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## Wpływ Kognitywnych Terapeutycznych Ćwiczeń na usprawnienie kończyny górnej u pacjenta po udarze mózgu – studium przypadku

Effects of cognitive exercise therapy on upper  
extremity function in stroke  
patients –  
A case study

Testy i ćwiczenia izokinetyczne w praktyce fizjoterapeutycznej  
Isokinetic testing and exercises in physiotherapeutic practice

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# Cryotherapy as Part of the Post-Stress Disorder Rehabilitation Complex

O.A. Panchenko<sup>1(A,B,C,D,E,F)</sup>, Zbigniew Śliwiński<sup>2,3(A,D,F)</sup>

<sup>1</sup>Scientific-Practical Medical Rehabilitation and Diagnostic Centre of the Ukrainian Ministry of Health, Ukraine

<sup>2</sup>Faculty of Medicine and Health Sciences, Institute of Physiotherapy, Jan Kochanowski University in Kielce, Poland

<sup>3</sup>Wrocław Medical University, Wrocław, Poland

## Abstract

### Aim.

The aim of our investigation is to estimate cryotherapy and complex rehabilitating procedures effectiveness for the patients who suffer of some post stress disorders. The aim of psychotherapeutic treatment for PSD suffering patients is to relieve such patients from some traumatic event intrusive memories and following emotional pains. Every patient should have got possibility to be involved in present day social and economic activities.

### Material and methods.

Research approaches and materials: the clinical and experimental psychological investigations have been conducted with 114 patients, who suffered of various post stress disorders on the basis of psychoneurological department of the State Institution "Scientific Practical Medical Rehabilitating Diagnostic Centre of the Ukrainian Health Ministry" Konstantinivka city, Donetsk region, Ukraine. The main (experimental) group consisted of post stress disorders suffering patients. This group consisted of 74 patients, who, along with corresponding medical treatment according to the clinical medical treatment protocol, attended course of general extreme air cryotherapy (GEACT). The control group consisted 70 patients.

The equipment to create extreme low temperature (beneath -100°C), was cryochamber "Cryo Therapy Chamber" Zimmer Midizin Systeme (Germany). It was possible to treat the patients both individually and in groups (3-4 persons). All the procedures were conducted according to O.A. Panchenko's methodology. The patients had been selected according to inclusion-exclusion criteria. All the patients were volunteers, they were properly informed about extremely low temperature influences and about such medical investigation conditions.

### Conclusions.

Today, cryotherapy is widely spread in various fields of medical science. This methodology constant technical improvement and any side effects absence promote this methodology to be popular around the Globe. General extreme air cryotherapy is an ideal model of psychophysiological stress. As a result, patients' psychophysiological and psychological conditions improvements have been observed.

## Key words:

cryotherapy, post-stress disorders, rehabilitation complex

## Introduction

Nowadays, we are the witnesses of various crises recent rapid increase along with conflict phenomena around the Globe for numerous social groups. Together with modern society social and technocratic development high dynamism, information technologies development, scientific and technological solutions and life quality improvements, there are various reasons of psychoemotional stress level increase, alongside with personality organization complication. These circumstances advance high level demands to the integrative activity as a whole and in particular to all the processes of psychic sphere.

Psychological stress is a special and specific mental condition. This is an original form of distinctive extreme situation for the subject. The most necessary condition of social stress increase subject's level of threat perception. Any emotional stress is absent if some individual does not perceive

some situation as a dangerous one. Perception and estimation of any situation as dangerous are bounded up with several cognitive processes, individual's personality characteristics (anxiety, emotional stability etc.) and his or her previous life experience. Therefore, there are no definite factors or situations to provoke identical kind of stress for any separate individual.

Anxiety is a mandatory attribute for any kind of emotional stress and a symptom of human functional reserves deficiency to overcome any threat. It could be defined as sense of apprehension or expectation, interconnected to frustration (actual human need blockade). Anxiety releases the most important mechanism of emotional stress.

Any threat could be defined as anxiety and fear interconnection. As a whole, anxiety and fear are the main indicators of psychic stress adaptation mechanisms. Adaptation mechanisms activation is a stimulus to resolve any stressful situation.



