massage with kinesiotherapy, physical exercises, electrotherapy [25]. At the same time, most English-language sources indicate the effectiveness of combining manual therapy with physical exercises [26-28]. The task of our research was to combine classic physiotherapeutic methods with the latest treatment technologies, as well as with methods of physical impact on the cervical spine and the muscular system. For the first time, we performed complex treatment with the simultaneous use of spinal traction, electrophoresis with karipain, shock wave therapy and myostimulation. The conducted study demonstrated the effectiveness of combining medical treatment of cervical pain according to protocols with complex physiotherapeutic treatment. The given scheme proved to be very effective for regression of pain syndrome, improvement of quality of life and reduction of the negative impact of degenerative-dystrophic changes of the cervical spine on work capacity. In our opinion, it is promising to develop new schemes for complex treatment of cervical pain, possibly with the addition of physical rehabilitation methods to drug therapy and physiotherapy.

CONCLUSIONS

1. Cervical pain syndrome of the spine in MM of the AFU most often manifests itself in the form of cervicocranialgia and cervicobrachialgia .
2. Drug treatment of cervicalgia demonstrates an effective reduction in pain intensity according to VAS, especially when combined with physiotherapeutic treatment.
3. Complex physiotherapeutic treatment in combination with drug therapy in MM of the AFU leads to regression of pain syndrome and improvement of quality of life and reduction of disability according to the diagnostic scales of NPAD and NDI.

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Assessment of long-term therapeutic adherence to lifestyle modification and the possibility of its correction in the program of rehabilitation and clinical management of obese patients

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ABSTRACT

Aim: To determine the long-term therapeutic adherence to lifestyle modification in the rehabilitation of obese patients, to formulate ways of its improvement, to test their effectiveness.

Materials and Methods: 288 people with degree I, II and III obesity were interviewed. After determining the starting level of long-term therapeutic adherence to lifestyle modification, an individual facilitating lecture-interview was conducted and a repeat survey was conducted. According to its results, patients were divided into groups with high therapeutic adherence (for rehabilitation measures to reduce body weight, maintain and improve the adherence) and with low therapeutic adherence (comparison group). After the implementation of the rehabilitation program, the level of therapeutic adherence was determined again.

Results: A low long-term therapeutic adherence to lifestyle modification is determined in patients with obesity of the I, II and III degree, which is established by the interview method. Measures to improve it lead to an increase in the patient's responsibility and the degree of compliance with the recommendations given by him, improves self-management, which is relevant in conditions of long-term weight loss and its maintenance at the achieved level, which is demonstrated by a statistically significant difference in the indicators the studied groups.

Conclusions: It is advisable to include measures to improve long-term therapeutic adherence to lifestyle modification to programs of rehabilitation of obese patients.

KEY WORDS: long-term adherence, lifestyle modification, obesity, rehabilitation

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INTRODUCTION

Obesity in the world has become an epidemic, which is defined as a serious problem of modern health care, associated with increased risks of morbidity, disability and mortality [1-3].

The modern approach to weight loss is based on the recognition of the chronic nature of obesity [3, 4]. The greatest effect of maintaining the achieved weight loss is observed in patients who comply with the following conditions: self-control of weight; adherence to a low-carbohydrate diet; daily physical activity [5, 6]. Methods that cause weight loss of more than 5 kg per month are undesirable, since a rapid decrease in leptin levels due to rapid weight loss will lead to a compensatory increase in food intake and repeated weight gain [2, 3]. Therefore, long-term strategies to modify body weight to prevent relapse are warranted.

However, in 95% of cases, patients do not manage to maintain the body weight achieved in the correction process for a long time; most patients return to their initial weight or exceed it [2, 4]. An important role in the development of relapses of the disease is played by the passive position of patients at the stage of stabilization of reduced body

weight, underestimation by specialists and patients of the personal factor in the process of obesity treatment and in the change of lifestyle in general [5-8].

Solving issues of insufficient long-term therapeutic adherence (LTA) is one of the urgent problems of modern medicine and rehabilitation, and is associated with long-term correction of chronic diseases. LTA is defined as a characteristic of the patient's treatment-related behaviour (for example, taking a drug, following a diet, changing lifestyle, visiting a medical institution, etc.), and its compliance with the recommendations of a medical professional [4, 7]. According to the conclusions of the World Health Organization, this is one of the main reasons for a decrease in the severity of the therapeutic effect, a significant increase in the probability of developing complications of the main disease, which leads to a decrease in the quality of life of patients and an increase in treatment costs [9]. The effectiveness of the patient's participation depends on his readiness for long-term treatment, proper motivation and possession of the skills necessary in the daily management of his disease [10, 11].

Therefore, strategies for the clinical management of obese patients are a long-term complex process, and the goal of rehabilitation should be not only weight loss under the

control of specialists, but also maintaining the achieved result for a long time independently. Insufficient coverage of the LTA to lifestyle modification problem and its solution determined the relevance of the presented research.

AIM

To determine the value of LTA to lifestyle modification (dietary changes, increasing the level of physical activity, etc.) in the process of rehabilitation and clinical management of obese patients, to formulate ways of its improvement, to test their effectiveness.

MATERIALS AND METHODS

288 people with alimentary exogenous obesity of the I-III degree aged 39.6 ± 1.4 took part in our study. According to the body mass index (BMI): I degree obesity – 65 women, 51 men; II degree obesity – 64 women, 43 men; III degree obesity – 43 women, 31 men. Criteria for inclusion in the research group: BMI more than 30 kg/m^2 , but not more than 45 kg/m^2 ; absence of exacerbation of chronic somatic pathology or decompensated condition at the time of the start of the study; informed consent regarding participation in the conducted research and processing of confidential information. Exclusion criteria from the study: symptomatic obesity; diagnosed type I diabetes; decompensated state of acute or chronic somatic pathology at the time of the start of the study; taking drugs for weight loss, correction of insulin resistance.

Participants answered three questions about determining the value of LTA to lifestyle modification:

- Assess the possibility of implementing the recommendations and following the methods for reducing body weight for a long time as of today» (the main question, the answer to which most fully characterized the level of the studied LTA);
- Assess the importance of long-term self-control of weight for yourself» (the answer characterizes the understanding of the reality of the duration of the weight loss process and the need for your active participation to achieve the result);
- Estimate your confidence in self-control of body weight over a long period of time» (the answer characterizes the reality of maintaining the achieved result).

The answer was provided in the format of a 10-point visual analog scale (VAS), where 0 points are minimal adherence, complete non-compliance with recommendations, 10 are maximum adherence, absolute adherence to recommendations. The value of LTA was assessed as low (less than 6 points), medium (6-8 points), high (9-10 points). The patient was considered sufficiently ready for lifestyle modification starting with an indicator of 6.5 points [12].

After the initial questioning, diagnosis and discussion of possible causes of low LTA were carried out, individual measures to increase its level and encouragement to undergo rehabilitation were offered. After an individual facilitating lecture-interview, repeated testing was conducted, according to the results of which the patients were divided into two groups: the basic group (BG) and the main group (MG).

The basic group (BG1, BG, BG3 according to the degree of obesity) was formed by patients with a low level of LTA that did not reach the minimum level (6.5 points), who did not undergo a rehabilitation program to reduce body weight, but were informed about the risks of obesity; familiar with the basic principles of hypocaloric nutrition and physical activity in obesity. The main group (according to the degree of obesity MG1, MG2, MG3) consisted of patients with a level of LTA sufficient to comply with the recommendations; they underwent a developed rehabilitation program during the year, which included the following components:

Reducing body weight by gradually developing a sustainable long-term stereotype of healthy eating (by optimizing caloric content, regime, nature of products) with the formation of the diet first by a specialist, then by forming and following it independently;

Increasing household and training physical activity (therapeutic exercises during training in the rehabilitation center, morning gymnastics, stretching, aerobic and anaerobic training in the format of telerehabilitation, independent classes);

Maintaining and improving the level of LTA, which is the basis for patients' compliance with developed recommendations for nutrition and physical activity;

Massage (lymphatic drainage of the largest areas of fat deposits, general, of the abdominal cavity) with the aim of accelerating the removal of stagnant fluid in the tissues, recovery after training, psycho-emotional and physical relaxation;

Psychological support (creating a positive mood during visits to the rehabilitation center and communication with medical specialists; improvement of the psycho-emotional state, behavioral psychocorrection, development of a conscious active attitude to the process of losing weight).

The first three months of movement classes and manual interventions with appropriate nutritional correction were conducted in the format of visits to the rehabilitation center. During the next six months, the classes were held in the format of telerehabilitation (therapeutic exercises, nutrition consultations, psychological support) with supervision in the rehabilitation center. The last three months of the program were devoted to consolidating the acquired skills in correcting and maintaining body weight as independently as possible, but with periodic counseling, help and supervision of a rehabilitation specialist to form a stable stereotype of normocaloric nutrition and regular physical activity. After the implementation of the rehabilitation program, the LTA level was re-determined.

The Bioethics Committee of Vasyl Stefanyk Precarpathian National University approved the use of the presented methods and research protocol.

The results were processed by means of mathematical statistics using the IBM SPSS Statistics program. The calculations included the measurement of the median value (Me), upper and lower quartiles (25%; 75%). The Mann-Whitney U-test was used to compare independent samples, and the Wilcoxon T-test was used for dependent samples, differences at $p < 0.05$ were considered statistically significant.

Table 1. Dynamics of components of LTA to lifestyle modification in obese patients under the influence of measures to improve it, Me (25%; 75%)

| Groups | The number of people in the group | Level of LTA at the time of the questionnaire (VAS, points) | | |
|---|-----------------------------------|---|--|--------------------------------------|
| | | Self-assessment of the potential for implementation (continuation of implementation) of weight loss recommendations | The importance of self-control of weight | Confidence in self-control of weight |
| I degree obesity | | | | |
| Initial examination (BG1+MG1) | n=116 | 5,11 (4,0; 7,0) | 7,06 (5,0; 9,0) | 6,00 (4,0; 7,0) |
| BG1 after the facilitated lecture-interview | n=60 | 6,15 (5,0; 7,0) | 8,15 (6,0; 10,0) ° | 6,22 (5,0; 7,0) |
| BG1 after one year | n=60 | 6,23 (4,0; 7,0) | 8,19 (6,0; 9,0) | 5,42 (3,0; 7,0) |
| MG1 after the facilitated lecture-interview | n=56 | 8,33 (6,0; 10,0) °* | 9,09 (7,0; 10,0) °* | 8,45 (7,0; 9,0) °* |
| MG1 after rehabilitation | n=56 | 9,06 (8,0; 10,0) °* | 9,52 (8,0; 10,0)* | 9,23 (8,0; 10,0) °* |
| II degree obesity | | | | |
| Initial examination (BG2+MG2) | n=98 | 4,52 (3,0; 6,0) | 6,47 (5,0; 8,0) | 4,61 (3,0; 7,0) |
| BG2 after the facilitated lecture-interview | n=57 | 5,53 (4,0; 7,0)° | 6,60 (5,0; 9,0) ° | 4,59 (3,0; 8,0) ° |
| BG2 after one year | n=57 | 6,45 (5,0; 8,0) • | 7,15 (5,0; 9,0) | 4,71 (2,0; 7,0) |
| MG2 after the facilitated lecture-interview | n=41 | 7,76 (6,00; 9,00) °* | 8,61 (7,00; 10,0) °* | 7,38 (5,00; 9,00) °* |
| MG2 after rehabilitation | n=41 | 9,12 (8,00; 10,0) °* | 9,32 (8,00; 10,00) °* | 8,62 (7,00; 10,0)* |
| III degree obesity | | | | |
| Initial examination (BG3+MG3) | n=74 | 3,69 (2,00; 5,00) | 6,21 (5,00; 8,00) | 1,42 (1,00; 3,00) |
| BG3 after the facilitated lecture-interview | n=47 | 5,63 (4,00; 7,00) ° | 7,32 (5,00; 9,00) ° | 3,57 (2,00; 5,00) ° |
| BG3 after one year | n=47 | 6,38 (5,00; 8,00) • | 8,52 (7,00; 9,00) • | 4,13 (2,00; 5,00) |
| MG3 after the facilitated lecture-interview | n=27 | 7,09 (6,00; 8,00) °* | 7,44 (6,00; 9,00) ° | 6,65 (5,00; 8,00) °* |
| MG3 after rehabilitation | n=27 | 8,09 (7,00; 9,00) °* | 9,16 (8,00; 10,00) • | 8,12 (7,00; 9,00) °* |

Note: ° statistically significant difference compared to the corresponding indicator before the facilitated lecture-interview for increasing LTA (p<0.05);

• – statistically significant difference in comparison with the corresponding initial indicator before the one-year period of observation / rehabilitation (p<0.05);

* – statistically significant difference compared to the corresponding BG indicator (p<0.05).

RESULTS

When determining the initial level of LTA during the self-assessment of the possibility of fulfilling the recommendation to reduce body weight, all obese patients found its level to be insufficient (less than 6.5 points) (Table 1), which confirmed the need for appropriate measures to increase the effectiveness of a long-term rehabilitation program. The magnitude of the possibility of fulfilling the given recommendations was the lowest in patients with III degree obesity. All patients noted the importance of weight self-control at a fairly high level. At the same time, sufficient confidence in self-control was not determined in any of the groups; the rate of patients with III degree obesity was especially critical.

After analyzing personal experience, data from the literature, and factors that the World Health Organization defines as affecting LTA, we recommend following recommendations:

Conducting motivational and explanatory conversations not only with obese patients, but also with their families (environmental factors according to the biopsychosocial model);

Determination of short- and long-term goals of rehabilitation in the SMART format, their achievement and dynamic correction;

Identification and elimination of unpleasant sensations that can cause premature exit from the obesity program (hunger, fatigue, depression, lack of psychological support);

Individual determination of factors that could cause the termination of the implementation of the given recommendations and exit from the program, their facilitation;

Training in methods of self-monitoring (body weight, blood pressure, respiratory rate, levels of fatigue according to the Borg scale, subjective indicators of deterioration of the condition; use of mobile applications for controlling the determination of caloric intake and physical activity trackers) and self-reporting (electronic diary of nutrition and physical activity);

Adapting the principles of nutrition and physical activity regimes to the patient's work and rest regime; creation of a program of individual training in video format;

Use of telemedicine tools (consultation, correction of the rehabilitation program, transfer of self-monitoring

indicators, answers to questions, correspondence using mobile applications and social networks, online video communication and video conferences);

Creation of a diet according to the target caloric content, but with a specific selection of products according to the patient's dietary preferences and financial capabilities;

Forming a schedule of personal visits to the rehabilitation facility for intermediate control and correction of the program at least once a month;

Emphasizing the positive changes achieved in the rehabilitation process, improvement of well-being, appearance, mood, state of health, expansion of the body's functional reserves.

Analysis of LTA levels after a one-year observation period (base groups) and practical implementation of the program (main groups) showed that patients in the main groups had a statistically significant improvement in the level of compliance with the given recommendations and would potentially continue to follow them independently to achieve the target body weight (MG2 and MG3) or support of the obtained result (MG1) (Table I). Among BG patients, representatives of BG2 and BG3 showed a statistically significant improvement in the potential implementation of recommendations, but only persons with III degree obesity reached the minimum level characterizing their actual implementation (6.5 points). The importance of awareness of self-control of weight in the dynamics has also increased, especially in persons with II-III degrees of obesity. Confidence in self-control of the mass was found at a high level by representatives of MG1, at an average level by MG2 and MG3. Among BG representatives, this parameter remained at a low level.

DISCUSSION

Despite weight reduction methods proven by numerous studies (creating a caloric deficit between intake and expenditure) [7, 8], the prevalence of this disease is increasing, therefore, there are certain factors that complicate the course

of corrective interventions and limit their effectiveness. We believe that one such important factor is LTA before lifestyle modification. If the problem of therapeutic adherence with an emphasis on medication is given some attention [8, 9], the problem of rehabilitation adherence remains understudied [11], in particular, regarding the needs of obese patients [3, 4].

The distribution of obese patients by LTA levels is a reasonable point of diagnosis of the patient's condition on the way to body weight correction, which can be carried out by various specialists in the field of rehabilitation. Early detection of a group of patients who, after conducting initial measures, did not show a sufficient level of consent for carrying out measures possible within the framework of the rehabilitation program, allows, on the one hand, to save the resources of the specialist and the rehabilitation institution, and on the other hand, to initially diagnose potential persons who need highly specialized measures (psychological interventions, drug treatment, bariatric surgical treatment). The result obtained in the course of the research shows that simply informing patients about the risks and consequences of obesity, methods of its correction, without active measures to overcome low LTA, is ineffective from the point of view of compliance with the given recommendations, therefore, the presented approach is appropriate for use in rehabilitation practice.

CONCLUSIONS

In patients with obesity of the I-III degree, a low degree of therapeutic adherence to long-term lifestyle modification is determined, which can be determined by the interview method. In clinical management and rehabilitation programs for obese patients, it is advisable to include measures to improve therapeutic adherence, which leads to an increase in the patient's responsibility and degree of compliance with the recommendations given by him, improves self-management, which is relevant in conditions of long-term weight loss and its maintenance at the achieved level.

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Interrelation of students' motor activity and physical state as a basis for determining individual health-improving motor regimen

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ABSTRACT

Aim: To investigate the interrelation between motor activity and the physical state of students.

Materials and Methods: The research, which was conducted in 2023–2024, involved 168 students (86 girls and 82 boys) aged 17–18. The following indicators were studied: motor activity indicator according to the Framingham method, body mass index, Ruffier index, body balance index using the Romberg test, speed index, indicator of speed and strength abilities, agility indicator, strength indicator, strength endurance indicator, flexibility indicator, endurance indicator.

Results: The dependence of morphological and functional indicators and indicators of physical development of the student's body on the level of weekly motor activity, including the amount of time spent directly on physical exercises, has been established. It has been found that the Ruffier index has the strongest correlation relationship with motor activity, and therefore can be considered an informative indicator of the physical state of young people.

Conclusions: The interrelation of a high level of students' motor activity with the level of physical state as well as morphological and functional indicators of their body development has been established. The identified correlation relationships can form the basis for planning the nature and direction of the content of motor loads in the process of students' physical exercises by gender.

KEY WORDS: motor activity, students, physical state, physical development, morphological and functional indicators

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INTRODUCTION

The level of health and motor activity of young people as components of their physical state are among the most important criteria for assessing the development potential of modern society and indicators of the cultural character formedness in the individual. Harmonious personality development is ensured by adequate motor activity, which is one of the main factors determining the level of health of the population. Insufficient motor activity reduces the possibility of maintaining health, is a factor in the emergence and development of somatic diseases, and causes a low level of students' motor abilities [1, 2]. The ineffective modern organization of physical education in higher educational institutions leads to a decrease in motivation to exercise and, as a result, a decrease in the motor activity of students. These problems are the object of constant attention of many scientists [3].

The analysis of scientific research in pedagogical and biomedical fields shows that most scientists focus on the general problems of motor activity of the population, its importance for the full physical development and health of children and youth, its quantitative age norms, and

qualitative content [4]. According to the WHO, the weekly norm of motor activity for a person aged 17 to 64 should be at least 150 minutes of moderate-intensity aerobic physical loads, or at least 75 minutes of high-intensity aerobic physical loads, or an equivalent combination of moderate and high-intensity motor activities [5]. According to the scientists, a person should take an average of 10,000 steps per day [6]. However, these norms of motor activity are average and do not take into account the age and individual characteristics of those who exercise. Given that the norm of motor activity of modern youth is considered to be a value that fully satisfies the biological needs for movement and is adequate to the functional capabilities of the body, health status, and motor abilities of those who exercise, one of the prerequisites for determining an individual norm is to determine the interrelation between motor activity and the physical state of student youth.

AIM

The aim is to investigate the interrelation between motor activity and the physical state of students.

MATERIALS AND METHODS

Students aged 17-18 from Ukrainian State Dragomanov University, Drohobych Ivan Franko State Pedagogical University, and Berdyansk State Pedagogical University, totaling 168 people (86 girls and 82 boys) were involved in the research.

Research methods: theoretical analysis and generalization of literary sources, medical and biological methods, and correlation analysis. The theoretical analysis and generalization of literary sources were used to investigate the current state of the problem under study and to systematize and generalize the information obtained as a result of the research. 20 sources from the scientometric databases PubMed, Scopus, Web of Science Core Collection, and others were analyzed. Medical and biological methods were used to determine the morphological and functional as well as physical development indicators of students. The following indicators were studied: motor activity indicator according to the Framingham method (high level, hours per week); body mass index, which characterizes the features of a person's physique and allows to assess physical development (kg/m); Ruffier index to assess the functional state of the cardiovascular system of students (points); body balance index using the Romberg test (s); speed index for overcoming a distance of 30 m (s); indicator of speed and strength abilities based on the results of a long jump from a standing position (cm), agility indicator by results of 4x9 m shuttle run (s), strength abilities indicator based on the following tests: for girls – push-ups (times), for boys – pull-ups (times), strength endurance indicator in lifting the torso to the sitting position for 1 min (times); flexibility indicator in tilting the torso forward from the sitting position (cm), endurance indicator based on the results of 12 min of distance swimming (m). Statistical

methods made it possible to determine the interrelation between the level of motor activity and indicators of students' physical state. For this purpose, the linear Pearson correlation coefficient was used.