Post stress disorders (PSD) are various reactions to stress events that are behind individual's experience. If we talk about any extreme or stress situation, we should imply extremal nature of such event, that goes beyond usual human experience. All such events awake extreme fear, anxiety and helplessness. Trauma (stress influence) intensity level erases all patients' individual or personal characteristics and promotes posttraumatic stress disorders (PTSD) development. Such disorders could be immanent to any person. Pre and posttraumatic situations analysis investigations have provided us with evidences of various neurotic and psychopathic symptoms development because of hostile situation experience [3].

During any kind of catastrophic situation, there is some acute reactions to stress, as perplexity, fear, psychomotor agitation or catatonia, panic reactions, probable consciousness narrowing, memory disorders, disorientation, visual and auditory hallucinations depending on the nature of any catastrophic situation.

Accident consequences could be nominally divided into three major groups of disorders: psychopathological (clinical), psychological and social. To psychopathological ones [5] belong acute stress disorders, pain, anxiety disorders, inexplicable physical symptoms, depression, domestic problems, posttraumatic symptoms, avoidant behavior symptoms and phobic disorders. To psychological ones belong suspiciousness development, behavioral and emotional reactions rigidity, axiological sphere dissociation, psychological defense mechanism and coping strategies equality and inadequacy, microsocial interconnections limitation and avoidance behavior formation.

Among psychological and social trauma consequences, in the first instance we should make an emphasis on social disadaptation states that manifests themselves in the form of paracathexis, bad mood, anxiety, emotional instability, low levels of sociability and self-control, suspicion and radicalism. For such patients it is difficult to be any kind of psychotherapeutic aid recipients. They believe that they are able to cope with their negative emotional stress by themselves. People around often agree with them, these people try to persuade our patients not to think about their psycho-traumatic stressful event. Nevertheless, the patients often fall short of expectations.

Post stress disorders problem has become actual over the last years. In Ukraine and over the World there are various sources of instability, numerous areas of active military actions. Great number of military men becomes involved into these conflicts settlement. Civil population suffers of military action consequences. Our experience has shown that military action area civil population suffers of such consequences even to a greater extent compare to combatants. This civil population suffers of severe psychic traumas and consequent psychological disorders [1].

The main psychotherapy and psychocorrection are rational, cognitive, and behavioral therapies. Autogenic trainings, aromatherapy, musical therapy and game therapy are widely used too. The main task of aforementioned therapeutic me-

asures is to let the patients an opportunity to acquire self-adjustment and recovery-adaptation skills. Individual and group therapeutic practices are the mostly widespread psychocorrection forms.

Psychotherapeutic methodologies should be combined with other medical treatment forms (pharmaceutical treatment, physiotherapy, kinesiotherapy etc.) Psychotherapeutic activity remedial aims are approachable coupled only with patients' pathological processes, mental conditions, personality and social environment peculiarities consideration. Sanitation availability and patients' individual living conditions are very important too. All of that, as a whole, determines any medical treatment effectiveness.

Brand new drug-free health aid methodologies and physiological measures, with no side effects are the most important aims of rehabilitating medicine nowadays. Among them are the ways to search new recovery procedures, to keep and sustain patients' normal psychic conditions, to improve patient's performance in the workplace, organismic functional backup widening for patients who suffer of various neurosis and neurosis-like states.

Active general extreme air cryotherapy usage serves to heal great number of somatic diseases, borderline psychic and psychosomatic personality disorders. It makes such therapy to be a perspective methodology in the area of modern rehabilitation medicine. Great cryotherapy therapeutic modality makes possible to use this therapeutic methodology for various human psychoemotional disorders.

General extreme air cryotherapy promotes patients' psychoemotional conditions. It was discovered that extreme cryoinfluence promotes systemic hemodynamics functioning, upraise vegetative regulation and physical working efficiency indexes, enhances antioxidative and non-specific resistibility system functioning levels. Just after the very first cryotherapeutic procedure, almost all patients who were treated with help of various air cryoequipment felt significant mood improvement, refreshing and easiness sensation and even slight euphoric haze. Depression reduction could be explained by the patients' personal anxiety, emotional oppression and psychic tension levels decrease. This phenomenon is explained by endorphins and leucine enkephalins rush.

The whole cryotherapeutic measures medical effectiveness is interconnected to stress stimulating influence to patient's Hypothalamic- Pituitary- Adrenal and peripheral circulation systems. This reaction essence is all patient's body systems activation, that is necessary for patient normal living conditions provision. Thus, biological essence of such stressful impact is the adaptation process. To achieve that, some special functional conditions and psychological and physiological complex reactions are provoked [2].

Existing experience of general extreme air cryotherapy usage in medical and prophylactic fields witnesses of this method prospects and safety to restore patients' adequate psychoemotional conditions and psychic working efficiency during post stress disorders medication.



## Aim

The aim of our investigation is to estimate cryotherapy and complex rehabilitating procedures effectiveness for the patients who suffer of some post stress disorders. The aim of psychotherapeutic treatment for PSD suffering patients is to relieve such patients from some traumatic event intrusive memories and following emotional pains. Every patient should have got possibility to be involved in present day social and economic activities [9].

## Material and methods

Research approaches and materials: the clinical and experimental psychological investigations have been conducted with 114 patients, who suffered of various post stress disorders on the basis of psychoneurological department of the State Institution "Scientific Practical Medical Rehabilitating Diagnostic Centre of the Ukrainian Health Ministry" Konstantinivka city, Donetsk region, Ukraine. The main (experimental) group consisted of post stress disorders suffering patients. This group consisted of 74 patients, who, along with corresponding medical treatment according to the clinical medical treatment protocol, attended course of general extreme air cryotherapy (GEACT). The control group consisted 70 patients. These patients took corresponding medical treatment, according to the clinical medical treatment protocol.

Both groups had been formed to eliminate any statistically significant difference indexes for all methodologies in use.

The equipment to create extreme low temperature (beneath -100°C), was cryochamber "Cryo Therapy Chamber" Zimmer Midizin Systeme (Germany). It was possible to treat the patients both individually and in groups (3-4 persons). All the procedures were conducted according to O.A. Panchenko's methodology. The patients had been selected according to inclusion-exclusion criteria. All the patients were volunteers, they were properly informed about extremely low temperatu-

re influences and about such medical investigation conditions.

For post stress disorder manifestation diagnostics we used Mississippi post-traumatic stress disorder scale and emotional and physical self-estimation questionnaire. During our psychodiagnostic investigation, the main prevailing emotional state kinds were relieved for the Donetsk region population. Test results witnessed of utter negative emotional states revelation (fear, anxiety, despair and annoyance) for very long period of time [1].

The majority of regional population suffer or anxiety at present time (Fig. 1). The level of sense of fear has been decreasing for a while, and just one of four examined patients suffered of it. The senses of despair and despondency are very high now, and this level is approximately twice higher now compare to October 2014 level. The levels of helplessness, annoyance and indifference are stable for a long period; there are no tendencies for such emotional state decline. In addition, we have conducted the studies in the period between July 2014 and January 2017. Eastern Ukraine civilian population psychoemotional state peculiarities have been studied yet. Adult Eastern Ukraine civilians (aged 18-70) of various social status took part in our investigation (3,017 in Total). By the results of our investigation, it is possible to make a conclusion, that 13.8% of patients suffered of post traumatic stress disorders (PTSD) as a whole or of one of some PTSD symptoms (sleep disorders, mood alterations and decreased activity). Such changings are interconnected to both regional social escalation and adaptive psychic mechanisms exhaustion because of the psychotraumatic factors exposure duration.

To estimate cryotherapy procedures effectiveness during post stress disorders suffered patients' rehabilitation process, the following methodologies have been used: neuro psychic strain diagnosis (by T.A. Nemchin (NPS)); functio-