The process of conducting this research is based on the relevant ethical rules. First of all, this research complies with the provisions of the Declaration of Helsinki of the World Medical Association. In addition, our research received the consent of the Ethical Committees of the Ukrainian State Dragomanov University, Drohobych Ivan Franko State Pedagogical University, and Berdyansk State Pedagogical University. After that, the participants were informed about the aim and objectives of the research. They were also informed that participation in the research was voluntary, and they had the right to withdraw at any time.

RESULTS

To study the interrelation between the level of motor activity and indicators of the physical state of students' organism, a linear correlation analysis was conducted using the Pearson method, which established the existence of a dependence of the level of indicators of the physical state of students aged 17-18 on the level of their motor activity. At the same time, only the volume of its high level, i.e. the time directly spent on physical exercises, was considered as an indicator of motor activity.

During the correlation analysis in girls, a direct interrelation between motor activity and the following indicators of physical state was established: endurance indicator ($r = 0.60$ at $p \leq 0.05$), arm strength indicator ($r = 0.64$ at $p \leq 0.05$), strength endurance indicator ($r = 0.65$ at $p \leq 0.05$), speed and strength qualities ($r = 0.45$ at $p \leq 0.05$), and balance ($r = 0.52$ at $p \leq 0.05$). Also the inverse correlation coefficients between the level of motor activity and the Ruffier index ($r = -0.79$ at $p \leq 0.05$) were established in girls (Fig. 1).

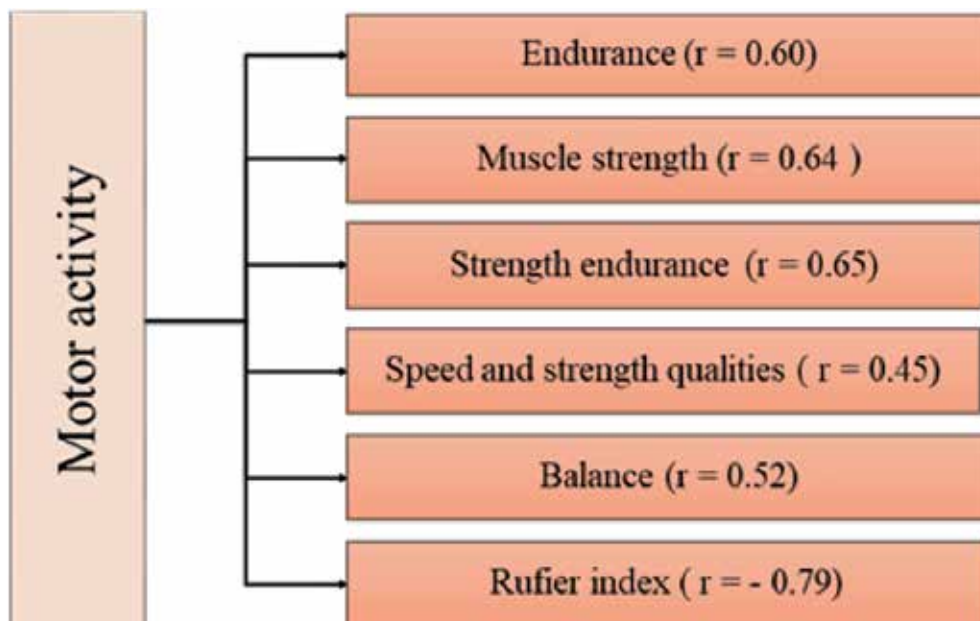


Fig. 1. Dependence of indicators of the physical state of 17-18-year-old female students on the amount of weekly motor activity.

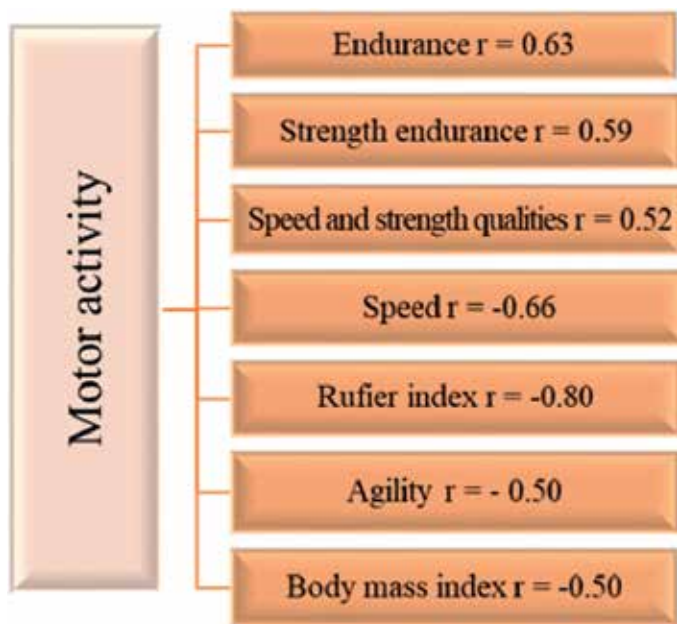


Fig. 2. Dependence of indicators of the physical state of 17-18-year-old male students on the amount of weekly motor activity.

At the same time, it was found out that the level of motor activity in boys has correlation relationships with indicators of endurance ($r = 0.63$ at $p \leq 0.05$), strength endurance ($r = 0.59$ at $p < 0.05$), speed and strength qualities ($r = 0.52$ at $p \leq 0.05$). The inverse correlation coefficients between motor activity and indicators of speed ($r = -0.66$ at $p \leq 0.05$), Rufier index ($r = -0.80$ at $p \leq 0.05$), agility ($r = -0.50$ at $p \leq 0.05$), and body mass index ($r = -0.50$ at $p \leq 0.05$) were established (Fig. 2).

The study found that the Rufier index, which characterizes the level of functional reserve of the heart and the body's adaptation to physical loads, has the strongest correlation relationship of all the parameters studied with the level of motor activity of students (girls and boys) aged 17-18. Given this, the level of Rufier index can be the basis for determining the individual level of students' weekly motor activity. Other correlation relationships between the level of motor activity and the physical state of students can form the basis for planning the nature and focus of the content of motor activity in the process of physical education by gender.

DISCUSSION

The analysis of scientific works [7] indicates that almost 60 % of the population lead a sedentary lifestyle and have a low level of motor activity under physiological norms. Recently, there has been a downward trend in the health indicators of student youth, which is due to the discrepancy between the amount of their motor activity and the biological needs of the body. This is one of the main reasons for the disruption of the musculoskeletal system, a decrease in the functional resources of the body, the emergence of somatic disorders, a slowdown in metabolic processes, and a deterioration in the psycho-emotional state. Analyzing the state of health of students, several authors emphasize

the problem of deterioration of their physical state [8]. Scientists define physical state as the compliance of the body's vital signs with age and sex norms. One of the most important factors in improving the physical state of students is their dynamic motor activity, the volume and intensity of which corresponds to the individual capabilities of those who are engaged. Scientists [9] argue that the physical state of modern youth depends on the lifestyle and proper organization of motor activity by almost 50 %. After all, motor activity is an important component of everyone's life, which contributes to a healthy lifestyle and has a positive impact on the overall level of well-being, disease prevention, reducing the impact of bad habits on the body, the number of antisocial manifestations, and depression [7]. According to scientists [10], a decrease in the amount of motor activity of students negatively affects their physical development, physical fitness, and functional state, which makes it especially important to preserve and improve the health of student youth.

According to experts [11], a certain "dose" of motor activity is necessary for the normal functioning of the human body and the preservation of health. There is a certain optimal level of motor activity that has the most favorable effect. It is noted that the optimal load is individual. It should take into account the peculiarities of life-sustaining activity, physical state, and individual capabilities [12]. The norm of motor activity of students of higher educational institutions can be considered a value that fully satisfies the biological needs for movement, meets the functional capabilities of the body, and promotes its development, physical fitness, and health. In the scientific literature and physical education programs, the optimal amount of motor activity for students is 12-14 hours per week with sufficient physiological load [13]. At the same time, the analysis of scientific works [14] shows that the norm of motor activity of

students is up to 8-10 hours per week. Studies [15] indicate that only 18 % of students adhere to the recommended amount of motor activity. Scientists [16] note that 32.4 % of girls and 38.5 % of boys have a minimum amount of weekly motor activity among students. Studies [2] have found that 2 hours of weekly motor activity do not have an effective impact on the health and physical fitness of modern youth. To improve physical state, the optimal amount of motor activity is 6-10 hours per week.

The standards of motor fitness, the implementation of which is conditioned by the optimal and economical level of functioning of the main body systems (cardiovascular, respiratory, neuromuscular), as well as metabolic processes, correspond to a high level of physical state. To achieve this, it is necessary to develop an individual regimen of specially organized motor activity [17]. An optimal motor regimen is the most important condition for a healthy lifestyle. It is based on systematic physical exercises; their main tasks are to strengthen and preserve health, develop physical abilities, and motor skills of young people, and strengthen the prevention of adverse age-related changes [18].

An individually selected motor regimen that involves rational planning of the amount and intensity of physical loads can not only improve physical state indicators, but also effectively resist the endless flow of stress, anxiety, and depression that are characteristic of the present time. Exercise can act as a kind of protective barrier that reduces tension and stress in everyday life, and has a positive effect on improving mood and the overall physical and psychological state of a person [19]. The age aspect is important when determining a motor regimen aimed at improving physical state. Each age period has certain features: the nature of metabolism; the predominant type of autonomic nervous regulation; the speed of inclusion

in the load and recovery after it; features of the immune system functioning; mental status; dominant needs and interests [20].

An individual motor regimen should be based on expediency and health benefits, so it is necessary to focus on the indicators that most closely correlate with the level of motor activity. It is important not only to know how much you need to move and perform locomotion during the week but also what kind of exercises to do and what level of physical state you need to achieve. This requires determining the focus of exercise and the parameters of physical loads.

CONCLUSIONS

In the course of the research, the dependence of the level of morphological and functional indicators and indicators of physical development of 17-18-year-old students on the amount of their motor activity has been established. It has been determined that the Rufier index, which characterizes the level of functional reserve of the heart and the body's adaptation to physical loads, has the strongest correlation relationship with the level of motor activity of girls and boys aged 17-18 years of all studied parameters. Given this, the level of the Rufier index can be the basis for determining the individual level of weekly motor activity of students. Other correlation relationships between the level of motor activity and motor performance of students can form the basis for planning the nature and focus of the content of motor activity in the process of physical education by gender.

Prospects for further research are in the development of a methodology for determining the individual motor regimen of students aged 17-18 in the process of their physical education.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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ORIGINAL ARTICLE

Accessibility of rehabilitation services to the population of the mountainous geographical zone of Transcarpathian Region

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ABSTRACT

Aim: To study the level of accessibility of rehabilitation services for the population of the mountainous geographical zone of residence in Transcarpathian region.

Materials and Methods: results of a sociological survey among 136 people with special needs (disabled) and 268 people with chronic diseases living in the mountainous geographical zone of Transcarpathian region. Methods: bibliosemantic, medico-statistical, of systemic approach and of structural-and-logical analysis.

Results: The level of permanent territorial accessibility of rehabilitation services was 7.8% for rural residents with special needs, and 69.0% for urban residents. For this category of the population, the level of economic accessibility of these services was 16.9% and 26.8%. The level of permanent territorial accessibility of rehabilitation services was 13.4% for rural residents with chronic diseases, and 24.6% for urban residents. For this category of the population, the economic accessibility of these services was 27.5% and 45.2%.

Conclusions: A low level of territorial and economic accessibility of rehabilitation services for the population of the mountainous geographical zone of residence with a lower level of accessibility for the population of rural areas than the population of cities has been established. The results of the study should be taken into account when reforming the health care system of the region.

KEY WORDS: rehabilitation services, mountainous geographical zone, population, accessibility

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INTRODUCTION

At present, the system of rehabilitation assistance organization is actively developing in Ukraine. The development of the rehabilitation care system is defined at the legislative level [1-3].

It should be noted that the organization of rehabilitation assistance to the population of the mountainous geographical zone of residence has its own characteristics, which include the following. Problems related to living conditions: settlements of the mountainous geographical zone are far removed from cities and district centers in which health care institutions of specialized medical care are located [4]. Problems associated with irregular transport links between remote settlements and other settlements, especially in winter, spring and autumn periods, when existing roads are impassable or conditionally passable [5].

This determined the relevance of this study.

AIM

The aim was to study the level of accessibility of rehabilitation services for the population of the mountainous geographical zone of residence in Transcarpathian region.

MATERIALS AND METHODS

MATERIALS

Results of a sociological survey among 136 people with special needs (disabled) and 268 people with chronic diseases living in the mountainous geographical zone

of Transcarpathian region. Data on respondents are presented in Table 1. The survey was conducted according to a specially designed questionnaire. The level of accessibility of rehabilitation services for residents of cities and rural areas of the mountainous geographical zone of residence was studied. In the course of the study, the confidentiality of information about respondents was preserved.

METHODS

Bibliosemantic, medico-statistical, of systemic approach and of structural-and-logical analysis.

RESULTS

At the beginning of the study we learned the level of provision of rehabilitation programs and their implementation. The obtained results are shown in Table 2.

The analysis of the data given in Table 2 indicates the following:

People with special needs: individual rehabilitation programs are developed and approved for all persons who undergo a medical and social examination at Medical and Social Expert Commission, with which 49.3% of the surveyed persons from rural areas and 74.0% of urban residents are familiar in detail; rehabilitation programs are not implemented in 41.5% of cases of disabled people from rural areas and 40.9% of disabled people living in cities. At the same time, it is necessary to point out the low level of participation of family doctors in providing rehabilitation of persons with special needs both in rural areas (12.3%) and in cities (26.8%);

Table 1. Characteristics of respondents

| Indicator | Urban residents | | Rural residents | |
|--|-----------------|------|-----------------|------|
| | Abs. | % | Abs. | % |
| Total | 197 | 100 | 207 | 100 |
| People with special needs | 71 | 36,3 | 65 | 31,4 |
| People with chronic diseases of the motor system | 65 | 33,0 | 59 | 28,5 |
| People who have suffered a cerebral stroke | 15 | 7,6 | 29 | 14,0 |
| People who have suffered a myocardial infarction | 27 | 13,7 | 31 | 15,0 |
| People after sustained injuries | 19 | 9,4 | 23 | 11,1 |

Table 2. The level of provision of rehabilitation programs and their implementation

| Indicator | Rural residents | | Urban residents | |
|---|-----------------|------|-----------------|-------|
| | Abs. | % | Abs. | % |
| People with special needs | | | | |
| In course of Medical and Social Expert Commission check-up, a rehabilitation program was approved | 65 | 100 | 71 | 100,0 |
| Familiar with the rehabilitation program | 32 | 49,3 | 53 | 74,0 |
| Not interested in the rehabilitation program | 9 | 13,8 | 7 | 9,8 |
| Not familiar with the rehabilitation program | 24 | 36,9 | 11 | 15,5 |
| The family doctor is familiar with this program | 19 | 29,2 | 37 | 52,1 |
| The family doctor monitors the implementation of the program | 8 | 12,3 | 19 | 26,8 |
| The program is fully implemented | 12 | 18,5 | 20 | 28,2 |
| The program is implemented partially | 26 | 40,0 | 22 | 30,9 |
| The program is not implemented | 27 | 41,5 | 29 | 40,9 |
| Patient underwent a health resort rehabilitation course | 9 | 13,8 | 18 | 25,3 |
| People with chronic diseases | | | | |
| During the last inpatient treatment, the patient received rehabilitation services | 52 | 36,6 | 69 | 54,8 |
| At the time of discharge after inpatient treatment, rehabilitation course was recommended | 62 | 43,7 | 74 | 58,7 |
| The family doctor recommends rehabilitation measures | 41 | 28,8 | 35 | 33,7 |
| The patient underwent a course of outpatient rehabilitation | 39 | 27,5 | 48 | 38,1 |
| The patient underwent health resort rehabilitation course | 17 | 11,9 | 23 | 21,7 |

People with chronic diseases: according to evidence-based management, the level of coverage of persons with certain chronic diseases by rehabilitation services both during inpatient treatment and in outpatient settings is low; 11.9% of respondents from rural areas and 21.7% of city residents are covered by health resort treatment. At the same time, family doctors pay insufficient attention to the rehabilitation of people with chronic diseases both in rural areas (28.8%) and in cities (33.7%).

The next step of the research was to study and analyse the level of awareness of the impact of rehabilitation on maintaining and strengthening health and the possibility of receiving rehabilitation services. The obtained results are shown in the Table 3.

The analysis of the data presented in Table 3 indicates the following:

People with special needs: persons with special needs living in rural areas (89.2%) and urban residents (91.5%) are sufficiently informed about the need for rehabilitation and the impact of rehabilitation on their health (56.9% and 77.5%, respectively). More than 50.0% of urban residents are informed about the conditions for receiving and the cost of rehabilitation services. At the same time, in less than 20.0% of cases, rural residents are informed about the conditions for obtaining and the cost of rehabilitation services;

People with chronic diseases: persons with chronic diseases living in rural areas (41.5%) and residents of cities (69.8%) are

Table 3. The level of awareness of the impact of rehabilitation on maintaining and strengthening health and the possibility of receiving rehabilitation services

| Indicator | Rural residents | | Urban residents | |
|--|-----------------|------|-----------------|------|
| | abc | % | abc | % |
| People with special needs | | | | |
| About the need for rehabilitation | 58 | 89,2 | 65 | 91,5 |
| About the impact of rehabilitation on health | 37 | 56,9 | 55 | 77,5 |
| It is possible to receive rehabilitation services in state (communal) health care facilities | 9 | 13,8 | 19 | 26,8 |
| It is possible to receive rehabilitation services in private health care facilities | 11 | 16,9 | 48 | 67,6 |
| Conditions of receiving rehabilitation services | 11 | 16,9 | 42 | 59,1 |
| The cost of rehabilitation services | 10 | 15,4 | 42 | 59,1 |
| Not sure about the answer | 7 | 10,8 | 6 | 8,5 |
| People with chronic diseases | | | | |
| About the need for rehabilitation | 59 | 41,5 | 88 | 69,8 |
| About the impact of rehabilitation on health | 48 | 33,8 | 74 | 58,7 |
| It is possible to receive rehabilitation services in state (communal) health care facilities | 21 | 14,8 | 48 | 38,1 |
| It is possible to receive rehabilitation services in private health care facilities | 34 | 23,9 | 62 | 49,2 |
| Conditions of receiving rehabilitation services | 18 | 12,7 | 53 | 42,1 |
| The cost of rehabilitation services | 18 | 12,7 | 50 | 39,7 |
| Not sure about the answer | 83 | 58,5 | 38 | 30,2 |

Table 4. The level of availability of rehabilitation services for the population of Transcarpathian region of the mountainous geographical area of residence

| Indicator | Rural residents | | Urban residents | |
|--|-----------------|------|-----------------|------|
| | Abs. | % | Abs. | % |
| People with special needs | | | | |
| Rehabilitation services are always available territorially | 5 | 7,8 | 49 | 69,0 |
| Rehabilitation services are available territorially only during a certain period of the year | 29 | 44,5 | - | - |
| Rehabilitation services are conditionally available territorially | 6 | 9,2 | 2 | 2,8 |
| Rehabilitation services are not available territorially | 8 | 12,3 | 9 | 12,7 |
| Not sure about the answer | 17 | 26,2 | 11 | 15,5 |
| The payment rate for rehabilitation services is affordable | 11 | 16,9 | 19 | 26,8 |
| The payment rate for rehabilitation services is conditionally available | 15 | 23,1 | 20 | 28,2 |
| The payment rate for rehabilitation services is not available | 20 | 4,6 | 15 | 21,1 |
| Not sure about the answer | 19 | 29,2 | 17 | 23,9 |
| People with chronic diseases | | | | |
| Rehabilitation services are always available territorially | 19 | 13,4 | 31 | 24,6 |
| Rehabilitation services are available territorially only during a certain period of the year | 42 | 29,6 | 25 | 19,8 |
| Rehabilitation services are conditionally available territorially | 31 | 21,8 | 39 | 31,0 |
| Rehabilitation services are not available territorially | 27 | 19,0 | 14 | 11,1 |
| Not sure about the answer | 23 | 16,2 | 17 | 13,5 |
| The payment rate for rehabilitation services is affordable | 39 | 27,5 | 57 | 45,2 |
| The payment rate for rehabilitation services is conditionally available | 39 | 27,5 | 31 | 24,6 |
| The payment rate for rehabilitation services is not available | 37 | 26,0 | 16 | 12,7 |
| Not sure about the answer | 27 | 19,0 | 22 | 17,5 |

Table 5. The level of assessment of the impact of rehabilitation on the state of health

| Indicator | Rural residents | | Urban residents | |
|--|-----------------|------|-----------------|------|
| | Abs. | % | Abs. | % |
| People with special needs (p-38, p-42) | | | | |
| Significant improvement | 17 | 44,7 | 11 | 26,1 |
| Improvement | 8 | 21,1 | 12 | 28,6 |
| No changes | 7 | 18,4 | 10 | 23,8 |
| Deterioration | 3 | 7,9 | 2 | 4,8 |
| Undecided | 3 | 7,9 | 7 | 16,7 |
| People with chronic diseases (p-52, p-69) | | | | |
| Significant improvement | 11 | 21,1 | 8 | 11,6 |
| Improvement | 13 | 25,0 | 35 | 50,8 |
| No changes | 13 | 25,0 | 12 | 17,4 |
| Deterioration | 7 | 13,5 | 9 | 13,0 |
| Undecided | 8 | 15,4 | 5 | 7,2 |

also sufficiently informed about the need for rehabilitation and the impact of rehabilitation on their health (33.8% and 58.7 % respectively). At the same time, a low level of awareness of urban residents about the conditions and cost of rehabilitation services was revealed (42.1% and 39.7%) and an extremely low level of awareness of rural residents about the conditions and cost of rehabilitation services (12.7%).