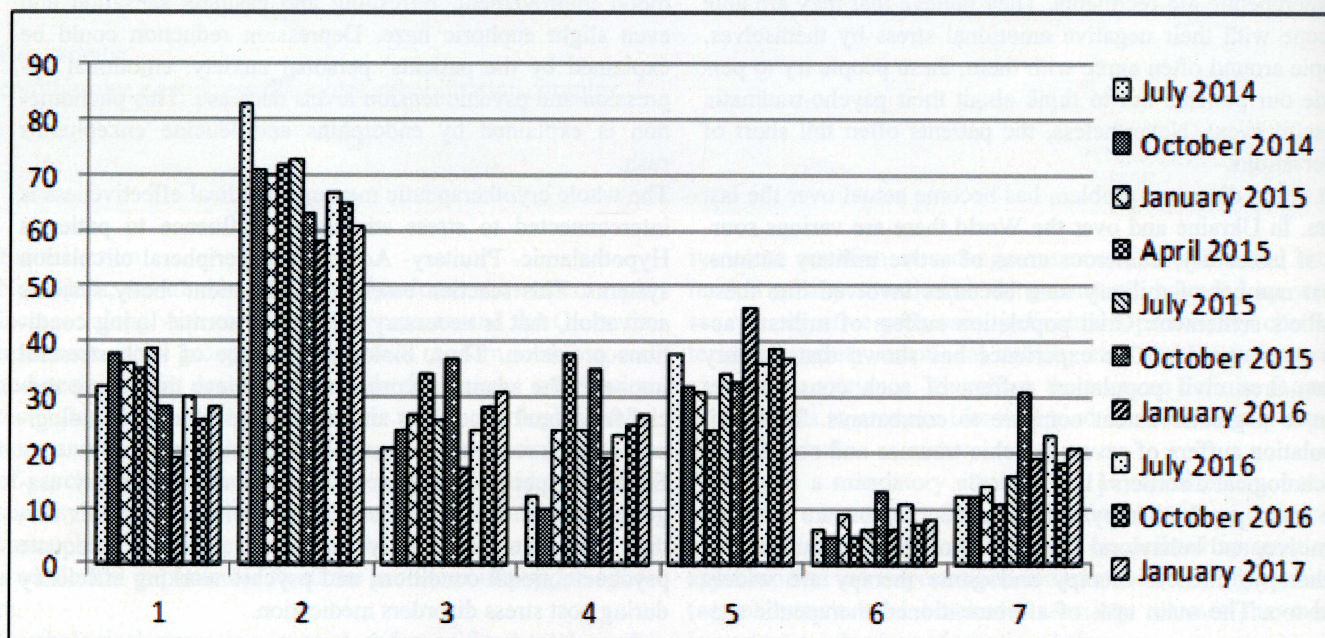


Figure 1. Military actions regional population emotional reactions in the Eastern part of Ukraine. 1 – fear, 2 – anxiety, 3 – helplessness, 4 – despair, 5 - annoyance, 6 – indifference, 7 – despondency