Then, research data on the level of availability of rehabilitation services for the population of Transcarpathian region of the mountainous geographical area were summarized. The obtained results are shown in Table 4.

The analysis of the data given in Table 4 indicates the following:

People with special needs: for the population with special needs in rural settlements of the mountainous geographical area, rehabilitation services are territorially permanently available in 7.8%, and for the corresponding urban population it is 69.0%. The level of territorial inaccessibility is 12.3% and 12.7%, respectively. It should be noted that for 44.5% of the interviewed rural residents with special needs, rehabilitation services are available only in a certain period of the year, which is related to the condition of the roads in the mountainous geographical area. For 31.8% of surveyed rural residents with special needs, the level of payment for rehabilitation services is not affordable. For urban residents, this figure was 21.1%. At the same time, for 29.2% of surveyed rural residents and 23.9% of surveyed urban residents the answer was undecided.

People with chronic diseases: for the population with chronic diseases in rural settlements of the mountainous geographical area, rehabilitation services are territorially permanently available in 13.4%, and for the corresponding urban population it is 24.6%. The level of territorial inaccessibility is 19.0% and 11.1%, respectively. It should be noted that for 29.6% of surveyed rural residents and 19.8% of urban

residents with chronic diseases, rehabilitation services are available only in a certain period of the year, which is related to the condition of the roads in the mountainous geographical area. For 26.0% of surveyed rural residents with special needs, the level of payment for rehabilitation services is not affordable. For urban residents, this figure was 12.7%. At the same time, for 19.0% of rural residents and 17.5% of surveyed urban residents the answer was undecided.

Further, the issue of the respondents' evaluation of the level of assessment of the impact of rehabilitation on the state of health was studied. Indicators were calculated according to the number of persons from each study group who received rehabilitation services. The obtained results are shown in Table 5.

The analysis of the data presented in Table 5 indicates the following:

People with special needs: 65.8% of respondents from rural areas and 54.7% of respondents from cities indicated a positive effect of rehabilitation on their health, but at the same time, 7.9% of rural respondents and 4.8% of respondents living in cities indicated a deterioration in their health against the background of receiving rehabilitation services;

People with chronic diseases: 46.1% of respondents from rural areas and 62.4% of respondents from cities indicated a positive effect of rehabilitation on health, but at the same time, 13.5% of rural respondents and 13.0% of respondents living in cities indicated a deterioration in health against the background of receiving rehabilitation services.

DISCUSSION

In the available literature, we did not find publications on the availability of rehabilitation services to compare the data we obtained with the available research results. At the present time, the system of rehabilitation which is

defined at the legislative level is actively developing in Ukraine [1]. The law establishes legal, organizational and economic conditions for the rehabilitation of an individual with limited abilities of everyday functioning in the sphere of health care with the possibility of reaching and ensuring the optimal level of functioning in the environment. We would like to draw your attention to the fact that the World Health Organization pays great attention to the issues of rehabilitation, as evidenced by the document "Rehabilitation 2030: A Call to Action", which sets the task of increasing the scale of rehabilitation at the level of WHO member states [6].

Provision of the population of mountainous geographical zone of residence with rehabilitation services has its special features. Among them, there are the problems associated with the conditions of living. Thus, the settlements of the mountainous geographical zone, as a rule, are sparsely populated. They are far removed from the cities and district centers in which the health care facilities of specialized medical care are located [4]. Important are the problems associated with irregular transport links between remote settlements and other settlements, especially in winter, spring and autumn periods, when existing roads are impassable or conditionally passable [5]. This determined the relevance of this study and the practical significance of its results.

Taking into account the fact that Ukraine is reforming the health care system with the formation of a capable

network of specialized medical care institutions [7], we focus on the need to create a system of institutions (units) of rehabilitation within its framework. An analysis of the approved capable network of specialized medical care facilities indicates an insufficient level of its ability to provide the population of the country with affordable rehabilitation services.

CONCLUSIONS

A low level of territorial and economic accessibility of rehabilitation services for the population of the mountainous geographical zone of residence with a lower level of accessibility for the population of rural areas than the population of cities has been established. Thus, the level of permanent territorial accessibility of rehabilitation services was 7.8% for rural residents with special needs, and 69.0% for urban residents. For this category of the population, the level of economic accessibility of these services was 16.9% and 26.8% respectively. The level of permanent territorial accessibility of rehabilitation services was 13.4% for rural residents with chronic diseases, and 24.6% for urban residents. For this category of the population, the economic accessibility of these services was 27.5% and 45.2% respectively. The results of the study should be taken into account when reforming the health care system of the region.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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State of students' health and physical fitness under the restrictions of martial law

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ABSTRACT

Aim: To study the impact of martial law restrictions on the level of students' health and physical fitness at higher educational institutions.

Materials and Methods: The research conducted in 2022-2024 involved 127 students (58 men, 69 women). Methods included analysis, synthesis and generalization of literary sources, express methodology for assessing physical health, testing of physical qualities, and methods of mathematical statistics.

Results: It has been established that martial law restrictions negatively impact students' health and physical fitness. Over the two years of war, the level of physical health has significantly deteriorated by 1.8 for male students and by 2.0 for female students. The results of all physical fitness tests have also significantly deteriorated for both male and female students. Among the physical qualities, the most pronounced negative changes occurred in the endurance, strength, and flexibility indicators.

Conclusions: The research results show that students' education under martial law in Ukraine, which takes place in various formats, is accompanied by significant emotional and intellectual intensity, extremely limited motor activity, and stressful situations. This negatively affects the health and physical fitness of today's students. Future specialists' poor health and low physical fitness can negatively impact their professional working capacity and cause various diseases.

KEY WORDS: health, physical fitness, motor activity, students, martial law

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INTRODUCTION

Many global problems in modern education need to be addressed immediately, but among them are vital issues on which the existence of the educational system and the entire society depends. One of them is the state of students' health, which, unfortunately, is a serious concern in Ukraine [1, 2]. Among the factors that negatively affect the health of students, not the least role is played by constant mental and psycho-emotional strain, information stress, insufficient material security, disorders in diet and sleep, and, especially, a decrease in motor activity. Moreover, in recent years, quarantine restrictions caused by the COVID-19 pandemic and martial law factors have led to even greater restrictions on motor activity among Ukrainian students [3, 4].

According to the World Health Organization, physical activity is any body movement performed by skeletal muscles that requires energy expenditure, including activity during work, play, homework, travel, and recreational

activities [5]. According to the World Health Organization recommendations, a person needs 150 minutes of moderate activity or 75 minutes of vigorous physical activity to stay healthy [5, 6]. These recommendations can be fulfilled at home without special equipment and in limited space.

Scientists [7, 8] argue that most students currently have insufficient motor activity, which leads to the development of hypokinesia. This is an important risk factor for developing various diseases and a decrease in mental and physical performance. During the global quarantine, when educational institutions switched to distance learning, this situation worsened many times over [9]. The war in Ukraine has led to a difficult and unique challenge for both students and the education sector as a whole, as it is a sector that plays a crucial role in overcoming its negative consequences and restoring the health of young people in particular and society as a whole [10]. The martial law in Ukraine has affected the education of today's generation, as today's students face distance learning, relocation, changes in

their usual living conditions, constant stress, threats to life due to missile danger, and a reduction in sports activities in educational institutions and at their place of residence. There was a communication restriction and a dramatic change in lifestyle, education, and employment [11]. According to scientists [12], all this negatively impacted their health and physical fitness. Our research aims to verify these conclusions by assessing the dynamics of Ukrainian students' physical health and physical fitness during the two years of war.

AIM

The aim is to study the impact of martial law restrictions on the level of students' health and physical fitness at higher educational institutions.

MATERIALS AND METHODS

The research was conducted at the Ivan Franko Zhytomyr State University in 2022-2024. The research involved 127 students (58 men, 69 women) aged 17-20 who entered the Faculty of Philology in 2022. Students' health and physical fitness indicators were assessed at the beginning of the 1st semester and at the end of the 4th semester of their study. Physical education, as a compulsory academic subject area, was conducted only during the first instructional year in the amount of 2 hours per week.

The following methods were used to achieve the aim of the research: analysis, synthesis and generalization of literature sources, express methodology for assessing physical health by H. L. Apanasenko, testing of physical qualities, and methods of mathematical statistics. The express methodology of physical health assessment by H. L. Apanasenko provided for determining the sum of points for five indices characterizing both the physical development of students and the functional capabilities of the main systems of their body (body mass index, vital index, strength index, Robinson index, time of heart rate recovery to the initial values after 20 squats in 30 seconds) [13]. The following seven tests assessed physical fitness: 100 m run (to determine the level of development of quickness), pull-ups (for female students – push-ups) (to determine the level of development of strength), standing long jump (to assess the level of development of speed and strength qualities), lifting the torso to the sitting position for 1 min (to

determine the level of development of strength endurance), 4 x 9 m shuttle run (to assess the level of development of agility), 1 km run (to determine the level of development of endurance), torso tilt forward (to assess the level of development of flexibility).

The significance of the difference in the results of the students was determined during the studying based on the Student's test. Before the experiment, the groups of adolescents were tested for normal distribution using the Kolmogorov-Smirnov test in IBM SPSS Statistics 23.0. The distributions were found to be normal, which allowed for statistical calculations using Student's t-test. The significance for all statistical tests was set at $p < 0.05$. 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 assessment of the dynamics of physical health indicators in male students during martial law in Ukraine are presented in Table 1; female students are presented in Table 2.

The analysis of body mass index indicators showed that during the two years of war, there was a significant deterioration by 1.3 kg/m² in male students ($p < 0.05$) and by 1.4 kg/m² in female students ($p < 0.01$). The deterioration of this index is due to an increase in body fat in students due to a significant decrease in their motor activity during the war. Despite the fact that the value of the body mass index in students of both sexes is within the age norm, the indicators have a steady tendency to deteriorate, which can lead to overweight and obesity in the future.

The analysis of the vital index showed a significant ($p < 0.05$) deterioration in the functional capabilities of the respiratory system of students during the war: in men – by 2.4 ml/kg, in women – by 3.5 ml/kg. This confirms the conclusions of many scientists about the negative impact of martial law restrictions, accompanied by stress and hypokinesia, on students' lung capacity. After the two years of war, the indicators of the vital index correspond to a below-average level.

The strength capabilities of students, which were assessed by indicators of the strength index, also significantly deteriorated over the two years of war. Thus, in male

Table 1. Dynamics of health indicators in male students during martial law ($X \pm m$, $n = 58$)

| Health indicators | Before martial law | After the two years of war | The difference | Reliability of the difference | |
|------------------------------------|--------------------|----------------------------|----------------|-------------------------------|-------|
| | | | | t | p |
| Body mass index, kg/m ² | 23.2±0.32 | 24.5±0.35 | 1.3 | 2.74 | <0.05 |
| Vital index, ml/kg | 56.2±0.79 | 53.8±0.84 | 2.4 | 2.08 | <0.05 |
| Strength index, % | 58.7±1.07 | 55.3±1.12 | 3.4 | 2.20 | <0.05 |
| Robinson index, c. u. | 85.4±1.14 | 88.9±1.18 | 3.5 | 2.13 | <0.05 |
| Heart rate recovery time, s | 122.6±2.61 | 131.2±2.73 | 8.6 | 2.28 | <0.05 |
| Health level, points | 5.4±0.48 | 3.6±0.51 | 1.8 | 2.47 | <0.05 |

Table 2. Dynamics of health indicators in female students during martial law ($X \pm m$, $n = 69$)

| Health indicators | Before martial law | After the two years of war | The difference | Reliability of the difference | |
|------------------------------------|--------------------|----------------------------|----------------|-------------------------------|-------|
| | | | | t | p |
| Body mass index, kg/m ² | 21.3±0.27 | 22.7±0.31 | 1.4 | 3.41 | <0.01 |
| Vital index, ml/kg | 50.9±0.97 | 47.4±1.02 | 3.5 | 2.49 | <0.05 |
| Strength index, % | 48.4±0.95 | 43.8±1.06 | 4.6 | 3.26 | <0.01 |
| Robinson index, c. u. | 83.9±1.08 | 87.1±1.13 | 3.2 | 2.05 | <0.05 |
| Heart rate recovery time, s | 125.9±2.28 | 134.2±2.45 | 8.3 | 2.48 | <0.05 |
| Health level, points | 5.1±0.39 | 3.1±0.42 | 2.0 | 3.49 | <0.01 |

students, the difference between the initial and final data of the research is 3.4 % ($p < 0.05$), and in female students – 4.6 % ($p < 0.01$). At the same time, the strength index of students of both sexes at the end of the research is estimated as “low,” which indicates a significant deterioration in the training of the muscular system during the period of martial law. Changes in the Robinson index allow us to judge the effectiveness of the cardiovascular system of students. In contrast, the growth of the index shows a deterioration in the system’s functional capabilities. Thus, in the process of studying students under martial law for the two years, a significant decline of the Robinson index is observed: in male students – by 3.5 c. u. ($p < 0.05$), in female students – 3.2 c. u. ($p < 0.05$). These conclusions are confirmed by the negative dynamics of the duration of heart rate recovery after exercise. This indicator worsened by 8.6 s ($p < 0.05$) in male students, and in female students – by 8.3 s ($p < 0.05$).

Assessment of students’ general level of physical health using the method of H. L. Apanasenko showed that, like all indices, the level of health also deteriorated during the two years of war. The difference between the indicators before and at the end of the research is 1.8 points ($p < 0.05$) in male students and female students – 2 points ($p < 0.01$). In general, the level of physical health of students of both sexes after the two years of war decreased to a low level, which confirms the negative impact of martial law restrictions on students’ bodies.

The results of assessing the dynamics of physical fitness of male and female students, presented in Tables 3 and 4, confirmed our previous conclusions about the negative impact of martial law restrictions on students’ physical health. The largest and most significant changes were in the endurance, strength, and flexibility indicators. Thus, male students’ results in running for 1 km deteriorated by 34.89 s ($p < 0.01$), in pull-ups – by 3.09 times ($p < 0.01$), in torso tilt forward – by 3.67 cm ($p < 0.01$).

Female students have a similar trend to men – deterioration of results in all tests; however, the most pronounced negative changes occurred in the results of 1 km run (by 51.08 s ($p < 0.01$)), push-ups (by 4.31 times ($p < 0.01$)) and in torso tilting forward (by 2.89 cm ($p < 0.05$)).

DISCUSSION

Motivating students to engage in independent physical exercises during martial law is one of the central problems of education, which should preserve a healthy nation capable of defending its state, rebuilding it, eliminating the consequences of war, and integrating into the European educational space.

During martial law, a decrease in motor activity is usually associated with an irrational student’s daily routine. In the context of studying the bulk of the material remotely, the time when students are forced to maintain an uncomfortable static position while sitting at their workplace and limit their natural motor activity increases [14]. It is also important to note that a negative consequence of a decrease in motor

Table 3. Dynamics of physical fitness of male students during martial law ($X \pm m$, $n = 58$)

| Tests | Before martial law | After the two years of war | The difference | Reliability of the difference | |
|--|--------------------|----------------------------|----------------|-------------------------------|-------|
| | | | | t | p |
| 100 meter run, s | 14.72±0.68 | 15.23±0.83 | –0.51 | 0.48 | >0.05 |
| Pull-ups, times | 8.93±0.72 | 5.84±0.97 | –3.09 | 2.56 | <0.05 |
| Standing long jump, cm | 223.21±7.64 | 218.26±7.43 | –4.95 | 0.46 | >0.05 |
| Lifting the torso to the sitting position for 1 min, times | 34.45±1.57 | 29.71±1.64 | –4.74 | 2.09 | <0.05 |
| 4 x 9 m shuttle run, s | 9.58±0.93 | 10.37±0.76 | –0.79 | 0.66 | >0.05 |
| 1 km run, s | 282.52±7.15 | 317.41± | –34.89 | 3.42 | <0.01 |
| Torso tilt forward, cm | 12.81±0.81 | 9.14±0.75 | –3.67 | 3.32 | <0.01 |

Table 4. Dynamics of physical fitness of female students during martial law ($X \pm m$, $n = 69$)

| Tests | Before martial law | After the two years of war | The difference | Reliability of the difference | |
|--|--------------------|----------------------------|----------------|-------------------------------|-------|
| | | | | t | p |
| 100 meter run, s | 17.24±0.83 | 18.78±0.95 | -1.54 | 1.20 | >0.05 |
| Push-ups, times | 13.48±0.86 | 9.17±0.93 | -4.31 | 3.40 | <0.01 |
| Standing long jump, cm | 169.21±6.84 | 164.52±7.12 | -3.69 | 2.91 | <0.05 |
| Lifting the torso to the sitting position for 1 min, times | 31.67±1.57 | 27.35±1.78 | -4.32 | 1.82 | >0.05 |
| 4 x 9 m shuttle run, s | 10.91±0.85 | 11.85±0.96 | -0.94 | 0.73 | >0.05 |
| 1 km run, s | 327.14±9.21 | 378.22±9.85 | -51.08 | 3.79 | <0.01 |
| Torso tilt forward, cm | 15.35±0.91 | 12.46±0.98 | -2.89 | 2.16 | <0.05 |

activity is the exacerbation of symptoms of existing chronic diseases and the deterioration of the main functional systems of the body. As a result of insufficient motor activity in the daily routine, weakness and lethargy of muscles occurs, general cerebral circulation is disturbed, venous stasis of blood in the lower extremities occurs, and the body's working capacity decreases [15].

According to many scientists [16, 17], one of the urgent issues of state policy in Ukraine is the organization of student youth's health improvement. In the context of a significant deterioration in the psychophysical state of student youth, the issue of preserving their health cannot be considered outside the context of physical education of students in higher educational institutions. At the same time, one of the key problems is the proper organization of students' physical culture and health recreation activities in independent forms in the conditions of extremely limited motor activity in modern realities. Restriction of motor activity associated with distance learning in martial law is one of the main factors in reducing students' health reserves and physical fitness. In addition, physical inactivity leads to a decrease in the level of students' responsibility for maintaining their health and developing healthy lifestyle skills [18]. Therefore, there is a need to find new effective means and methods to solve the problems of attracting and engaging students in academic and independent physical exercises.

Poor health and a low level of psychophysical fitness of future professionals negatively affect professional skills and cause the emergence of occupational diseases. At the same time, good health, a high physical working capacity, and professional skills are the main factors contributing to successful performance in any profession [19].

Scientists [20] argue that physical activity is the best way to relieve psycho-emotional strain, overcome stress, and prevent various diseases. Physical loads improve mood and lead to an optimal level of functional state of the body. Regular exercise is a preventive measure against the negative effects of emotional stress [21]. Engaging in various types of physical activity has a positive impact on stabilizing the student's psychophysical state. While doing physical exercises, a student abstracts from mental

activity, unpleasant sensations, fear, and excessive worries. Thanks to this switching, the nervous system is relatively calm, reducing stress's impact on the student's body.

At the same time, the adaptation of modern education in the field of physical education to the conditions of distance learning in martial law necessitates the development of a new model of this process based on the process of applying independent physical activity, which requires the search for new effective ways and means of physical improvement and personal responsibility for their health and physical fitness. It has been established that among the main factors of a healthy lifestyle, students' independent physical activity takes one of the last places. Instead, the lack of physical activity results in being overweight, disrupting daily routines, and causing a lack of motivation. Students must maintain a healthy lifestyle under martial law for a long time.

Training sessions in higher educational institutions during martial law should be aimed at solving the problems of preserving and improving the health of student youth, where students should be motivated to engage in systematic physical exercises, and the effectiveness of systematic physical exercises for each student should be established [22]. It is necessary to convince students that systematic exercise helps to improve the functioning of all organs and systems of the body, exercises in conditions of motor activity restriction are the most important means of preventing diseases and promoting health in stressful conditions of war.

Our research examines the aspects of a significant deterioration in student youth's health and physical fitness. It analyzes one of the key problems, i.e., the proper organization of students' physical culture and health recreation activities in various forms in the conditions of extremely limited motor activity caused by martial law in Ukraine. Martial law has necessitated the optimization of the structure and content of physical education in higher educational institutions. It is necessary to create conditions for increasing efficiency, promoting a healthy lifestyle, and overcoming public indifference to public health; ensuring the functioning and improvement of the network of physical culture and mass sports institutions; developing sports infrastructure, including the construction and modernization of sports

facilities; and providing quality sports and fitness services. This will help create appropriate conditions for developing physical culture and mass sports in Ukraine under martial law and post-war reconstruction.

CONCLUSIONS

It has been established that martial law restrictions hurt students' health and physical fitness. Over the two years of war, the level of physical health has significantly deteriorated by 1.8 for male students and by 2.0 for female students. The results of all physical fitness tests have also significantly deteriorated for both male and female students. Among the physical qualities, the most pronounced negative changes occurred in the endurance, strength, and flexibility indicators.

The results of the research show that students' education under martial law in Ukraine, which takes place in various

formats, is accompanied by significant emotional and intellectual intensity, extremely limited motor activity of students, and the presence of stressful situations. This has a negative impact on the health and physical fitness of today's students. Poor health and low level of physical fitness of future professionals can negatively affect their professional working capacity and cause various diseases. Therefore, one of the important tasks of the educational process of higher educational institutions of Ukraine under martial law is to enhance the system of physical and sports improvement of students to strengthen their physical and mental health, boost their level of physical fitness, and foster motivation for systematic physical activity.

Prospects for further research include working out and implementing a modern methodology for developing and maintaining students' health and physical fitness through rational motor activity during martial law.

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Dependence of stress level on the strength of nervous processes and development of special types of endurance in 16-17-year-old men

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ABSTRACT

Aim: To investigate the relationship between stress level and indicators of special endurance in 16-17-year-old men engaged in martial arts, taking into account the individual and typological characteristics of their nervous system.

Materials and Methods: The research involved 40 young men (high schoolers) aged 16-17 engaged in various martial arts types. Research methods: theoretical analysis and generalization of literary sources, pedagogical testing, and methods of mathematical statistics. The following indicators were studied: stress level using the V. Shcherbatiukh test; nervous system strength by results of the tapping test; an indicator of speed and strength endurance by results of jumping rope; an indicator of coordination and strength endurance by results of the Burpee test.

Results: The correlation relationship between the level of stress and the manifestation of various types of endurance in young men, as well as the relationship between the level of stress and motor fitness of young men, taking into account the individual and typological properties of their nervous system, in particular the strength of nervous processes, has been established.

Conclusions: It has been found that young men with a strong nervous system are more stress-resistant, that is, they have a significantly lower level of stress and show better indicators of special types of endurance. At the same time, young men with a high level of development of speed and strength endurance as well as coordination and strength endurance have a lower level of stress.

KEY WORDS: stress level, 16-17-year-old men, high schoolers, motor fitness, nervous system strength, special types of endurance

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INTRODUCTION

The high pace and intensity of modern life increase the burden on the psyche of high schoolers, causing increased anxiety, emotional fluctuations, behavioral reactions, and even physiological manifestations, which justifies the importance of stress resistance as an individual trait for maintaining health. Given this, one of the tasks facing the modern school is to reduce the level of stress in high schoolers using specially oriented physical exercises, which allow them to adapt and maintain optimal working capacity and efficiency of the body in non-standard and dangerous situations [1, 2].

The attention of researchers is increasingly attracted to the issues of psychophysiological prerequisites for reducing stress levels, the relationship between stress levels and motor fitness, the dependence of motor capabilities of high schoolers in the process of physical exercises on the individual and typological properties of the nervous system [3, 4].

According to experts [5, 6], different types of martial arts are characterized by unique manifestations and combinations of manifestation of strength, speed, coordination, and endurance, high requirements for the development of will

and psyche, ability to resist stressful states in the fight with an opponent. It is assumed that the functional mobility of nervous processes in martial arts practitioners helps to restrain emotions, control themselves, and quickly make informed decisions in situational conditions of struggle. At the same time, H.A. Marusak et al. proved that in martial arts, higher manifestations of stress resistance are characteristic of the attack strategy than the defense strategy [7].

Scientists [8] recommend introducing elements of martial arts into the physical education of high schoolers. Researchers [9] have noted that martial arts are popular among high schoolers, especially young men, contribute to the development of vital motor skills, affect the volitional sphere of the individual, and improve the general psycho-emotional state of those who practice.

The strength of nervous processes, like other properties of the nervous system i.e. mobility and balance is a stable and hereditarily determined trait, although living conditions and upbringing can to some extent affect the typological properties of temperament and behavior due to the nervous system plasticity [10]. Therefore, genetically programmed behavioral traits, including emotional and volitional manifestations, are shaped by the typological

properties of the nervous system. The strength of the nervous system, which regulates the processes of excitation and inhibition, determines the degree of extinction of conditioned reflexes, the difference in the strength of the conditioned response to strong and weak stimuli, the effect of an extraneous stimulus on the sensitivity to the main stimulus, which may be an indirect indicator of the ability to withstand psycho-emotional stress.

Thus, the issues of manifestation of resistance to psycho-emotional stress in individuals with different individual and typological characteristics of the central nervous system and the participation of nervous system strength in the success of motor activity in physical exercises are becoming relevant. To establish the influence of the strength of nervous processes on stress resistance and the level of manifestation of motor capabilities in senior high schoolers, it is relevant to study the relationship between indicators of stress level, nervous system strength, and the manifestation of special types of endurance in 16-17-year-old high schoolers engaged in martial arts.

AIM

The aim is to investigate the relationship between stress level and indicators of special endurance in 16-17-year-old men engaged in martial arts, taking into account the individual and typological characteristics of their nervous system.

MATERIALS AND METHODS

The research involved 40 young men (high schoolers) aged 16-17 (Kyiv, Ukraine) who were engaged in various types of martial arts (boxing, kickboxing, karate, etc.).

The scientific methods used to achieve the aim of the research included: theoretical analysis and generalization of literary sources and Internet data on the topic of the research (22 literary sources included in various international scientometric databases were processed); pedagogical testing; methods of mathematical statistics, in particular the Pearson's correlation analysis. The following indicators were studied: stress level using the V. Shcherbatykh test (points). The value of the nervous system strength was determined by the results of the 1-minute tapping test in

the modification of V. Ryzhkov (c. u.). When high schoolers put dots for every 10 s successively in 6 different squares on paper within 1 min the degree of manifestation of strength – weakness of the nervous system is determined by the value of deviations of the curve of the graph of the final level from the initial one by formula $D = -3n_1 - 2n_2 - n_3 + n_4 + 2n_5 + 2n_6$, where n is the number of dots in the 1st 10-second interval. Based on the D indicator, the dynamic performance index (DPI) is determined by the formula: $DPI = -0.06 \times D$. The motor indicators were evaluated: an indicator of speed and strength endurance by results of the test of jumping rope for 1 min (number of times); an indicator of coordination and strength endurance (functional and dynamic exercise – the Burpee test for 10 s (number of times).

This research complies with the provisions of the Declaration of Helsinki of the World Medical Association. In addition, our research received the consent of the Ethical Committees of the Ukrainian State Dragomanov University. The participants were informed about the aim and objectives of the research. Consent to voluntary participation in the survey was obtained from all high schoolers.

RESULTS

The results of the study of stress levels and nervous system strength in 16-17-year-old men are presented in Table 1.

The level of stress was determined by the V. Shcherbatykh test. Thus, the average group level of this indicator in young men aged 16-17 years is 9.5 ± 0.8 points, which indicates that high schoolers experience moderate stress, which can be compensated by rationally organized motor activity. The average group level of the nervous system strength in 16-17-year-old men makes 3.8 ± 2.1 points, which indicates the average value of the nervous system strength in high schoolers.

To estimate the manifestation of special types of endurance in young men of senior school age who are engaged in martial arts, pedagogical testing was applied. The results of the pedagogical testing are presented in Table 2.

The relationship between the level of stress and motor indicators characterizing the manifestation of special types

Table 1. Characteristics of nervous system strength and stress level of 16-17-year-old men ($n = 40$)

| Indicators | $\bar{X} \pm m$ |
|--|-----------------|
| Nervous system strength (V. Ryzhkov's method), c. u. | 3.8 ± 0.6 |
| Stress level (V. Shcherbatykh test), points | 9.5 ± 0.8 |

Legend: \bar{X} – arithmetical average; m – standard deviation error.

Table 2. Characteristics of special motor fitness of 16-17-year-old men ($n = 40$)

| Indicators | $\bar{X} \pm m$ |
|--|-----------------|
| Speed and strength endurance (jumping rope in 1 min, number of times) | 92.7 ± 4.2 |
| Coordination and strength endurance (Burpee test, number of times in 10 seconds) | 5.5 ± 0.3 |

Legend: \bar{X} – arithmetical average; m – standard deviation error.

Table 3. Interrelation between the level of stress and the manifestation of special endurance in 16-17-year-old men (n = 40)

| Special endurance indicator | Stress level, points |
|---|----------------------|
| Coordination and strength endurance (Burpee test, number of times) | -0.32 |
| Speed and strength endurance (jumping rope in 1 min, number of times) | -0.54 |

Table 4. Interrelation between the indicator of the nervous system strength, stress resistance level, and indicators of special endurance in 16-17-year-old men (n = 40)

| Indicator | The resultant feature (nervous system strength) |
|--|---|
| Speed and strength endurance (jumping rope in 1 min, number of times) | -0.41 |
| Coordination and strength endurance (Burpee test, number of times in 10 seconds) | -0.52 |
| Stress level (V. Shcherbatykh test, points) | 0.63 |

of endurance in 16-17-year-old men engaged in martial arts was studied using the Pearson's linear correlation method. The results of the correlation analysis are revealed in Table 3.

Thus, it has been found that 16-17-year-old men with a low level of stress have higher indicators of coordination and strength endurance ($r = -0.32$ at $p \leq 0.05$), speed, and strength endurance ($r = -0.54$ at $p \leq 0.05$).

Taking into account the hereditary conditionality and conservatism of the nervous system strength as an individual and typological feature of the development of the psyche, the research set the task of studying its influence on stress resistance, as well as on the motor capabilities of 16-17-year-old men in the manifestation of special endurance. Thus, the correlation relationships between the level of the nervous system strength and the level of manifestation of special types of endurance in high schoolers were recorded. The results of the correlation analysis are presented in Table 4.

It has been established that young men aged 16-17 years with a stronger nervous system show higher indicators of speed and strength endurance ($r = -0.41$ at $p \leq 0.05$) and coordination and strength endurance ($r = -0.52$ respectively at $p \leq 0.05$). In addition, it has been determined that the level of stress in high schoolers is determined by the strength of nervous processes, that is, young men with a strong nervous system respond to stress much more easily. It has been shown that senior high schoolers with a strong nervous system are more tolerant to stress ($r = 0.63$ at $p \leq 0.05$).

DISCUSSION

The ability to control and consciously influence one's emotional state in various stressful situations that arise during school activities, significantly reducing the working capacity of senior high schoolers, which, in the worst case, can lead to the disintegration of the individual which is inextricably linked to the level of their stress resistance [11, 12]. The group of people with an average level of stress resistance

is characterized by reduced emotional stability. This indicates that these young people are ready for stressful situations, but not global and not instantaneous ones. As adolescents face stressful situations that are similar in content, they get used to them and begin to react to stress more calmly. A person with a high level of stress resistance is characterized by such a quality as emotional stability; these characteristics are combined with a high degree of intellectual development, directly with the flexibility of thinking; the ability to have high visual perception performance; high working memory and memorization; and the ability to concentrate. Flexibility of thinking is associated with the situational qualitative transformation of perception and thinking [13].

Scientists have confirmed [14, 15] that the strength of the nervous system determines the level of stress resistance as the ability to respond to stress without deteriorating the mental and somatic health of high schoolers. It has also been established that the higher the level of development of such motor skills as agility, speed and coordination, and strength endurance, the higher the level of stress resistance in senior high schoolers [16, 17]. The results of our research are in line with the data already existing in psychological and pedagogical theory, which establish that the level of stress resistance is closely related to the type of nervous system [18, 19]. As noted in the work of scientists [20], the psyche is a property of the nervous system, and therefore, individual properties of the psyche, including temperament, determine individual properties of the nervous system. Considering the nature of stress resistance and its relationship with temperament, experts [21] note that at the level of temperament, the feature that causes instability is increased emotionality. Thus, emotional balance is a factor that leads to an increase in the level of stress resistance of an individual. It can be argued that the level of stress resistance in adolescents depends on the level of their adaptation to the environment, self-confidence,

and self-reliance, as emphasized by researchers [22]. Our research shows that 10 and 11-grade high schoolers have average indicators characterizing their psycho-emotional state, but a slightly lower level of stress resistance has been recorded. According to the data from pedagogical testing, the level of motor fitness in senior high schoolers is low.

Of considerable interest is the confirmed relationship between indicators of stress resistance and motor fitness of senior high schoolers. The relationship between the indicator of nervous system strength and the level of high schoolers' stress resistance has been investigated. It has been found that 16-17-year-old men with a strong nervous system are more stress-resistant and have a significantly lower level of stress. It has been found that the highest stress resistance is shown by young men with a high level of development of agility and coordination and strength endurance, and young men with a strong nervous system have a higher level of agility, speed as well as coordination and strength endurance.

It has been established that different types of martial arts are actively introduced in schools today, but the experience of using certain types of martial arts (boxing, kickboxing, etc.) in various forms of physical education is currently insufficient. However, the use of at least some elements of these types of martial arts in the process of physical exercises would contribute to the education of volitional qualities, and motor fitness and reduce psycho-emotional stress of high schoolers in modern learning conditions. Moreover, due to age peculiarities senior high schoolers control their emotions and perceive their capabilities more adequately.

The results of our research allowed us to determine the possibilities of influence on senior high schoolers' stress resistance using martial arts and can form the basis for substantiation and development of the corresponding

methodology taking into account the determined interrelations between the level of stress resistance and motor qualities depending on the features of the nervous system of young men.

CONCLUSIONS

It has been found that 16-17-year-old men experience moderate stress. However, the research proves that the manifestation of stress tolerance is conditioned by the strength of the nervous system as an individual and the typological characteristics of an individual. The dependence between the indicator of the nervous system strength and the level of stress in high schoolers has been investigated, which means that young men with a strong nervous system can be tolerant to stress and have stress resistance.

It has been established that high schoolers with a strong nervous system show a higher level of speed and strength as well as coordination and strength endurance. The obtained scientific data prove the predetermination of motor achievements of 16-17-year-old men in martial arts, which are characterized by high requirements for the complex manifestation of endurance, strength, speed, and coordination.

It has been recorded that the level of stress has an impact on the success of martial arts training of 16-17-year-old men. This allows using the obtained data to predict the success of martial arts training of senior high schoolers, as well as to attempt to reduce the level of stress through exercises for the development of special endurance.

We see prospects for further research in the substantiation and development of a methodology for reducing high schoolers' stress in the process of martial arts training, taking into account the individual and typological properties of the nervous system.

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Assessment of the quality of life of children with congenital cleft lip and palate and associated dental diseases

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ABSTRACT

Aim: To evaluate of the quality of life in children with cleft lip and palate and concomitant diseases of the tissues of the oral cavity.

Materials and Methods: 66 children with cleft lip and palate and concomitant diseases of the oral cavity tissues participated in the research. In this study was made a dental examination, study of quality of life together with socialization and social adaptation according to T. Dembo and S. Rubinstein self-worth assessment technique modified by A. Prikhozhan; assessment of emotional state according to the NADS method; assessment of O.Chaban Quality of Life Scale Method.

Results: Children with cleft lip and palate at the younger age had higher indicators of their health assessment. The older children have a higher self-confidence index, which may indicate the complication of the process of socialization of the studied group of older children. There was a strong connection between children's perception of their appearance and the level of self-esteem. There is a strong statistically significant difference between the research group and the control group according to the quality of life assessment scale. This may indicate that children with clefts are more cared for by adults and parents and they feel more protected, which allows them to maintain a high standard of living.

Conclusions: Was noted by us a strong relationship between the level of self-esteem and quality of life: the level of quality of life positively affects the child's self-esteem at all levels.

KEY WORDS: congenital non-unions, emotional state, quality of life, social adaptation, self-perception

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INTRODUCTION

Congenital cleft upper lip and/or palate (CL/P) is the most common congenital craniofacial anomaly. In a review study conducted by Salari et al., in 2022 the prevalence of CL/P per 1000 live births was 0.45. CL/P are among the most severe malformations of the maxillofacial area, leading to significant functional (functions such as hearing, phonation, mastication, swallowing, and breathing) and aesthetic disturbances [1]. The prevalence of cleft palate varies significantly in European countries with a prevalence of 1/1000 among newborns in Europe [2]. Thus, in recent years, in Ukraine we can observe increase frequency newborn children with CL/P [3]. Given into consideration the high prevalence of CL/P, it is needed preventive measures to reduce the number of patients, as well as diagnostic and treatment programs in order to reduce the effects of this disorder in children.

CL/P takes the second place in the structure of antenatal development shafts and is associated with a wide range of dental abnormalities [4]. A visible orofacial defect can affect oral health-related quality of life (OHRQoL). OHRQoL in this regard, it is relevant to study different aspects of the quality of life in patients of different age groups and with different types of CL/P, as well as the frequency and reasons for changes in HRQoL. However, the CL/P-specific health

concepts of individuals with CL/P measured to date have only been classified into the HRQoL conceptual framework under the following categories: physical, psychological, and social health, which focuses on examining physical functioning, and also on the psychological and social well-being of a person [5]. Aesthetic and functional disorders, as well as various dental anomalies that occur with CL/P both before and after restorative interventions, limit a person's communication, suppress his awareness of his own physical inferiority and lead to mental disorders, mainly depressive [5].

Children with CL/P are at increased risk of developing dental problems such as caries and gingivitis [6]. The teeth on the cleft side had a high level of gingivitis. Shallow gingival recessions often occurred around the central incisor on the cleft side [7]. Previous studies have reported a high prevalence of caries and bleeding gums because they are at high risk of poor oral hygiene compared to their non-CL/P peers [8]. Due to unfavorable changes in anatomical and morphological structures, patients with CL/P and alveolar cleft often accumulate dental plaque in the oral cavity [9]. In addition, most patients with CL/P undergo fixed orthodontic therapy, which limits oral hygiene, which increases the risk of dental and periodontal diseases [10].

Limited orofacial dysfunction may account for the impact on eating in children with CL/P, as suggested by A.L. Sundell and A. Marcusson (2019) [11]. Also, children with CL/P are prone to velopharyngeal dysfunction, which leads to speech problems [12]. The emotional component is closely related to psychological problems, which include self-esteem, appearance, and family support [13]. In addition, when analyzing the emotional aspect, children with CL/P report anxiety and fear, frequent conflicts in the family compared to their peers without CL/P [14].

Despite the comprehensive treatment that patients with CL/P receive, they still have lower OHRQoL, especially physical pain and psychological discomfort. At the same time, taking care of the condition of the oral cavity, which is a common practice, are motivational factors to maintain a long and complex regimen of oral care [15].

It is important to assess the quality of life among individuals who were born with congenital cleft lip and palate throughout their lives. Oral health has a significant impact on the HRQoL of this patient group. This may be because in addition to congenital cleft lip and palate, they also often have dental caries and bleeding gums. Inclusion of qualitative assessments of treatment efficacy and satisfaction with care among this patient cohort may be valuable. There is a need for individualized monitoring and prioritization of oral care, as HRQoL can be achieved with quality care. Implementation of standardized prevention and control programs aimed at education, motivation and responsibility will contribute to the improvement of oral health in children with congenital cleft lip and palate. Psychological support for cleft children and their families should be an integral part of care to reduce the stigma commonly associated with congenital cleft lip and palate.

AIM

The aim of the study was to conduct a study of the quality of life in children with cleft lip and palate and concomitant diseases of the tissues of the oral cavity, to consider the issue of socialization and social adaptation of children with cleft lip and palate.

MATERIALS AND METHODS

66 children with cleft lip and palate and concomitant diseases of the oral cavity tissues participated in the research, they were patients from the Department of Plastic and Reconstructive Microsurgery at National Specialized Children's Hospital "OKHMATDYT" (Kyiv, Ukraine) aged from 8 to 18 years old. Divided by gender: 42 – boys, 24 – girls. Patients were also divided by age into 2 groups: 8-11 years old – 26 people, 12-18 years old – 40 people. A comparison group was also formed, which included children with chronic somatic pathology in the number of 67 children aged from 12 to 18 years, who underwent treatment at the Okhmatdyt National Medical Center of the Ministry of Health of Ukraine. In this study was made a dental examination together with diagnostic study of children with cleft lip and palate, study of quality of life together with socialization and social adaptation. The

study of socialization and social adaptation of children and adolescents of the subjects was considered through the self-perception of the subjects in society, namely according to T. Dembo and S. Rubinstein self-worth assessment technique modified by A. Prikhozhan; assessment of emotional state according to the NADS method; assessment of O. Chaban Quality of Life Scale Method. Data were analyzed with the statistical package IBM SPSS Statistics Base (version 22) and EZR. All results were considered statistically significant at a value of $p < 0.05$. Quantitative data are presented as mean (M) \pm standard deviation (SD), unless otherwise stated. The normality of the data distribution was checked using the Shapiro-Wilk test.