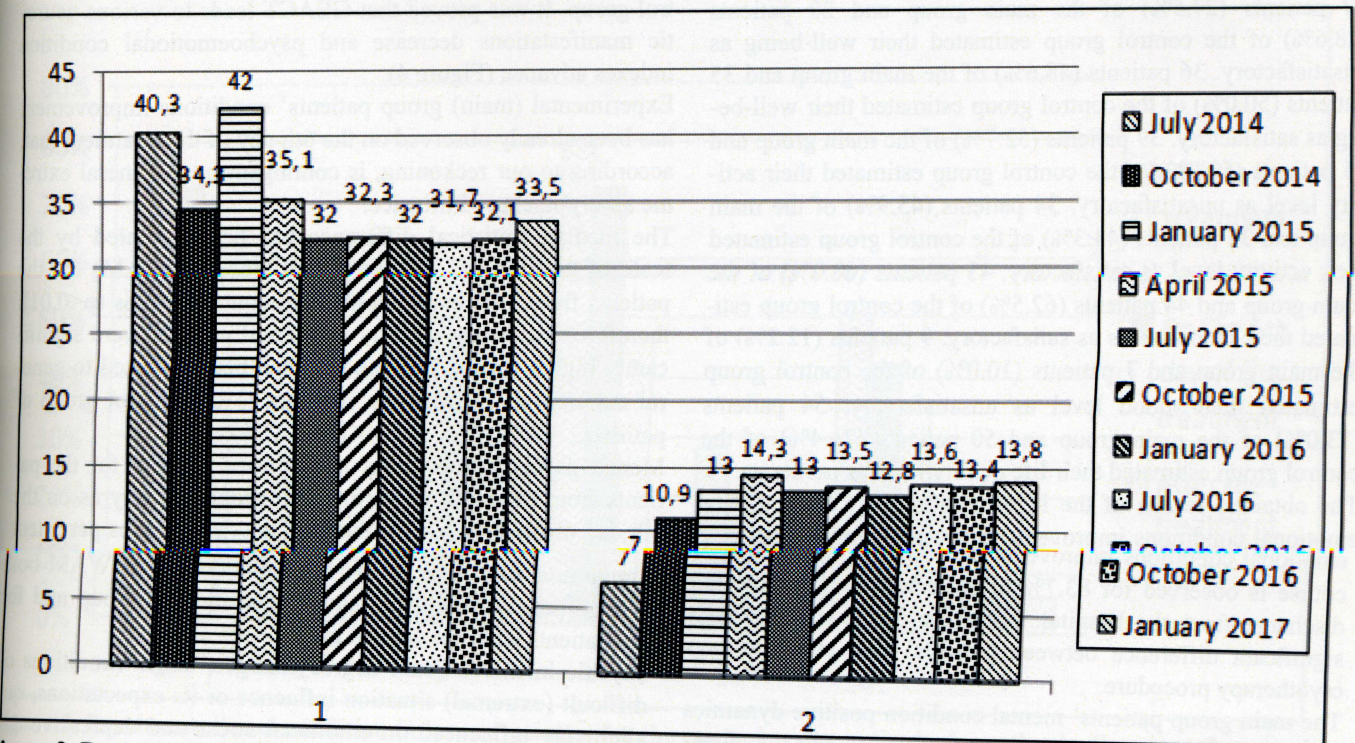


Figure 2. Post stress diagnosis results: 1 - some PTSD symptoms diagnosed, PTSD as a whole diagnosed

al state differential self-estimate (feeling-activity-mood); color choice method by M Lucher; personal and reactive anxiety research methodology by Spielberger-Khanin; "Life quality" methodology; neuro-psycho strain estimation scale.

### Research results and discussion

the results of our research, it was discovered that 64 patients (86.5%) of the main group suffered of asthenic disorders,

meanwhile in the control group 56 patients (80%) suffered of it; 55 patients (74.3%) of the main group experienced moderate neuro-psycho strain level increase, meanwhile in the control group 53 patients (75.7%) suffered of it; 42 patients (56.8%) of the main group and 35 patients (50%) of the control group experienced high personal anxiety level increase. 59 patients (79.7%) of the main group and 56 patients (80%) of the control group experienced state anxiety high level (Figure 3).

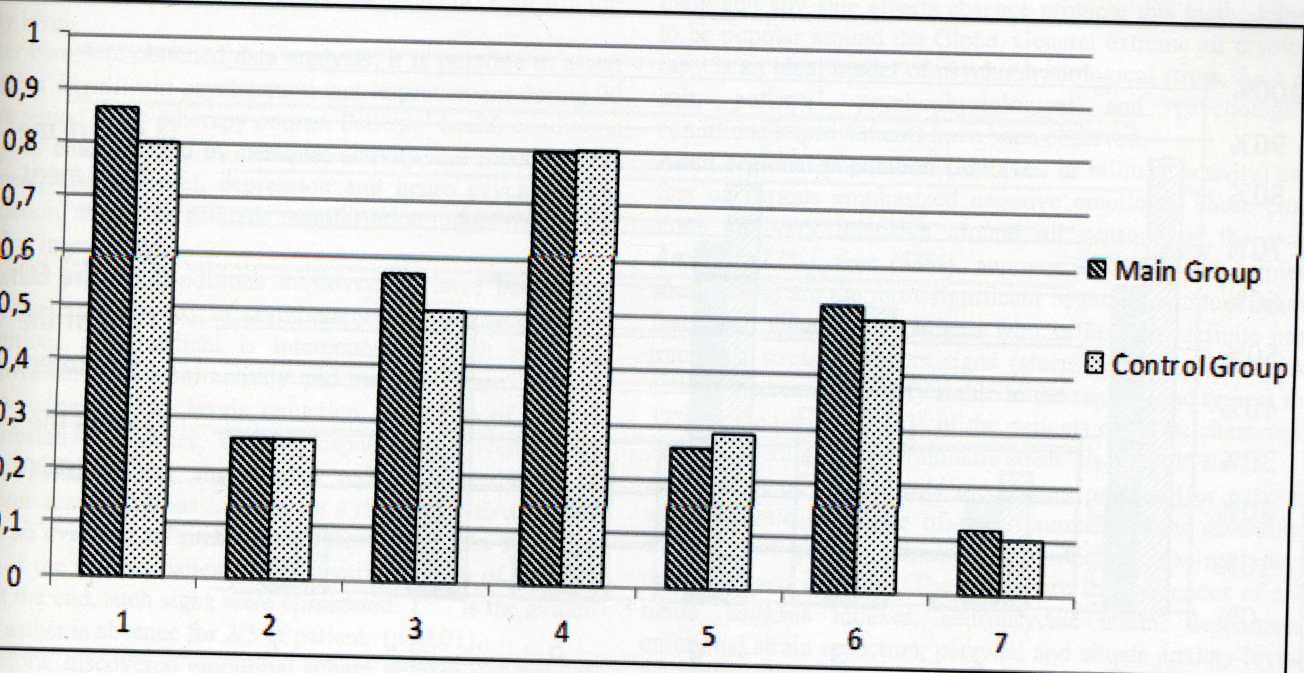


Figure 3. The results of examination for the patients from main and control groups: 1 - asthenic disorders, 2 - excessive neuro-psycho strain, 3 - personal anxiety, 4 - situational anxiety, 5 - unsatisfactory well-being, 6 - unsatisfactory activity, 7 - unsatisfactory mood



19 patients (27.5%) of the main group and 20 patients (28.6%) of the control group estimated their well-being as unsatisfactory. 36 patients (48.6%) of the main group and 35 patients (50.0%) of the control group estimated their well-being as satisfactory. 39 patients (52.7%) of the main group and 35 patients (50.0%) of the control group estimated their activity level as unsatisfactory. 34 patients (45.9%) of the main group and 31 patients (44.3%) of the control group estimated their activity level as satisfactory. 45 patients (60.0%) of the main group and 44 patients (62.5%) of the control group estimated their mood levels as satisfactory. 9 patients (12.2%) of the main group and 7 patients (10.0%) of the control group estimated their mood level as unsatisfactory. 54 patients (73.0%) of the main group and 50 patients (71.4%) of the control group estimated their life quality level as moderate.

The obtained results of the investigation show that psychoemotional conditions improvement as a result of cryotherapy course is observed for 83.7% of patients directly after their discharge from the hospital. Therefore, there is statistically significant difference between patients' first and last days cryotherapy procedure.

The main group patients' mental condition positive dynamics was observed on the 6th day of cryoinfluence, and this dynamics was much higher compare to the control group (see pictures 4 and 5). Mental condition changes manifested themselves by the way of patients' wellbeing, activity and mood improvement, personal and reactive anxiety levels reduction, various asthenic manifestations level decrease, working efficiency improvement and neuro-psycho strain decrease.

62 patients (83.7%) of the main group noticed significant wellbeing improvement at the moment of their discharge from the hospital compare to 53 patients (75.7%) of the con-

trol group. It was proved that GEACT leads to various neurotic manifestations decrease and psychoemotional condition indexes advance (Figure 4).