RESULTS

All patients in the research group had caries incidence with clinical changes in the periodontal tissues. During the dental examination, the triad was observed – adentia, overcompleteness of the dentition, retention of teeth is a negative effect on the functions of speech, chewing, swallowing, and breathing. The patients' parents and the patients themselves noted complaints of bad breath, accumulation of dental plaque, toothache, bleeding gums, and changes in the mucous membrane of the oral cavity.

Analysis of the results of self-assessment according to the method of T. Dembo and S. Rubinstein, which has such sub-scales as: health, abilities, character, self-confidence, relationship with peers, relationships in the family. Were obtained the following indicators: a direct correlation was observed between the age of the child and assessment of state of health, the older the children – the lower the health assessment index (children 8-11 years old 8.18, older children 12-18 years old 7.42). A direct correlation between age and self-confidence was also noted, as example, children aged 8-11 had a higher self-confidence index – 8.38, than older children aged 12-18 – 7.28. (Table 1).

There is a statistically significant difference between age and self-esteem according to the Dembo-Rubinstein method, namely in the sub-scales: "Character" (strong), "Health" (weak), "Self-confidence" (moderate) "Beauty, appearance" (strong).

Also, age and general levels of self-esteem has a strong statistically significant difference according to the analysis: (in the age group 8-11 the average score is 84.54, in the age group 12-18 – 75.63). According to the sub-scale "Character" it is observed: in the age group of 8-11 years the average level of self-esteem is higher (average 8.08) than in the age group 12-18 (average 6.85). According to the sub-scale "Self-confidence" it is observed: in the age group of 8-11 years the average level of self-esteem is higher (average 8.38) than in the age group 12-18 (average 7.28). According to the sub-scale "Health" it is observed: in the age group of 8-11 years the average level of self-esteem is higher (average 8.18) than in the age group 12-18 (average 7.42). According to the sub-scale "Beauty, appearance" it is observed: in the age group of 8-11 years old the average level of self-esteem is higher (average 8.96) than in the age group 12-18 (average 7.15).

Table 1. Statistical analysis by age

| Method | Age (mean) | | Statistical probability (Welch ANOVA p) |
|--|------------|-------|--|
| | 8-11 | 12-18 | |
| Dembo-Rubinstein's self-assessment method: | | | |
| Character | 8.08 | 6.85 | 0.008 |
| Health | 8.18 | 7.42 | 0.083 |
| Self-confidence | 8.38 | 7.28 | 0.031 |
| Mind, ability | 8.12 | 7.65 | 0.303 |
| Beauty, appearance | 8.96 | 7.15 | 0.001 |
| Relationships in the family | 9.00 | 8.38 | 0.131 |
| Relationships with peers | 8.62 | 8.30 | 0.461 |
| The level of self-esteem | 84.54 | 75.63 | 0.004 |
| Chaban Quality of Life Scale | 22.92 | 20.40 | 0.007 |
| HADS A | 5.50 | 5.75 | 0.759 |
| HADS D | 3.23 | 4.70 | 0.025 |

Table 2. Statistical analysis by gender

| Method | Gender (mean) | | Statistical probability (Welch ANOVA p) |
|--|---------------|--------|--|
| | Male | Female | |
| Dembo-Rubinstein's self-assessment method: | | | |
| Character | 7.36 | 7.29 | 0.904 |
| Health | 7.60 | 7.96 | 0.435 |
| Self-confidence | 7.67 | 7.79 | 0.837 |
| Mind, ability | 7.43 | 8.54 | 0.013 |
| Beauty, appearance | 7.55 | 8.42 | 0.132 |
| Relationships in the family | 8.31 | 9.17 | 0.041 |
| Relationships with peers | 8.33 | 8.58 | 0.602 |
| The level of self-esteem | 76.93 | 83.00 | 0.103 |
| Chaban Quality of Life Scale | 21.07 | 21.26 | 0.434 |
| HADS A | 5.44 | 5.96 | 0.660 |
| HADS D | 4.40 | 3.93 | 0.346 |

There is a strong statistically significant difference between age and quality of life assessment (Chaban Quality of Life Scale): in the age group of 8-11 years, the average level of self-esteem is higher (average 22.92) than in the age group 12-18 (average 20.40) Table 2.

There is a statistically significant difference between gender and self-esteem according to the Dembo-Rubinstein method, namely in the sub-scales: "Abilities" (moderate), "Relationships in the family" (moderate) (Table 2). According to the "Abilities" sub-scale, it is observed as: the average level of self-esteem of the studied children and adolescent

boys is lower (average 7.43) than in girls (average 8.54). According to the sub-scale "Relationships in the family", the average level of self-esteem of the studied boys is lower (average 8.31) than in girls (average 9.17).

There is no statistically significant difference in the degree of severity and by age and gender (Tables 3 and 4).

An analysis was conducted between the level of self-esteem and the quality of life of the comparison group of children. With a high statistical probability, there is a correlation between the level of quality of life (Chaban Quality of Life Scale) and the level of self-esteem according to the Dembo-

Table 3. Statistical analysis of the severity of anxiety/depression by age

| Method | Age (%) | | Statistical probability (chi-squared test) |
|---|---------|-------|---|
| | 8-11 | 12-18 | |
| HADS A | | | 0.955 |
| There are no reliable signs of anxiety | 73.1% | 70.0% | |
| Subclinical level of anxiety | 23.1% | 25.0% | |
| Clinical level of anxiety | 3.8% | 5.0% | |
| HADS D | | | 0.284 |
| There are no reliable signs of depression | 96.2% | 85.0% | |
| Subclinical level of depression | 3.8% | 7.5% | |
| Clinical level of depression | 0.0% | 7.5% | |

There is no statistically significant difference

Table 4. Statistical analysis of the severity of anxiety/depression by gender

| Method | Gender (%) | | Statistical probability (chi-squared test) |
|---|------------|-------|---|
| | M | F | |
| HADS A | | | 0.989 |
| There are no reliable signs of anxiety | 71.4% | 70.8% | |
| Subclinical level of anxiety | 23.8% | 25.0% | |
| Clinical level of anxiety | 4.8% | 4.2% | |
| HADS D | | | 0.840 |
| There are no reliable signs of depression | 90.5% | 87.5% | |
| Subclinical level of depression | 4.8% | 8.3% | |
| Clinical level of depression | 4.8% | 4.2% | |

Rubinstein method of self-esteem diagnosis subscales shown: "Character" (weak correlation); "Health" (moderate correlation); "Self-confidence" (moderate correlation); "Beauty, appearance" (moderate correlation); "Relationship with peers" (moderate correlation); Level of self-esteem" (strong correlation) in the direction: better quality of life – better self-esteem. Therefore, it can be assumed that the level of quality of life has a positive effect on the child's self-esteem at all levels.

With a low statistical probability, there is a weak correlation between the level of quality of life (Chaban Quality of Life Scale) and the level of anxiety (HADS A) in the direction: a better level of quality of life – a lower level of anxiety (Table 5). With a high statistical probability, there is moderate correlation between the level of quality of life (Chaban Quality of Life Scale) and the level of depression (HADS D) in the direction: better level of quality of life – lower level of depression (Table 5).

Statistical analysis using the Spearman coefficient revealed: with a moderate statistical probability, there is

a weak correlation between the level of anxiety (HADS A) and the level of self-esteem according to the Dembo-Rubinstein method of self-esteem diagnosis according to the subscale: "Relationships with peers" (moderate correlation) in the direction: a higher level of anxiety – lower level of self-esteem.

With a high statistical probability, there is a correlation between the level of depression (HADS D) and the level of self-esteem according to the Dembo-Rubinstein method of self-esteem diagnosis according to the subscales: "Health" (weak correlation); "Self-confidence" (weak correlation); "Abilities" (moderate correlation); "Relationships in the family" (weak correlation); "Relationship with peers" (weak correlation); "Level of self-esteem" (moderate correlation) in the direction: a higher level of depression – a lower level of self-esteem.

With a moderate statistical probability, there is a correlation between the level of depression (HADS D) and the level of self-esteem according to the Dembo-Rubinstein self-esteem diagnostic method according to the subscale:

Table 5. Correlation of self-esteem according to the Dembo-Rubinstein scale with the level of anxiety, depression (HADS)

| Method | HADS A | | HADS D | |
|--|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | Spearman coefficient ρ (rho) | Statistical probability (p-value) | Spearman coefficient ρ (rho) | Statistical probability (p-value) |
| Dembo-Rubinstein's self-assessment method: | | | | |
| Character | -0.049 | 0.696 | -0.287 | 0.020 |
| Health | -0.175 | 0.160 | -0.337 | 0.006 |
| Self-confidence | -0.085 | 0.496 | -0.363 | 0.003 |
| Abilities | -0.124 | 0.322 | -0.416 | <0.001 |
| Beauty, appearance | 0.062 | 0.619 | -0.198 | 0.111 |
| Relationships in the family | -0.069 | 0.582 | -0.370 | 0.002 |
| Relationships with peers | -0.310 | 0.011 | -0.371 | 0.002 |
| The level of self-esteem | -0.156 | 0.212 | -0.505 | <0.001 |

Table 6. Comparison with the comparison group (full group)

| Method | Group | | Statistical probability (Welch ANOVA p) |
|--|----------|------------|---|
| | Research | Comparison | |
| Dembo-Rubinstein's self-assessment method: | | | |
| Character | 7.33 | 7.50 | 0.586 |
| Health | 7.73 | 8.13 | 0.186 |
| Self-confidence | 7.71 | 7.67 | 0.822 |
| Abilities | 7.83 | 7.67 | 0.577 |
| Beauty, appearance | 7.86 | 7.53 | 0.378 |
| Relationships in the family | 8.62 | 8.18 | 0.162 |
| Relationships with peers | 8.42 | 7.95 | 0.134 |
| Chaban Quality of Life Scale | 21.39 | 18.90 | <0.001 |
| HADS A | 5.65 | 6.00 | 0.573 |
| HADS D | 4.12 | 4.52 | 0.488 |

“Character” (weak correlation) in the direction: higher level of depression – lower level of self-esteem.

There is a strong statistically significant difference between the research and the comparison groups on the quality of life assessment scale: the research group have a higher average score (21.39) than the comparison group (18.92) (Table 6).

There is a strong statistically significant difference between the research group and the comparison group on the quality of life assessment scale. In the research group: 30.3% have a very high level of quality of life, 50.0% have a high level of quality of life, 18.2% have an average level of quality of life, and 1.5% have a low level of quality of life.

In the comparison group – 13.3% have a very high level of quality of life, 40.0% a high level of quality of life, 45.0% an average level of quality of life, 1.7% a low level of quality of life.

Therefore, it can be assumed that the research group has a higher level of quality of life (Table 7).

There is a moderate statistically significant difference between the research group and the comparison group (8-11 years old) on the subscale “Beauty, appearance”: the research group has a higher average score (8.96) than the comparison group of patients (7.87) (Table 8).

There is also a strong statistically significant difference between the research group and the control group

Table 7. Assessments of the quality of life

| Method | Group, % | | Statistical probability (chi-squared test) |
|---|----------|---------|---|
| | Research | Control | |
| HADS A | | | 0.456 |
| There are no reliable signs of anxiety | 71.2% | 70.0% | |
| Subclinical level of anxiety | 24.2% | 20.0% | |
| Clinical level of anxiety | 4.5% | 10.0% | |
| HADS D | | | 0.372 |
| There are no reliable signs of depression | 89.4% | 81.7% | |
| Subclinical level of depression | 6.1% | 13.3% | |
| Clinical level of depression | 4.5% | 5.0% | |
| Chaban Quality of Life Scale | | | 0.007 |
| Very high | 30.3% | 13.3% | |
| High | 50.0% | 40.0% | |
| Medium | 18.2% | 45.0% | |
| Low | 1.5% | 1.7% | |

Table 8. Comparison with the comparison group (8-11 years):

| Method | Group | | Statistical probability (Welch ANOVA p) |
|--|----------|------------|--|
| | Research | Comparison | |
| Dembo-Rubinstein's self-assessment method: | | | |
| Character | 8.08 | 7.78 | 0.472 |
| Health | 8.19 | 8.39 | 0.643 |
| Self-confidence | 8.38 | 7.83 | 0.234 |
| Abilities | 8.12 | 7.74 | 0.429 |
| Beauty, appearance | 8.96 | 7.87 | 0.016 |
| Relationships in the family | 9.00 | 8.83 | 0.657 |
| Relationships with peers | 8.62 | 7.91 | 0.125 |
| Chaban Quality of Life Scale | 22.92 | 18.83 | <0.001 |
| HADS A | 5.50 | 5.74 | 0.798 |
| HADS D | 3.23 | 3.78 | 0.432 |

(8-11 years old) on the scale "Assessment of the quality of life": the research group has a higher average score (22.92) than the control group (18.83) (Table 9).

There is a strong statistically significant difference between the research group and the control group (8-11 years old) according to the quality of life assessment scale: in the research group: 42.3% have a very high level of quality of life, 57.7% have a high level of quality of life. In the

control group – 8.7% have a very high level of quality of life, 43.5% have a high level of quality of life, and 47.8% have an average level of quality of life.

Therefore, it can be assumed that the research group (8-11 years old) has a higher level of quality of life.

There is no statistically significant difference on all scales between the research and the comparison groups (12-18 years) (Tables 10 and 11).

Table 9. Comparison with the control group, assessment of quality of life and emotional state

| Method | Group, % | | Statistical probability (chi-squared test) |
|---|----------|---------|---|
| | Research | Control | |
| HADS A | | | 0.833 |
| There are no reliable signs of anxiety | 73.1% | 65.2% | |
| Subclinical level of anxiety | 23.1% | 30.4% | |
| Clinical level of anxiety | 3.8% | 4.3% | |
| HADS D | | | 0.480 |
| There are no reliable signs of depression | 96.2% | 91.3% | |
| Subclinical level of depression | 3.8% | 8.7% | |
| Clinical level of depression | 0.0% | 0.0% | |
| Chaban Quality of Life Scale | | | <0.001 |
| Very high | 42.3% | 8.7% | |
| High | 57.7% | 43.5% | |
| Medium | 0.0% | 47.8% | |
| Low | 0.0% | 0.0% | |

Table 10. Comparison with the control group (12-18 years old)

| Method | Group | | Statistical probability (Welch ANOVA p) |
|--|----------|---------|--|
| | Research | Control | |
| Dembo-Rubinstein's self-assessment method: | | | |
| Character | 6.85 | 7.32 | 0.252 |
| Health | 7.42 | 7.97 | 0.190 |
| Self-confidence | 7.28 | 7.57 | 0.547 |
| Abilities | 7.65 | 7.62 | 0.941 |
| Beauty, appearance | 7.15 | 7.32 | 0.736 |
| Relationships in the family | 8.38 | 7.78 | 0.175 |
| Relationships with peers | 8.30 | 7.97 | 0.452 |
| Chaban Quality of Life Scale | 20.40 | 18.95 | 0.158 |
| HADS A | 5.75 | 6.16 | 0.619 |
| HADS D | 4.70 | 4.97 | 0.735 |

DISCUSSION

M. Leopoldo-Rodado et al. [16] assessed HRQoL in 4- to 7-year-old children treated with CL/P (n=171) compared to healthy controls (n=186). HRQoL in children was assessed using the Kiddy-KINDL and COHIP-14 questionnaires, and in parents – using the KINDL-p. Kiddy-KINDL total scores and parameter estimates showed similar values between children with CL/P and controls, except for the parameter “self-esteem.” A comparison of the Kiddy-KINDL and KINDL-p showed a total score (82.11 vs. 80.44, respectively). The

CL/P group showed significantly worse values for the COHIP-14 total score (10.53 vs. 5.01, respectively) in all parameters [16].

D. Locker introduced the concept of OHRQoL in 1988. The OHRQoL questionnaire, OHIP-49, was developed to measure oral indicators that can affect people's daily activities [17]. Later was also presented a shorter version (OHIP-14) [18]. The OHIP-14 is a useful tool for assessing OHRQoL in various patient populations, including individuals born with CL/P. Thus, T. Kortelainen assessed general and oral

Table 11. Comparison of emotional state (HADS A/ HADS D)

| Method | Group, % | | Statistical probability (chi-squared test) |
|---|----------|---------|---|
| | Research | Control | |
| HADS A | | | 0.240 |
| There are no reliable signs of anxiety | 70.0% | 73.0% | |
| Subclinical level of anxiety | 25.0% | 13.5% | |
| Clinical level of anxiety | 5.0% | 13.5% | |
| HADS D | | | 0.480 |
| There are no reliable signs of depression | 85.0% | 75.7% | |
| Subclinical level of depression | 7.5% | 16.2% | |
| Clinical level of depression | 7.5% | 8.1% | |
| Chaban Quality of Life Scale | | | 0.669 |
| Very high | 22.5% | 16.2% | |
| High | 45% | 37.8% | |
| Medium | 30% | 43.2% | |
| Low | 2.5% | 2.7% | |

symptoms, functional limitations, emotional and social well-being were lower among patients with CL/P than among schoolchildren without CL/P (mean scores: 55.5 vs. 15.0; 11.9 vs. 5.1; 14.0 versus 2.8; 12.6 versus 2.9, respectively). That is, the authors found significantly lower OHRQoL among children with CL/P than among their peers without gaps in OHIP-14 scores [19].

OHRQoL in children and adolescents can be assessed using two different approaches: children can directly report their own perceptions or parents can assess their child's OHRQoL. At the same time, parents' perceptions of their children's OHRQoL are not accurate enough to detect problems with OHRQoL in an individual child aged 7 to 17 years, and therefore only such an OHRQoL assessment cannot be recommended for individuals in this age group [20]. For example, the assessment of the Child Perception Questionnaire 11-14 (CPQ(11-14)) and the Parent Perception Questionnaire (PPQ) of their child's oral health. Moreover, children's CPQ scores (11-14) are more strongly related to OHRQoL than their parents' PPQ scores, especially in the areas of social and emotional well-being [21]. Similarly, children with CL/P also have a greater impact on OHRQoL compared to children with other dental conditions [22].

Evidence confirms the feasibility of using the Early Childhood Oral Health Impact Scale (ECOHIS) for preschool children, while age is a key factor among other recommended instruments for schoolchildren and adolescents. The Child-OIDP examines the frequency and severity of oral exposures experienced during the past 3 months using a 3-point scale [23]. According to S. Karki et al. (2021) children with both cleft lip and palate had lower OHRQoL than the rest. The same applies to patients who have a high level of dental

caries. The prevalence of caries ranged from 8 to 35% (n = 41) [24]. This is fully consistent with a systematic review reporting that eating, speech and emotional well-being are the most significant OHRQoL parameters among children and adolescents with CL/P [25].

CONCLUSIONS

The patients' parents and the patients themselves of research group noted complaints of bad breath, accumulation of dental plaque, toothache, bleeding gums, and changes in the mucous membrane of the oral cavity. Children with cleft lip and palate at the younger age of 8-11 years had higher indicators of their health assessment. The older the children have the lower indicators of their health assessment (children 8-11 years old – 8.18, older children 12-18 7.42 years old). Also, children aged 8-11 years had a higher self-confidence index – 8.38 than older children aged 12-18 years – 7.28, which may indicate the complication of the process of socialization of the studied group of older children. There was a strong connection between children's perception of their appearance and the level of self-esteem. The studied group did not have a high level of evaluation of their appearance, which also affected the level of self-esteem and the process of socialization.

There is a strong statistically significant difference between the research group and the control group according to the quality of life assessment scale. In the research group: 30.3% have a very high level of quality of life, 50.0% have a high level of quality of life, 18.2% – an average level of quality of life, 1.5% have a low level of quality of life. In the comparison group – 13.3% have a very high level of quality of life, 40.0% – a high level of quality of life, 45.0%

– an average level of quality of life, 1.7% – a low level of quality of life. This may indicate that children with clefts are more cared for by adults and parents and they feel more protected, which allows them to maintain a high standard of living. The parents of the children of the research group had a high parental potential, which had a positive effect on determining the high quality of life of the children.

Was noted by us a strong relationship between the level of self-esteem and quality of life: the level of quality of life positively affects the child's self-esteem at all levels: a better level of quality of life – better self-esteem. In addition, a high standard of living has a positive effect on the emotional state of children with a cleft: a better level of quality of life means a lower level of anxiety and depression.

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Correction of physical health and psycho-emotional state of student youth under martial law

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ABSTRACT

Aim: To investigate the level of physical health and psycho-emotional state of students under martial law and propose means of their psychophysical correction.

Materials and Methods: The research was conducted in 2023-2024 among students aged 20-22 (men, n = 52). The physical health of students was assessed using the "Health Self-Assessment" method; the psycho-emotional state was evaluated using "Diagnosis of Social Frustration Level" and "Anxiety Scale" methods.

Results: It has been found that the level of physical health of 42.3 % of students was rated as satisfactory, 23.1 % as mediocre, 19.2 % as good, and 15.4 % as unsatisfactory. More than half of the students during martial law experience headaches (53.8 %), deterioration of physical condition (86.5 %), have trouble sleeping (76.9 %); complain of physical fatigue (84.6 %), feel depressed (92.3 %). The majority of the students are dissatisfied with their socio-economic situation and have a high level of anxiety. A set of measures has been proposed to correct the physical health and psycho-emotional state of students.

Conclusions: It has been determined that under martial law, there is an unfavorable trend among students to deteriorate both physical and mental health indicators. Students show a high level of anxiety in both real and imaginary stressful situations provoked by war, which can be formed as an individual trait. The developed set of corrective measures will help preserve and restore students' physical and mental health, help them overcome difficulties, develop the ability to relieve muscle and emotional stress, etc.

KEY WORDS: physical health, mental health, psycho-emotional state, students, stress, martial law

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INTRODUCTION

The current global political, economic, and social environment often poses significant challenges to people's psychophysical resilience, especially in regions where conflicts and hostilities are observed [1-3]. With the outbreak and aggravation of existing armed conflicts around the world, including in Ukraine, the issue of maintaining and preserving the physical and mental health of people exposed to stress factors caused by such events is becoming acute. Scientists [4, 5] argue that any war causes significant suffering; every day brings destruction not only to infrastructure but also to the psychophysiology of ordinary people. Hence, we can talk about the current trend of hostilities leading to serious social and personal problems. These problems affect people's quality of life, social adaptation, and the general state of psychophysical health.

The problem of preserving student youth's health is particularly important during martial law, as the younger generation forms the basis of the future society [6-8]. It is also worth noting that due to the formation of an idea

of the state of health of a young person, a connection is established between the perception of the course of events and the motor activity performed, on the one hand, and the reaction of internal organic processes to external events, on the other [9-11]. Often, in such conditions, young people begin to look for defense mechanisms to various stressors and traumatic events in manifestations of deviant (atypical) behavior (smoking, binge eating, growing religiosity, committing illegal acts, etc.) [12-14]. As researchers rightly note [15, 16], motor activity and emotional states play a significant role in young people's lives and significantly impact various spheres of a person's life. In this context, studying the possibilities of correcting psychophysical health through positive therapy is particularly important. The development of effective methods and programs of therapeutic assistance for student youth experiencing stress and traumatic events under martial law can help maintain and preserve their physical health and psycho-emotional state and increase their level of adaptation and ability to overcome the consequences of war.

AIM

The aim is to investigate the level of physical health and psycho-emotional state of students under martial law and propose means of their psychophysical correction.

Objectives: 1) to study the level of physical health and psycho-emotional state of students under martial law; 2) to develop a set of corrective measures to preserve and restore the physical and mental health of students under martial law.

MATERIALS AND METHODS

The research was conducted between 2023 and 2024 among students aged 20-22 (men, $n = 52$) of the National Academy of Internal Affairs (Kyiv, Ukraine). The following methods were used to achieve the research aim: bibliosemantic, medical and biological, diagnostic, and statistical. The bibliosemantic method analyzed scientific sources on the outlined range of problems. 24 sources from the databases Web of Sciences Core Collections, Scopus, PubMed, Index Copernicus and others were investigated. The medical and biological method involved assessing the state of physical health of students according to the method of V. P. Voitenko, referred to as "Health Self-Assessment" [17]. The students were given a questionnaire containing 27 questions (for example, "Do you have headaches?", "Do you think your eyesight has worsened?", "Do you have memory loss?", etc.). The first 26 questions foresee "yes" or "no" answers, and the last question ("How do you assess your health?") with "good," "satisfactory," "poor," and "very poor" answers. The first 26 questions were scored as follows: a student was awarded 1 point for each "yes" answer and 0 points for a "no" answer. The total amount gives a quantitative assessment of students' physical health. Accordingly, if the answer to the last question is "poor" or "very poor," 1 point is added. The assessment of physical health was carried out as follows: if the sum of points is from 0 to 3 points, the state of health is considered perfect, 4-7 points – good health, 8-13 – mediocre health, 14-20 – satisfactory health, 21-27 – unsatisfactory health.

The diagnostic method involved the use of two methods to assess the psycho-emotional state of students during martial law: methods referred to as "Diagnosis of Social Frustration Level" and "Anxiety Scale" [19]. The method for diagnosing social frustration is an original research tool designed to assess social well-being, particularly the social component of quality of life. Social frustration, as a complex psychological variable, is defined in this method by the level of "satisfaction-dissatisfaction" in 20 areas of personal relationships, identified as the most hypothetically significant for a young person whose life takes place in a social environment. The degree of satisfaction is subjectively measured according to a 5-point system: completely satisfied – 1, rather satisfied – 2, hard to say – 3, rather dissatisfied – 4, completely dissatisfied – 5. The anxiety scale is an informative way of self-assessing the level of anxiety at the moment (reactive, situational anxiety as a state) and personal anxiety (as a stable characteristic of a person). The scale consists of 2 parts that assess situational and

personal anxiety. Each part comprises 20 judgments (10 characterize the presence of emotions, anxiety, worry, tension, and 10 – the absence of anxiety). Situational anxiety as a state is characterized by subjectively experienced emotions: nervousness, tension, concern, and worry. Personal anxiety assesses relatively stable aspects of the personality and evaluates the state/feeling of calmness, security, and confidence.

The statistical method was used to process the data obtained. The compliance of the sample data distribution with the Gauss' law was assessed using the Shapiro-Wilk W test. The reliability of the difference between the indicators was determined using Pearson's Chi-square (χ^2) criterion. The reliability of the difference was set at $p < 0.05$. All statistical analyses were performed using SPSS software, version 10.0, adapted for medical and biological research. The research was carried out in accordance with the requirements of the Regulations on academic integrity at the National Academy of Internal Affairs and followed the regulations of the World Medical Association Declaration of Helsinki. Prior consent to participate in the study was obtained from all respondents.

RESULTS

The results of students' self-assessment of their physical health under martial law according to the indicators defined in V. P. Voitenko's method are presented in Table 1.

It has been found that during martial law, there is a deterioration in students' physical health in general and in certain indicators. Thus, 53.8 % of the students experience headaches; 76.9 % of the students have problems sleeping; 86.5 % feel a deterioration in their physical condition; 59.6 % of the students are concerned about periodic back (lower back) pain, 55.8 % – neck pain; 84.6 % often complain of physical fatigue; 55.8 % feel short of breath when walking fast. In addition, 71.2 % of the students complain of memory problems; 88.4 % of the students find it more difficult to concentrate; 63.4 % experience tinnitus; and 92.3 % feel depressed occasionally.

To the question "How do you assess your health?" the ratio of the students' answers was as follows: good – 21.2 %, satisfactory – 55.8 %, poor – 17.3 %, very poor – 5.7 %. In general, the level of physical health, according to V. P. Voitenko's method, is assessed as satisfactory in 42.3 % of the students, as mediocre in 23.1 %, as good in 19.2 %, and as unsatisfactory in 15.4 % (Fig. 1). No students have a perfect health.

Table 2 shows the results of assessing the student's satisfaction using the method for diagnosing the social frustration level.

Considering the conditions of diagnosing social frustration (the lower the score, the higher the level of satisfaction), it can be argued that modern students are most dissatisfied with their socioeconomic situation in the context of war, and this indicator is progressing. This is quite a logical standpoint since, despite the state's assistance and family support, it is quite difficult for students to adapt to the realities of war, constant stress, etc. At the same time, today's youth are most

Table 1. The results of students' self-assessment of their physical health under martial law (n=52), %

| No. | Physical health indicators | Yes | No |
|-----|---|------|------|
| 1. | Do you suffer from headaches? | 53.8 | 46.2 |
| 2. | Would you say that you wake up easily to any noise? | 76.9 | 23.1 |
| 3. | Do you have pain in the heart area? | 26.9 | 73.1 |
| 4. | Do you think your vision has deteriorated? | 36.5 | 63.5 |
| 5. | Do you think your hearing has deteriorated? | 15.4 | 84.6 |
| 6. | Do you think your physical condition has deteriorated? | 86.5 | 13.5 |
| 7. | Do you have joint pain? | 23.1 | 76.9 |
| 8. | Does the weather change affect your feelings? | 51.9 | 48.1 |
| 9. | Do you have periods when it is difficult to fall asleep? | 80.7 | 19.3 |
| 10. | Do you have constipation? | 42.3 | 57.7 |
| 11. | Does neck pain bother you? | 55.8 | 44.2 |
| 12. | Do you ever feel dizzy? | 28.8 | 71.2 |
| 13. | Have you found it harder to concentrate than before? | 88.4 | 11.6 |
| 14. | Are you concerned about memory impairment? | 71.2 | 28.8 |
| 15. | Do you feel tingling in your body, "goosebumps"? | 48.1 | 51.9 |
| 16. | Does ringing or tinnitus bother you? | 63.4 | 36.6 |
| 17. | Do you keep one of the following medicines in your home medicine cabinet: analgin, drotaverine, or heart drops? | 76.9 | 23.1 |
| 18. | Do you have swelling in your legs? | 19.2 | 80.8 |
| 19. | Do you have to give up some dishes? | 40.4 | 59.6 |
| 20. | Do you experience shortness of breath when walking fast? | 55.8 | 44.2 |
| 21. | Do you suffer from low back pain? | 59.6 | 40.1 |
| 22. | Do you use mineral water for medicinal purposes? | 30.7 | 69.3 |
| 23. | Do you find it easy to break into tears in certain situations? | 7.7 | 92.3 |
| 24. | Do you often feel physically tired? | 84.6 | 15.4 |
| 25. | Do you have times when you feel depressed? | 92.3 | 7.7 |
| 26. | Do you think your working capacity has deteriorated? | 59.6 | 40.4 |

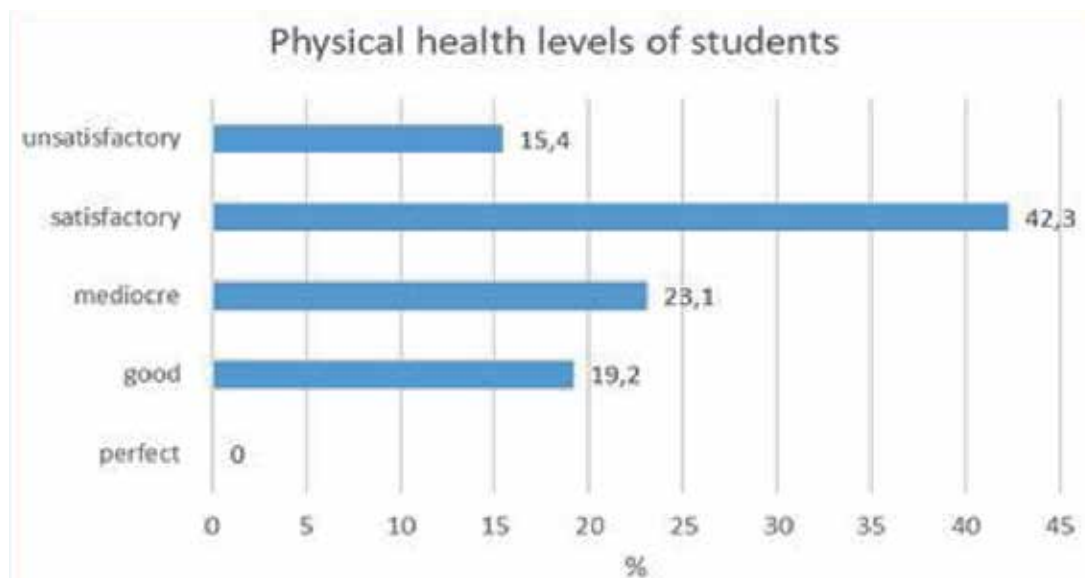
**Fig. 1.** The ratio of physical health levels of the students (n = 52) under martial law, %.

Table 2. The results of assessing the level of social frustration of the students (n = 52)

| Scales | 2023 | 2024 | GPA dynamics | |
|---|---------------------|---------------------|--------------|-------|
| | grade point average | grade point average | +/- | % |
| Satisfaction with relationships with family and friends | 3.04 | 2.74 | -0.30 | -9.86 |
| Satisfaction with the immediate social environment | 3.36 | 3.30 | -0.06 | -1.78 |
| Satisfaction with your social status | 3.26 | 3.36 | +0.10 | +2.98 |
| Satisfaction with the socio-economic situation | 3.56 | 3.64 | +0.08 | +2.19 |
| Satisfaction with your health and life | 2.96 | 3.28 | +0.32 | +9.76 |

Table 3. Levels of the students' situational anxiety (n = 52)

| Levels | 2023 | 2024 | Dynamics | χ^2 | p |
|----------------|-------|-------|----------|----------|-------|
| | | % | | | |
| Low level | 9.62 | 13.46 | +28.5 | 2.36 | <0.05 |
| Mediocre level | 53.92 | 59.62 | +9.56 | | |
| High level | 36.46 | 26.92 | -26.16 | | |

Table 4. Levels of the students' personal anxiety (n = 52)

| Levels | 2023 | 2024 | Dynamics | χ^2 | p |
|----------------|-------|-------|----------|----------|-------|
| | | % | | | |
| Low level | 7.69 | 11.54 | +33.36 | 1.27 | >0.05 |
| Mediocre level | 53.85 | 55.77 | +3.44 | | |
| High level | 38.46 | 32.69 | -15.01 | | |

satisfied with their relationships with family and friends. This opinion of the respondents can be explained by the fact that most help and support can be obtained from family and friends in difficult life circumstances. According to this scale, the dynamics indicators for 2023-2024 indicate a significant improvement in relations with the immediate environment (from 3.04 to 2.74 points). At the same time, an unfavorable trend is observed in the scale "satisfaction with health and life" (from 2.96 to 3.28 points). This demonstrates possible changes in the student's physical and mental health, which determines the feasibility of targeted corrective work with this category of people.

The results of the diagnosis of situational and personal anxiety are presented in Tables 3 and 4.

The results showed a tendency for quite a significant number of students to feel anxious. They are prone to relative adaptation in the face of situational stressors, as evidenced by the decline in the high level of situational anxiety during the two years of war. As for the indicators of personal anxiety, there are fewer dynamics. This means that more than a third of the respondents show a high level of anxiety in both real and imaginary stressful situations provoked by the war and hostilities in the country, which can be formed as an

individual trait. They have an unstable psycho-emotional state ("emotional swings," concernment, anxiety), a desire for informal communication and companionship, etc. The dominance of this level of anxiety can also result in the emergence of certain compensatory mechanisms in the form of deviant (atypical) behavior (smoking, binge eating, committing offenses, etc.).

We can conclude that the students' average level of destructive emotional states was found based on the data obtained. Still, at the same time, there is a significant number of people with high levels of anxiety. In other words, the surveyed students show relative changes in the usual psycho-emotional state of the individual, which can be accompanied by nervousness, tension, anxiety, care, etc. These manifestations appear as an emotional reaction to a stressful situation and can vary in intensity and dynamics over time. It should be noted that the dominance of such emotional responses can hurt their lives and behavior and, therefore, requires targeted and comprehensive measures to reduce anxiety and stress.

To preserve and restore students' physical and mental health during martial law, we have developed a set of measures for psychophysical corrective work with students. The developed measures were applied to all research

participants, with special attention paid to the respondents with unsatisfactory physical health and a high level of destructive emotional states. Training sessions within the framework of the program of corrective work with students were organized for groups of 10-15 people, the duration of each session was 2 hours, and the frequency of training sessions was 2 times a week (12 training sessions in total).

The complex of corrective measures is based on the use of the following techniques and physical exercises that reduce the level of physical and emotional stress of the body and increase the amount of motor activity of students and their interest in maintaining and restoring their physical and mental health: "Smooth the Sea" exercise; "Conquer Your Fear" technique; "Putting the Information on the Shelves" technique; super activity technique; "Float in the Ocean" exercise; "I Feel Good" exercise; "Conquer Your Dragon" exercise. Some of these exercises and techniques are based on visualization and exemplify the constructive use of imagination. Visualization can prevent the impact of a stressful impulse, delay it, or reduce stress if a stressful situation has not yet occurred, thereby preventing psychosomatic disorders in the body. Another part of the technique uses relaxation to overcome the stress impulse. By activating the nervous system, relaxation regulates mood and the degree of mental arousal and allows you to ease or release muscle and mental tension caused by stress. Thanks to these active defense mechanisms, students demonstrated the ability to intervene in any of the three phases of stress caused by martial law: anxiety, resistance, and exhaustion. It should be clearly understood that, having mastered these techniques and exercises, students will be able to learn how to regulate this tension, reduce it, and relax of their free will at their request. Physical exercises allow you to relax facial muscles (forehead, lips), gluteal muscles, arm muscles, chest muscles, abdominal muscles, etc. At the same time, the program provides for the use of self-regulation effects: the effect of calming (elimination of emotional tension), the effect of recovery (weakening of fatigue manifestations), and the effect of activation (increase in psychophysiological reactivity).

DISCUSSION

The conduct of hostilities on the territory of Ukraine has led to the emergence of factors dangerous to the psychophysical health of people in a large area that can cause a set of destructive conditions and phenomena in any person [4, 20]. The relevant personal reactions include, in particular, feelings of stupor, fear, hysteria, anxiety, panic, confusion, guilt, tense expectation of a disaster, loss of faith, avoidance of unpleasant emotions, desire for revenge, etc., that may occur in a person's life in connection with the death or injury of family members, destruction of their home, etc. In the difficult (sometimes extreme) conditions of life-sustaining activities of many people during the war, a fairly common negative emotional state for civilians is a feeling of constant anxiety and worry [21].

The impact of martial law peculiarities on the physical health and psycho-emotional state of young people is

obvious, as they are one of the most vulnerable categories of the population. According to researchers [6, 7], in the presence of powerful stressors and extreme situations, a young person's personality hardly reacts to external influences except through a disorganizing emotional state; in the energy regime that appears in martial law, the intellect fails to cope with its task. In any case, reason will not help an individual successfully overcome the inadequacy of emotional states, nor will it give them a communicative form.

The analysis of the results obtained made it possible to identify the peculiarities of physical health and psycho-emotional state of students in wartime, including a fairly high level of manifestation of destructive emotional states. According to some scholars [8, 11], emotional states that go beyond the norm can be accompanied by nervousness, tension, anxiety, worry, etc. In the context of hostilities and shelling, very different in their manifestation, these disorders may have similar mechanics: there is no normal connection between emotions and intelligence [22].

One of the ways to improve physical health and reduce anxiety among students is through corrective work. After all, as scientists rightly point out [9, 10, 23, 24], negative phenomena have a mostly negative, disorganizing effect on the performance and behavior of young people. Given this, the systematic and qualified work of coaches and psychologists will contribute to the process of restoring (preserving) the physical and mental health of young people and a deeper understanding of the emergence of stress and anxiety. Thus, it will contribute to acquiring skills to work with this problem.

CONCLUSIONS

It has been found that the level of physical health of 42.3 % of students was rated as satisfactory, 23.1 % as mediocre, 19.2 % as good, and 15.4 % as unsatisfactory. More than half of the students during martial law experience headaches (53.8 %), deterioration of physical condition (86.5 %), periodic lower back pain (59.6 %); have trouble sleeping (76.9 %); complain of physical fatigue (84.6 %), memory (71.2 %) and attention (88.4 %); feel depressed (92.3 %).

It has been established that in the conditions of war, there is an unfavorable trend among student youth in terms of dissatisfaction with their health and life against the background of dominant dissatisfaction with their socio-economic situation. They tend to be relatively adaptable in the face of stressful events. Still, more than a third of students show a high level of anxiety in both real and imaginary stressful situations provoked by the war. A significant number of the students point to certain personal changes that affect their psycho-emotional state, mood, and well-being. At the same time, the deterioration of the psychophysical well-being of young people can generate uncertainty and indifference or, on the contrary, provoke the emergence of deviant (atypical) behavior (smoking, binge eating, committing offenses, etc.). Improving the situation will be facilitated by providing students with

comprehensive and qualified psychophysical assistance through the organization and implementation of corrective measures to preserve (restore) this category of people's physical and mental health.

PROSPECTS FOR FURTHER RESEARCH

We plan to study the impact of the developed set of corrective measures on the dynamics of physical and mental health indicators of students.

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Evaluation of temporomandibular joint disorders in patients with systemic scleroderma after two years of rehabilitation

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ABSTRACT

Aim: To objectively evaluate the range of mandibular mobility based on linear measurements in patients with generalized scleroderma treated at the Department of Dermatology of the PIM of the Ministry of Internal Medicine, who underwent rehabilitation for 2 years.