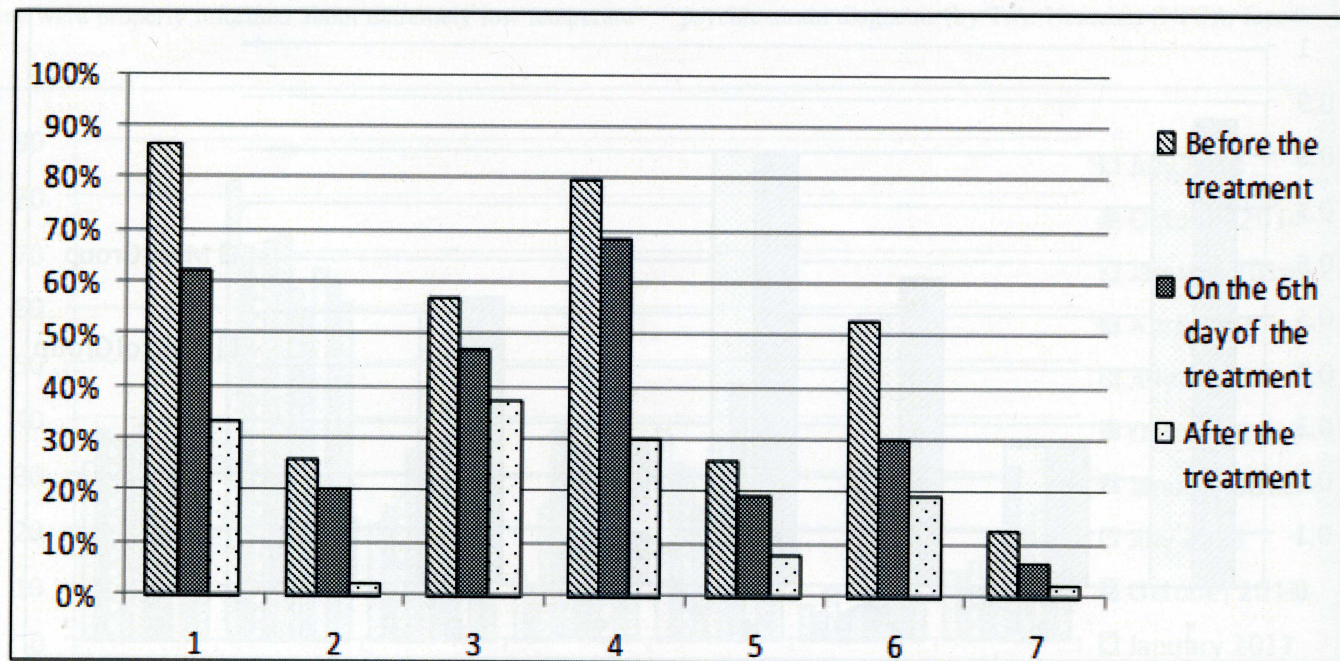
Experimental (main) group patients' conditions improvement has been already observed on the 6th day of the treatment that, according to our reckoning, is contingent upon general extreme air cryotherapy influence.

The median statistical difference has been revealed by the scale of "wellbeing", "activity" and "mood" (WAM) for the patients from both experimental and control groups ( $p < 0,01$ ); therefore, wellbeing, activity and mood indexes were significantly higher for the patients who had been imposed to general extreme air cryotherapy compare to the control group of patients.

Mental psychological stress levels were reduced for the patients from the main (experimental) group as early as on the 6th day of the therapy. On the 20th day, all indexes persistent diminution was observed by the methodology of WAM both for the patients from the main (experimental) group and for the patients from the control group.

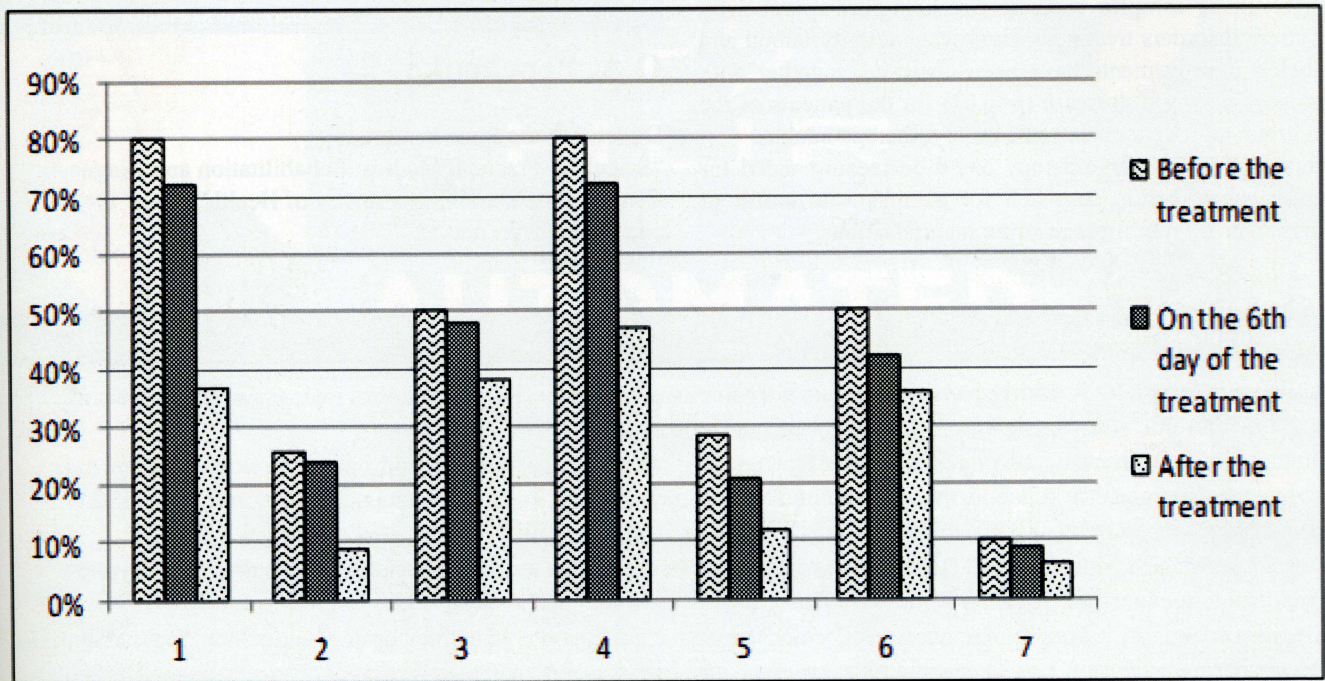
Psychic intensive strain degree changes, under conditions of difficult (extremal) situation influence or its expectations, qualitatively influenced on emotional stress and depressive damage manifestation level. Therefore, on the 20th day of our investigations, emotional stress level in majority of cases was characterized by patients' emotional balance, but depression level indexes were within normal limits.