Materials and Methods: The study group consisted of 55 patients aged 27 to 80 years (mean 56.4) with systemic scleroderma, who periodically received rheologic treatment in the Department of Dermatology. Additionally, pharmacotherapy was supplemented with 2 years of individually tailored rehabilitation, including facial muscle exercises and self-massage, adapted to each patient's motor capabilities. Each patient received a set of exercises to perform at home. The results of the study were analyzed before and after therapy, including measurements of mandibular range of motion: active mandibular inversion, lateral mandibular displacement, and anterior movement. Forty-two patients completed the project.

Results and Conclusions: The study confirmed significant mobility limitations in the temporomandibular joints of patients with generalized scleroderma. A slight improvement was observed after facial exercises and massage.

KEY WORDS: systemic scleroderma, rehabilitation, temporomandibular joint, range of motion, massage, facial exercises

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INTRODUCTION

Patients with systemic scleroderma have a characteristic facial appearance due to skin fibrosis and jawbone resorption, resulting in a mask-like appearance and a narrowed oral crevice, which causes difficulties in opening the mouth widely (Fig. 1). Temporomandibular joint disorders, with accompanying symptoms, pose significant challenges in food intake, oral hygiene maintenance, and dental treatment [1-5]. The musculoskeletal apparatus of the masticatory organ, also known as the stomatognathic system, is a complex structure responsible for chewing, articulation, swallowing, breathing, and taste sensation. The temporomandibular joint includes components such as the articular disc and the head of the mandible along with the surrounding tissues (condylar-circular complex), where rotational movements (opening and closing the jaws) and translational movements occur.

The ranges of mandibular movement depend on the ligaments' functioning, the structure of the articular surfaces, and the ratios and morphological features of the dental arches. We distinguish three directions of movement: advancement and retraction (sliding, translational movements), lowering and raising (hinge movements), and lateral movements

(masticatory movements). In the resting state, the upper and lower teeth are not tightly adjacent, and the head of the mandible does not rest deeply in the joint cavity [6-8]. Examination of active and passive mandibular mobility is a simple and objective indicator for assessing the function of the masticatory muscles and temporomandibular joints. Objective assessment based on linear measurements using a ruler can provide a quick picture of movement limitations.

AIM

To objectively evaluate the range of mandibular mobility based on linear measurements in patients with generalized scleroderma treated at the Department of Dermatology of the PIM of the Ministry of Internal Medicine, who underwent rehabilitation for 2 years.

MATERIALS AND METHODS

Patients with systemic scleroderma, a chronic and progressive disease, have been treated at the Department of Dermatology at PIM MSWiA for over 20 years. The Ethics and Human Research Oversight Committee of the hospital approved the rehabilitation during the patients' stay at the Clinic. Physiotherapy consisted of individually tailored

facial exercises and self-massage based on an assessment of the patient's hand function and capabilities. Each patient received a set of exercises to perform at home and was taught facial self-massage. The massage was performed with specific movements: from the jaw to the cheeks and forehead, around the lips towards the cheeks, along the nose towards the forehead, circular movements around the eyes, upward movements on the forehead, and massaging the neck skin towards the face.

It is recommended to perform facial massage at least twice a week for at least 10 minutes. According to the prescribed movements, apply the cream in the morning and evening after washing your hands and cleansing your facial skin. The movements should be performed according to the patient's ability, using the middle and index fingers, the dorsal part of the hands, and/or the forearms.

Recommended facial massage technique:

- From the jaw to the cheeks and forehead.

- Around the lower lip, moving downward and then upward toward the cheeks.
- Around the upper lip, moving upward and then toward the cheeks.
- Cheeks toward the ears and forehead.
- Along the nose, moving inward toward the forehead.
- Circular movements on the lower eyelid, from the outer to the inner corner, and then on the upper eyelid in the opposite direction.
- Forehead, in an upward direction.
- Neck skin, massaged toward the face (Fig. 2).

Facial muscle exercises are active, free exercises performed in front of a mirror twice a day, in the morning and evening.

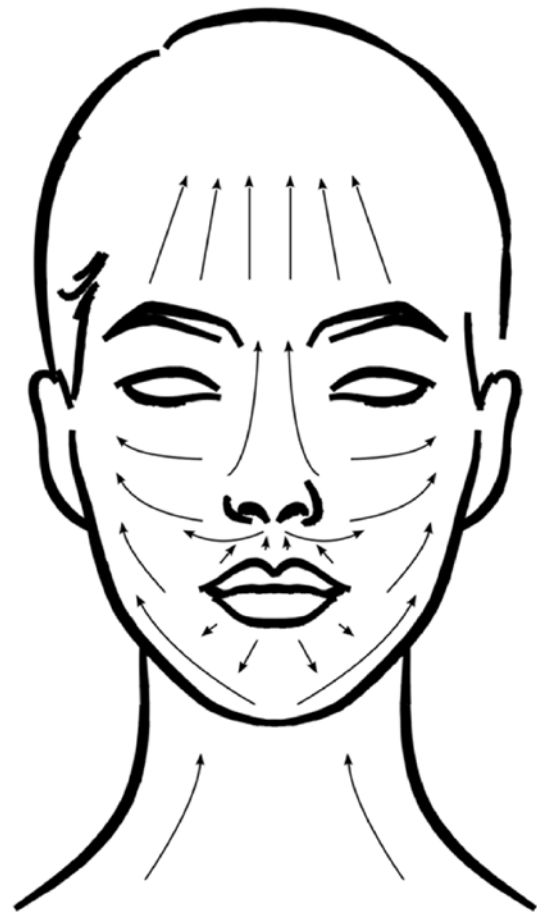


Fig. 2. Direction of facial skin massage.



Fig. 1. Maximum movement of mandibular inversion in a patient with generalized scleroderma.

These exercises resemble the clear and exaggerated pronunciation of the vowels A, O, U, and I, while stretching the skin of the red lip area as far as possible. Measurements were taken before, during, and after the 2-year follow-up of the patient.

Linear measurements of mandibular range of motion included:

- Range of active inversion movement.
- Lateral movement of the mandible.
- Measurement of anterior movement.

The value of mandibular opening was measured between the incisal edges of the teeth. The range of lateral movement was determined by the distance between the midline of the maxilla and mandible at the maximum lateral displacement of the mandible, without tooth contact in the resting position. Mandibular extension was defined by the distance between the labial surface of the upper incisal teeth and the lingual surface of the lower incisal teeth at maximum mandibular extension, with minimal distance between the upper and lower teeth [9-15].

RESULTS

Analysis of the results confirmed that patients with systemic scleroderma have significant limitations in

temporomandibular joint mobility. Initially, the study group consisted of 55 participants; 42 completed the project, including 35 women and 7 men, aged 28 to 80 years (mean 57.57). During the study, the average value of mandibular advancement slightly increased from 3.56 cm to 3.66 cm, and ultimately to a value of 3.80 cm. The median also increased during the study from 3.50 cm to 3.75 cm, and ultimately to 3.80 cm. During the study, the mode changed, but ultimately at the end of the study, it returned to the same value as at the beginning. The standard deviation remained almost unchanged throughout the study. This means that the average deviation of results from the arithmetic mean did not undergo significant changes during the study (Table 1).

During the study, the average value of anterior mandibular movement did not change and remained at 0.27 cm. At the same time, the median decreased from 0.30 cm to 0.25 cm. During the study, the mode also decreased, from 0.50 cm at the beginning of the study to 0.20 cm at the end. The standard deviation remained almost unchanged

throughout the study. This indicates that the average deviation of results from the arithmetic mean did not undergo significant changes during the study (Table 2).

For each patient participating in the study, the lateral movement to the left was calculated. Measurements were taken three times: at the beginning of the study, during the study, and at the end (Table 3).

During the study, the average value of lateral movement to the left increased from 0.62 cm to 0.76 cm. The median also increased from 0.50 cm to 0.80 cm, and similarly, the mode doubled from 0.50 cm to 1.00 cm. The standard deviation increased during the study, indicating that the average deviation of results from the arithmetic mean increased during the study. The obtained values allow us to conclude that generally, the value of lateral movement to the left increased during the study (Table 3).

During the study, the average value of lateral movement to the right increased from 0.64 cm to 0.69 cm. The median also increased from 0.50 cm to 0.75 cm; however, the mode remained unchanged. The standard deviation remained

Table 1. Jaw Abduction Examination – Statistical Indicators

| Parameter | Baseline of the study | Midpoint of the study | Endpoint of the study |
|-----------------------------|-----------------------|-----------------------|-----------------------|
| mean [cm] | 3,56 | 3,66 | 3,80 |
| median [cm] | 3,50 | 3,75 | 4,00 |
| minimum [cm] | 2,00 | 2,00 | 2,00 |
| maximum [cm] | 6,00 | 6,00 | 5,50 |
| mode [cm] | 3,00 | 4,00 | 3,00 |
| bottom quartile [cm] | 3,00 | 3,00 | 3,00 |
| Lower quartile [cm] | 4,00 | 4,00 | 4,50 |
| variance [cm ²] | 0,76 | 0,77 | 0,71 |
| standard deviation [cm] | 0,87 | 0,88 | 0,85 |
| coefficient of variation | 25% | 24% | 22% |
| asymmetry coefficient | 0,54 | 0,27 | 0,12 |

Table 2. Jaw Protrusion Examination – Statistical Indicators

| Parameter | Baseline of the study | Midpoint of the study | Endpoint of the study |
|-----------------------------|-----------------------|-----------------------|-----------------------|
| mean [cm] | 0,27 | 0,24 | 0,27 |
| median [cm] | 0,30 | 0,20 | 0,25 |
| minimum [cm] | -1,50 | -1,50 | -1,50 |
| maximum [cm] | 0,90 | 0,90 | 1,00 |
| mode [cm] | 0,50 | 0,20 | 0,20 |
| bottom quartile [cm] | 0,20 | 0,10 | 0,20 |
| Lower quartile [cm] | 0,50 | 0,50 | 0,50 |
| variance [cm ²] | 0,12 | 0,12 | 0,14 |
| standard deviation [cm] | 0,35 | 0,35 | 0,37 |
| coefficient of variation | 126% | 148% | 136% |
| asymmetry coefficient | -3,03 | -2,64 | -2,41 |

Table 3. Left Lateral Movement Examination – Statistical Indicators

| Parameter | Baseline of the study | Midpoint of the study | Endpoint of the study |
|-----------------------------|-----------------------|-----------------------|-----------------------|
| mean [cm] | 0,62 | 0,74 | 0,76 |
| median [cm] | 0,50 | 0,80 | 0,80 |
| minimum [cm] | 0,00 | 0,00 | 0,00 |
| maximum [cm] | 1,50 | 1,50 | 1,70 |
| mode [cm] | 0,50 | 1,00 | 1,00 |
| bottom quartile [cm] | 0,50 | 0,50 | 0,50 |
| Lower quartile [cm] | 1,00 | 1,00 | 1,00 |
| variance [cm ²] | 0,12 | 0,15 | 0,16 |
| standard deviation [cm] | 0,35 | 0,39 | 0,40 |
| coefficient of variation | 56% | 53% | 52% |
| asymmetry coefficient | 0,31 | -0,08 | 0,09 |

Table 4. Right Lateral Movement Examination – Statistical Indicators

| Parameter | Baseline of the study | Midpoint of the study | Endpoint of the study |
|-----------------------------|-----------------------|-----------------------|-----------------------|
| mean [cm] | 0,64 | 0,69 | 0,69 |
| median [cm] | 0,50 | 0,60 | 0,75 |
| minimum [cm] | 0,00 | 0,00 | 0,00 |
| maximum [cm] | 1,50 | 1,50 | 1,50 |
| mode [cm] | 0,50 | 0,50 | 0,50 |
| bottom quartile [cm] | 0,50 | 0,50 | 0,50 |
| Lower quartile [cm] | 1,00 | 1,00 | 1,00 |
| variance [cm ²] | 0,13 | 0,14 | 0,13 |
| standard deviation [cm] | 0,36 | 0,37 | 0,36 |
| coefficient of variation | 56% | 54% | 52% |
| asymmetry coefficient | 0,53 | 0,37 | 0,20 |

almost unchanged throughout the study. This means that the average deviation of results from the arithmetic mean did not undergo significant changes during the study. The obtained values suggest that the value of lateral movement to the right underwent a slight increase during the study (Table 4).

After determining the basic statistical measures for each series of test results, an analysis was conducted to assess the conformity of distributions with a normal distribution. The Shapiro-Wilk test was used for this purpose, which is commonly considered the most powerful test for samples with a small number of results ($n < 100$). In this test, the null hypothesis states that the sample comes from a population with a normal distribution, while the alternative hypothesis states that the sample does not come from a population with a normal distribution.

Calculations were performed using Microsoft Excel and Shapiro-Wilk coefficient tables. The calculated value of the theoretical statistic W was compared with the theoretical statistic value for the appropriate sample size and the

assumed level of statistical significance (for this study, a critical significance level of $p=0.05$ was accepted). According to the tables for the Shapiro-Wilk test, the theoretical value of the statistic for $n=42$ and $p=0.05$ is $W(42;0.05) = 0.942$. Obtaining a result below this value means that there is no basis to reject the null hypothesis, and for the given significance level, the distribution can be considered normal. Conversely, obtaining a result above the theoretical value necessitates rejecting the null hypothesis in favor of the alternative hypothesis, indicating that the distribution of the population cannot be regarded as normal.

Table 5 summarizes the calculated values of the theoretical statistic W for the results of the measurements taken at three moments during the study: at the beginning, during the mid-study assessment, and at the end (Table 5). Of all the samples examined, only in one case is there no basis to reject the null hypothesis, and it can be concluded that the population has a normal distribution at the accepted level of significance (lateral movement to the left at the end of the study).

Table 5. Theoretical W Statistic Values for the Shapiro-Wilk Test

| Study | Baseline of the study | Midpoint of the study | Endpoint of the study |
|---------------------|-----------------------|-----------------------|-----------------------|
| abduction movement | 0,941 | 0,938 | 0,940 |
| protrusive movement | 0,712 | 0,759 | 0,792 |
| left laterotrusion | 0,919 | 0,939 | 0,935 |
| right laterotrusion | 0,882 | 0,936 | 0,952 |

Table 6. Test Statistic Values for the Wilcoxon Test

| Study | Variant I | Variant II | Variant III |
|---------------------|-----------|------------|-------------|
| abduction movement | 5,027 | 5,123 | 4,905 |
| protrusive movement | 5,046 | 5,145 | 4,012 |
| left laterotrusion | 5,196 | 4,782 | 4,466 |
| right laterotrusion | 4,839 | 3,876 | 4,268 |

As part of the statistical analysis, the Wilcoxon test for paired observations was also conducted. This test is used to verify the equality of medians in two populations and allows us to determine whether there was a statistically significant change in the analyzed samples. A key advantage of the Wilcoxon test is the lack of assumptions about the sample distribution. The null hypothesis in the Wilcoxon test states that there is no significant difference in the distributions of the variables, meaning that the median is unchanged. The alternative hypothesis states that there is a significant difference in the distributions of the variables, indicating that the median is statistically different in both populations.

Calculations were performed using Microsoft Excel. The calculated value of the theoretical statistic Z, considering the adjustment for tied ranks, was compared with the theoretical statistic value for the assumed level of statistical significance. For a large number of samples ($n > 20$), the normal distribution is used for verification of the Wilcoxon test. For the purposes of the Wilcoxon test, a critical significance level of $p=0.001$ was accepted. The calculated values of the test statistic were compared with the computed critical area for the chosen significance level. The critical value was read from the standard normal distribution table for the accepted significance level ($= 3.291$). A test statistic value below this threshold indicates a lack of statistical basis for rejecting the null hypothesis, while a value above indicates the need to reject the null hypothesis in favor of the alternative hypothesis. The results of the calculations are presented in the table below (Table 6). The results of the Wilcoxon test show that in each case there was a statistically significant change between the populations, i.e., during the study.

The conducted interventions had an impact on the results obtained by the patients.

DISCUSSION

Systemic sclerosis (SSc) is a disease affecting small arterial vessels and mesenchymal tissues of unknown origin. It often involves the musculoskeletal system, and the disease can impact the mandible, causing bone erosions, osteolysis, and atrophy of the masticatory muscles [16,17]. These bone changes are thought to have an ischemic basis. The changes, which are usually bilateral, occur in the condyles, coronoid processes, and gonial angles [9-15,18]. The primary arterial blood supply to the mandible and most of the ascending ramus comes from the inferior alveolar artery. Blood supply to the condyles, coronoid processes, and gonial angles originates from small muscular arteries.

According to Cornu and Dechoux, the mean values of active mandibular mobility in adults without pathology are as follows (Table 7).

The normal range of abduction in absolute measurements is 44-54 mm. The physiological range for this movement to the right and left is 10 mm. The permissible physiological difference between the right and left lateral movement is 2 mm. The physiological range for mandibular protrusion is 7-8 mm [19-21]. In patients with SSc, there can be skin fibrosis of the face and oral and maxillofacial manifestations including trismus, muscle atrophy, thinning of the vermilion border, secondary microstomia, xerostomia, stiffness of the tongue and lips, widening of the periodontal ligament space, trigeminal neuralgia, and mandibular resorption. The incidence of mandibular resorption in SSc has been reported to be 20-33% [22-25]. The most commonly affected areas are the gonial angles (37.6%), followed by the condyle (20.8%), coronoid process (20.0%), and the posterior border of the ascending ramus (14.4%). In 13.7% of cases, bilateral condylar involvement is observed. Few cases of surgical correction for malocclusion caused by condylar involvement related to SSc have been documented.

Table 7. Mean values of active s.s.c. mobility in adults without pathology according to Cornu and Dechoux

| Kind of Movement | All (N = 3697) | Men (N = 1644) | Women (N = 2053) |
|----------------------|----------------|----------------|------------------|
| Abduction | 50.2 ± 6.5 | 51.7 ± 6.7 | 49.0 ± 6.0 |
| Protrusion | 7.3 ± 2.6 | 7.7 ± 2.6 | 7.1 ± 2.5 |
| Right latero-trusion | 9.1 ± 2.8 | 9.2 ± 2.7 | 9.0 ± 2.8 |
| Left latero-trusion | 9.9 ± 3.0 | 10.1 ± 3.0 | 9.7 ± 3.0 |

Surgical attempts have been made to replace resorbed condyles, as well as total bilateral temporomandibular joint replacement, which may provide these patients with functional occlusion, improved facial balance, and enhanced quality of life [26, 27].

Fibrosis of the salivary glands in SSc patients leads to xerostomia, increasing the risk of caries; thus, oral hygiene instruction (OHI) and dental prophylaxis are recommended for these patients. Research has also examined the correlation between mandibular osteolysis, mouth opening measurements, disease duration, and the presence or absence of teeth. An increasing correlation was found between mouth opening and disease duration. No correlation was observed between the presence or absence of teeth and osteolysis, nor between the presence or absence of teeth and the side of osteolysis. In patients with SSc, there can also be vocal cord paralysis, spontaneous facial fractures, and episodes of dysphagia and choking. Permanent damage to the vocal cords, combined with severe localized bone resorption, may lead to significant

disability and nutritional disorders, making the treatment of these patients a considerable challenge.

CONCLUSIONS

The physiotherapy conducted at the Dermatology Clinic and the home exercise program influenced the results achieved by patients in the temporomandibular joints. Facial muscle exercises and self-massage contributed to an increase in the opening, protrusion, and both lateral movements of the mandible. During the course of the disease, the patient has problems with joints and muscle function, and frequent resorption of the terminal phalanges of the hands and feet causes him to become disabled. An important element, as confirmed by research, is supporting treatment with physiotherapy. Exercise and self-massage may not be possible with these problems. Balneology specialists are prepared to use spa medicine to support treatment. It seems reasonable for patients with systemic sclerosis to use their knowledge and treatments more and more often.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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National classifier of medical devices nc 024:2023 as a standard and methodological basis for providing the rehabilitation system with medical devices

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ABSTRACT

Aim: To present methodological approaches to the classification of medical devices in the National Classifier of Medical Devices of Ukraine NC 024: 2023 for providing the rehabilitation system with medical devices for their practical application in the development of the rehabilitation system in the country.

Materials and Methods: international and domestic legal documents on the classification of medical devices and the development of the rehabilitation system. bibliosemantic, of systemic approach and of structural-and-logical analysis.

Conclusions: methodological approaches to providing the rehabilitation system with medical devices with the use of the National Classifier of Medical Devices NC 024:2023 are presented.

KEY WORDS: National Classifier of Medical Devices, rehabilitation system, application

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INTRODUCTION

The rehabilitation system is actively developing in Ukraine. The directions of development of the rehabilitation system are defined at the legislative level [1, 2]. The efficiency of the system depends to some extent on the availability of medical devices.

In Ukraine, the classification of medical devices has been harmonized with the international nomenclature of medical devices Global Medical Device Nomenclature (hereinafter referred to as GMDN) [3], which is currently used in most countries of the European Union and the United States [4-7]. GMDN is a system of globally recognized international descriptors used to identify medical devices; a product naming system used for diagnosing, prevention, monitoring, treatment, or relieving human illness and injuries. The GMDN nomenclature is recommended for practical use by the International Forum of Medical Device Regulators (IMDRF) and is the only platform for identifying medical devices and the basis for international industry information exchange [8].

Harmonization was carried out through the approval of the National Classifier of Medical Devices (hereinafter referred to as NC 024:2023) [9].

The National Classifier of Medical Devices was adopted in order to unify technical and economic information and identification of medical devices in accordance with the system of generally accepted international descriptors.

The National Classifier NC 024:2023 should be used in the public procurement process to describe the subject of public

procurement in agreements (contracts), ensure transparency of procurement procedures for medical devices for budget funds, create an effective competitive environment in the field of public procurement, and facilitate the entry into the world market of domestically produced medical devices.

AIM

To present methodological approaches to the classification of medical devices in the National Classifier of Medical Devices of Ukraine NC 024: 2023 for providing the rehabilitation system with medical devices for their practical application in the development of the rehabilitation system in the country.

MATERIALS AND METHODS

MATERIALS

International and domestic legal documents on the classification of medical devices and the development of the rehabilitation system.

METHODS

bibliosemantic, of systemic approach and of structural-and-logical analysis.

REVIEW AND DISCUSSION

The National Classifier of Medical Devices NC 024:2023 is designed to identify instruments, apparatus, devices, materials or other medical equipment. It is an adapted

translation of the list of medical devices included in the GMDN nomenclature, as well as supplemented with medical devices that are not included in the GMDN nomenclature, but are used in Ukraine.

Taking into account the above noted, the compliance of the terminology used in the national classifier of medical devices NC 024: 2023 was analyzed. In the course of the undertaken analysis, the full compliance of the terms used in the national classifier of medical devices NC 024: 2023 with the GMDN system was established. The GMDN system and NC 024:2023 define a medical device as any instrument, apparatuses, device, software, material or other product used both separately and in combination with each other (including software provided by the manufacturer to use specifically for diagnostic and/or therapeutic purposes and necessary for the proper functioning of the medical device) intended by the manufacturer for use in order to provide diagnostics, prevention, monitoring, treatment

or alleviation of the course of the patient's illness in case of disease, diagnostics, monitoring, treatment, alleviation of the patient's condition in case of injury or disability or their compensation, research, replacement, modification or maintenance of the anatomy or physiological process, control of the fertilization process and the main intended effect in or on the human body which is not achieved by means of pharmacological, immunological or metabolic agents, but the functioning of which such agents may contribute.

The national classifier of medical devices NC 024:2023 includes 65352 medical devices, 720 of which are used exclusively in the rehabilitation system. When developing the classifier, the following methodological approaches were used: hierarchical, ordinal, five-digit.

Each item of the classifier consists of five parts. These are: code, name of the medical device in Ukrainian, description of the medical device in Ukrainian, name of the medical device

Table 1. Fragment of the National Classifier of Medical Devices of Ukraine "Classifier of Medical Devices NC 024:2023": rehabilitation

| Code | English name | English description |
|-------|--|---|
| 63362 | Ambulatory posturo-graph | A body-worn device intended to measure and graphically record ambulatory body movements related to posture and balance to assist with the diagnosis and treatment of balance disorders caused by a variety of conditions (e.g., neurological, vestibular). It consists of sensors that detect degree of body sway/tilt, and may in addition include vibratory stimulators which provide feedback to the patient for balance/posture improvement; it may be connected to an off-the-shelf computer for device control and graphical recording analysis/display. The device is intended to be operated by a healthcare professional in a clinical setting. |
| 38064 | Ankle continuous passive motion exerciser | A mains electricity (AC-powered) device designed to continuously move the ankle joint (e.g., flexion, inversion/eversion) without patient assistance during continuous passive motion (CPM) exercise therapy usually following surgery or trauma to the joint. The device typically consists of a motorized carriage with straps to hold and move the leg/ankle, and an electrical control unit for the healthcare professional to set the variable range of motion and motion speed; digital displays, manual/automated safety capabilities, and other features may also be included. CPM is believed to stimulate articular tissues and circulation of synovial fluid, and to reduce joint oedema. |
| 36678 | Arm ergometer | A device used to provide a quantitative measurement of the rate at which work (energy) is performed by a muscle or group of muscles under controlled conditions. It is operated by a person using their arms, usually the patient, undergoing assessment, treatment, training, or rehabilitation and measures this related muscle activity at defined workloads. |
| 58911 | Arthritis transcutaneous electrical joint stimulation system | An assembly of battery-powered devices intended to be used as adjunctive therapy in reducing the level of pain and stiffness associated with rheumatoid arthritis or osteoarthritis by electrically stimulating arthritic tissue in a joint across the skin (transcutaneously); it is not intended for neurostimulation. It typically consists of an external electric current generator and electrodes (leads) that are placed on the skin with conductive patches to deliver pulsed electrical fields to the painful arthritic tissue. It is intended for routine home-use to treat symptoms of rheumatoid arthritis (RA) of the hands and osteoarthritis of the knee. |
| 48071 | Assistive dynamic arm support system | An assembly of mechanical devices designed to bear the weight of a weak or paralyzed arm providing gravity-compensating support for the functional use and/or rehabilitation of the arm/wrist/hand. It is used to support activities of daily life (ADL) such as feeding, self care, computer use, as well as therapeutical training and prevention of complaints of neck and/or shoulder (CANS). It consists of a main column anchored to a surface or wheelchair and a suspended sling or a set of components which take the weight bearing through a set of axes, joints, and a splint underneath the user's arm. Gravity compensation works via a counterweight or spring mechanism and a power-assistive electromotor. |

in English, description of the medical device in English. It should be noted that digital information about a medical device included in the national classifier is presented in the form of a five-digit numerical code GMDN (Code), and it is cross-referenced with the exact wording of the term (Term Name) and description (Definition).

We carry out a specific example of a medical device intended for rehabilitation:

Code: 61543

Term Name: Mobile gait rehabilitation system, pneumatic-support

Definition: A mobile assembly of battery-powered devices designed to assist a patient with a walking disability (neurogenic, muscular, or osseous in origin) to regain lost motor function, which may include rising from sitting to standing and/or ambulation. It consists of a mobile rigid framework on electronically-controlled wheels which includes: patient-worn inflatable trousers intended to stabilize and support the weight of the patient during ambulation; a pneumatic pump to inflate the trousers; handgrips; and an electronic control unit. It is intended to be used in a clinical setting (e.g., gait lab, rehabilitation center, nursing home) under healthcare professional supervision.

A fragment of the National Classifier of Medical Devices of Ukraine, which presents data on medical devices intended for rehabilitation, is presented in the Table 1.

It should be noted that in the process of procurement of medical devices, the classifier NC 024:2023 is used alongside with the national classifier of Ukraine SC 021:2015 "Unified Procurement Dictionary" [10]. At the same time, the practical use of the National Classifier NC 024:2023 is provided by the computer program "System of on-line access to the classifier of medical devices". It provides continuous on-line access of the representatives of health care institutions, establishments, organizations and enterprises to the information of the classifier.

In order to organize the provision of rehabilitation assistance, the Ministry of Health of Ukraine approved an approximate list of material-and-technical equipment of inpatient rehabilitation departments, units of health care institutions that provide rehabilitation assistance to adults in the post-acute rehabilitation period [11]. The approved sample list of material-and-technical equipment includes a list of medical devices, their quantity and description for rehabilitation units of health care institutions.

In the context of the implementation of state guarantees of the provision of free medical care [12], the requirements for equipping institutions (units) for the provision of rehabilitation services with medical devices are determined at the state level [13].

The analysis of these documents and NC 024:2023 as a standard for providing the rehabilitation system with medical devices indicates certain discrepancies in the terminology and description of the medical devices specified in them. This situation requires full harmonization of these regulatory documents on the basis of NC 024:2023.

CONCLUSIONS

The National Classifier of Medical Devices NC 024:2023 is designed to identify instruments, apparatuses, devices, materials belonging to medical devices, is the relevant national standard and, using the computer program "System of on-line access to the classifier of medical devices", contributes to the provision of the rehabilitation system with medical devices available in Ukraine. At the same time, it is necessary to fully harmonize the sample list of material-and-technical equipment of inpatient rehabilitation departments, units of health care institutions that provide rehabilitation assistance to adults in the post-acute rehabilitation period and the conditions for the purchase of medical services (requirements for the list of equipment) with NC 024: 2023.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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Possibilities of integration of health promotion into the rehabilitation process

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ABSTRACT

Aim: The aim is to analyse and determine the possibilities of using health promotion tools and approaches at different levels of implementation of the rehabilitation process.

Materials and Methods: Published information sources on the organization of rehabilitation care and health promotion served as materials of the study. The methods of system analysis, structural and logical analysis, bibliosemantic and information-analytical methods were used during the research.

Conclusions: The implementation of the rehabilitation process at different levels requires different conditions, resources and the availability of specialists, which leads to different approaches to the integration of health promotion. On the basis of the defined categories of rehabilitation, it is possible to form a framework for the integration of health promotion into the rehabilitation process with the identification of potential tools and approaches. However, all levels require not only resources, but also appropriate professional training of specialists in the implementation of health promotion activities.

KEY WORDS: health promotion, rehabilitation, physical therapist, occupational therapist, community

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INTRODUCTION

Non-communicable diseases (NCDs) and injuries have long been the main causes of morbidity and mortality – they create a major global burden for the world's population, regardless of age, gender or socio-economic status [1]. In 2020 and 2021, the global burden of disease from all causes increased, mortality rates increased, and life expectancy decreased, attributable to the direct and indirect impacts of COVID-19, health system overload, and poor coordination of policy responses to the COVID-19 pandemic [1, 2]. It should be taken into account that the development of NCDs depends on genetic, physiological, environmental and behavioural factors with which people do not associate everyday life, leading to the feeling of adverse health consequences only after many years [3]. Such a situation requires taking more active actions in relation to health promotion and disease prevention both at national level and at the level of regions and communities.

At the same time, the need for rehabilitation is also constantly growing due to a number of reasons: the aging of the population, the increase in chronic non-communicable diseases, the war in Ukraine and other conflicts, the consequences of the COVID-19 pandemic, natural disasters [4]. The increasing need for treatment and rehabilitation and insufficient resources of the health care system in many countries make it necessary to involve in health promotion not only the healthy population, but also the population with diagnosed diseases. Experts have long recommended the integration of health promotion

services into traditional health services, which will reduce mortality, disability and reduce health care costs [5].

AIM

The aim is to analyse and determine the possibilities of using health promotion tools and approaches at different levels of implementation of the rehabilitation process.

MATERIALS AND METHODS

Published information sources on the organization of rehabilitation assistance and health promotion served as materials of the study. The methods of system analysis, structural and logical analysis, bibliosemantic and information-analytical methods were used during the research.

REVIEW AND DISCUSSION

As defined by the Ottawa Charter (1986), Health Promotion is a process that enables individuals and communities to increase control over their health and improve it [6]. According to the definition of the WHO, rehabilitation involves a set of interventions aimed at optimizing functioning and reducing disability among persons with health problems in interaction with their environment [7, 8].

Therefore, in general, the ultimate goal of both health care strategies, promotion and rehabilitation, is to achieve the ability of people to improve the mental, social and physical components of health, to strengthen control over them, to improve the quality of life, to prevent the occurrence of

diseases, complications and disabilities. The combination of the two strategies will allow to more effectively influence the consumers of rehabilitation services and achieve a better result in maintaining health and preventing disability.

Rehabilitation services, including occupational therapy and physical therapy, are provided to individuals who have or are at risk of developing impairments, activity limitations, or participation limitations. At the same time, these are persons of all age groups, regardless of the existing socio-economic, cultural and ethnic conditions [5]. Therefore, the beneficiary of rehabilitation can be any person who benefits from the service, the purpose of which is to optimize his/her functioning [9]. However, each such person is simultaneously a consumer of health promotion services both at the individual level and at the community level. It should also be taken into account that persons with disabilities not only have a worse health condition, but also smoke several times more often, have excessive body weight and insufficient physical activity [10]. Therefore, the rehabilitation process creates not only good opportunities

for the implementation of health promotion services, but also an important need to preserve and improve the health of individuals and population groups. According to the conceptual framework of health promotion proposed by S. Kumar and G. Preetha, health promotion approaches and strategies should be implemented not only among healthy population, but also among population with symptoms and revealed health disorders [11]. Health promotion programs for representatives of such groups include, along with rehabilitation and treatment, services to support a healthy lifestyle.

If we take as a basis the categories of provision of rehabilitation services recommended by WHO experts [6], then it is possible to evolve three main categories to be supplemented by health promotion: rehabilitation at the level of specialized medical care; rehabilitation at the level of primary health care, rehabilitation at the community level. For the specified three categories, a working framework for integrating health promotion into the rehabilitation process can be proposed (Table 1).

Table 1. Framework for integrating health promotion into the rehabilitation process

| Category | Places of service provision | Health promotion service providers | Health promotion tools | Approaches to health promotion |
|---|---|---|---|---|
| Rehabilitation at the level of specialized medical care | Rehabilitation hospitals, centers, departments, health care facilities providing rehabilitation services | Rehabilitation specialists (physical therapist, occupational therapist, assistants, psychologist), doctors, nurses | Informing and advising on a healthy lifestyle (physical activity, rational nutrition, giving up bad habits, etc.) Teaching physical activity skills according to the patient's capabilities Lifestyle assessment and motivational change counselling Referral of patients to other specialists in case of need | <ul style="list-style-type: none"> • medical • educational • behavioural • empowerment |
| Rehabilitation at the level of primary health care | Health care facilities or individual offices of primary health care | General practitioners, nurses, rehabilitation specialists (if available) | Informing and advising on a healthy lifestyle (physical activity, rational nutrition, giving up bad habits, etc.) Involvement in screening and vaccination Lifestyle assessment and motivational change counselling | <ul style="list-style-type: none"> • medical • educational • behavioural • empowerment |
| Rehabilitation at the community level | At the place of residence and work, in schools, childcare facilities, leisure centers, long-term care facilities, hospices, community centers, health care facilities | General practitioners, nurses, rehabilitation specialists, public health specialists, representatives of interdisciplinary groups | Implementation of health promotion programs on separate topics Involvement in the implementation of health promotion programs Creating a safe and healthy environment | <ul style="list-style-type: none"> • medical • educational • behavioural • empowerment social change |

During the provision of rehabilitation care at the level of specialized medical care, rehabilitation specialists: physical therapists, occupational therapists, psychologists can become the main implementers of health promotion measures. According to the literature, it is physical therapists and occupational therapists who could significantly reduce the burden of disease and disability if they effectively integrate health promotion strategies into their practice [8, 12, 13]. Of course, the focus should be on reducing patients' unpleasant features and symptoms, but attention to complex health needs requires advice on improving lifestyle: reducing or stopping smoking, rationalizing nutrition, optimizing physical activity, sleep hygiene and stress management, which are one of the basic skills of health promotion [13].

The possibilities of physical therapists to provide health promotion services are determined by the following factors: appropriate education, which includes knowledge of pathology regarding anatomy and physical exercises; practical experience and skills in engaging in physical exercises, fitness and health improvement; opportunities for frequent and relatively long-term contact with patients, the presence of trusting relationships with them [8, 14]. There are several important roles for physical and occupational therapists in promoting health and preventing disease or disability: promoting healthy lifestyles, emphasizing physical activity, and providing interventions not only for individuals but also for populations [8]. Scientists are constantly researching and presenting evidence on the positive impact of using health promotion measures during the rehabilitation of patients with diseases of the cardiovascular system [15] and nervous system [16]. In Canada, the Do-Live-Well (DLW) framework is used, the approach to health promotion in the practice of occupational therapists, which has been introduced since 2015, but requires constant improvement and training [17-19].

However, certain barriers to the integration of health promotion activities into the activities of physical therapists are also identified: limited time for providing services; lack of interest and commitment of the patient; insufficient awareness of patients and the public about the possibility of receiving services; insufficient level of knowledge and skills to implement health promotion; no reimbursement; lack of resources [8].

The insufficient level of knowledge and competences regarding health promotion can be overcome by improving and supplementing the educational programs of rehabilitation specialists. Thus, in the USA, with the help of a study, 25 competencies of the initial level of population health, prevention, health promotion, and wellness were defined for graduates of educational programs of physical therapists [20], which will allow better integration of health promotion activities into practice. Scientists have also developed and presented options for integrating population health issues into the professional education of physical therapists through three areas of competence: "fundamentals of population health", "health care policy" and "health prevention and promotion" [21], which will

allow specialists to focus not only on the patient, but also on the relationship with socio-economic determinants that affect health.

During rehabilitation at a specialized level, the following health promotion tools can be used: informing and advising on a healthy lifestyle (physical activity, rational nutrition, giving up bad habits, etc.); teaching physical activity skills according to the patient's capabilities; lifestyle assessment and motivational change counselling; referring patients to other specialists as needed. So, the main approaches are medical (providing rehabilitation and treatment services), educational (informing about a healthy lifestyle and opportunities to improve it), behavioural (motivational counselling and support throughout the entire rehabilitation process). However, they will all be aimed at enabling patients to take more control over their health and improve it through greater knowledge, skills and attitude change (empowerment approach).

The use of new technological solutions [22] and social networks [23] can facilitate health promotion activities for rehabilitation specialists. After all, there are data that patients during rehabilitation are ready to use modern information and communication channels [24], which will simultaneously strengthen health promotion activities.

The next potential category for integrating health promotion is rehabilitation integrated into primary health care, approaches to which are outlined in the document "Access to rehabilitation in primary health care: an ongoing challenge" [25]. At this stage, the main providers of health promotion services are general practitioners and nurses. However, the World Health Organization notes that the access of persons to rehabilitation services at the level of primary health care depends on the availability of a sufficient number of qualitatively trained personnel at the specified level [25]. Competence of general practitioners and nurses are sufficient for carrying out health promotion activities, but are often limited for implementing full and effective rehabilitation. Therefore, patients can receive high-quality health promotion services during the medical support of the rehabilitation process, which requires the involvement of rehabilitation specialists. Recently, there is more and more information about team-based primary health care, which offers patients a wide range of medical services using an interdisciplinary approach [26]. In the presence of physical therapists or occupational therapists at the level of primary health care, the process of health promotion can be complex, more qualitative and effective. So, for example, recommendations on physical activity (informational approach) can be supported by regular physical exercises conducted by a physical therapist (behavioural approach), help in modifying home environment by an occupational therapist, which will allow patients to feel control over their own health and make informed decisions (empowerment approach). It is especially important to involve the occupational therapist in teamwork, since his field of activity includes not only rehabilitation tasks, but also health promotion, disease and disability prevention, community development [27].

At the same time, during the implementation of the rehabilitation process, patients can be more actively involved in screening for chronic non-infectious and certain infectious diseases (medical approach).

The most significant for health promotion is rehabilitation at the community level, which is an important development strategy and contributes simultaneously to rehabilitation, social integration and poverty reduction for people with disabilities [28]. The main beneficiaries of the rehabilitation process at the community level are mainly people with long-term functional limitations who need constant physical and occupational therapy services. In general, rehabilitation at the community level is a complex strategy that requires the partnership of stakeholders with varying degrees of influence, control over resources, authority; respect for culture and local experience; expanding the capabilities of the target group; responsibility and justness during program development [28]. Such characteristics have much in common with the organization of health promotion.

In accordance with the Ottawa Charter, the key areas of health promotion activities, along with the formation of public policy aimed at health promotion, are the strengthening of community actions for health, the development of personal skills to preserve and strengthen health, the creation of a favourable environment for health, reorientation of medical services to disease prevention and health promotion services [5]. Cross-sectoral collaboration and community participation are key strategies [29]. To ensure a full-fledged

and effective rehabilitation process together with health promotion, appropriate specialists are needed, therefore it is important to unite into one team rehabilitation specialists (physical therapists, occupational therapists), primary health care workers, representatives of other sectors (education, social security, public organizations, business structures, etc.). Such a cross-sectoral working group can develop and implement targeted health promotion programs for populations in need of rehabilitation services. It is important to use the entire range of health promotion approaches: educational, behavioural, and empowerment. But it still needs to be supplemented with the tools of the social change approach, which will allow creating a healthier and more functional social environment.

CONCLUSIONS

The implementation of rehabilitation process at different levels requires different conditions, resources and the availability of specialists, which leads to different approaches to the integration of health promotion. On the basis of the defined categories of rehabilitation, it is possible to form a framework for the integration of health promotion into the rehabilitation process with the identification of potential tools and approaches. However, all levels require not only resources, but also appropriate professional training of specialists in the implementation of health promotion activities. The developed and proposed framework needs to be discussed, evaluated and refined by experts: rehabilitation specialists and public health specialists.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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