Anxiety analysis pointed out, that patients' personal and situation anxiety level in the beginning of our medical treatment course manifested themselves as anxiety and emotional disturbance symptoms. However, after the course of general extreme air cryotherapy, such symptoms were reduced reliably. Nevertheless, personal situational anxiety level was redu-



**Figure 4. Psychoemotional condition indexes dynamics for the main group patients. 1 – asthenic disorders, 2- excessive neuro-psycho strain, 3 – personal anxiety, 4 – situational anxiety, 5 – unsatisfactory wellbeing, 6 – unsatisfactory activity level, 7 – unsatisfactory mood**





**Figure 5. Psychoemotional condition indexes dynamics for the control group patients. 1 – asthenic disorders, 2- excessive neuro-psyhic strain, 3 – personal anxiety, 4 – situational anxiety, 5 – unsatisfactory wellbeing, 6 – unsatisfactory activity level, 7 – unsatisfactory mood.**

ced in this case only after the 20th day of medication course. Moreover, situational anxiety level had a tendency to decrease just after the 6th day of cryoinfluence.

“Life Quality” index reflexes general level of wellbeing and satisfactory level of all human life activity aspects. All of that influences patients’ health conditions are interconnected (or not) with various diseases. Life quality improvement indexes differences are statistically reliable even after the 6th day of cryotherapy procedures and guarantee patients’ high life quality level.

After complete obtained data analysis, it is possible to assert patients’ significant psychoemotional improvement during 20 days period of cryotherapy course. Patients’ health conditions may be characterized by personal activity and mood improvement, anxiety level, depression and neuro psychic strain reduction, as well as asthenic manifestation reduction and life quality improvement.

Patients’ psychic conditions improvement have been observed since the 6th day of cryotherapy course. Psychological conditions improvement is interconnected with wellbeing improvement, personal activity and mood increase, personal and reactive anxiety levels reduction, reduction of asthenic manifestations indexes, working capacity improvement and neuro psychological strain level reduction. Reduction of asthenic manifestations indexes, as a result of GEACT course, is an evidence of such course effectiveness. In the beginning of the course, patients shown various signs of asthenia, but at the end, such signs were eliminated. This is the evidence of asthenia absence for 2/3 of patients ( $p < 0.01$ ).

Therefore, discovered emotional sphere indexes dynamic for post stress disorders is an evidence of general extreme air

cryotherapy effectiveness. Such therapy provides us with fast and sustainable patients’ emotional conditions improvement. This kind of therapy is absolutely safe and effective rehabilitation methodology for the patients of such notion.

### Conclusions

Today, cryotherapy is widely spread in various fields of medical science. This methodology constant technical improvement and any side effects absence promote this methodology to be popular around the Globe. General extreme air cryotherapy is an ideal model of psychophysiological stress. As a result, patients’ psychophysiological and psychological conditions improvements have been observed.

Adult regional population (involved in military activity) suffers of various emphasized negative emotions. These emotions are very intensive around all seasons of the year. Anxiety (72%), fear (38%), annoyance (34%) and helplessness (26%) are the most significant negative emotions manifestations. Quantity of patients who suffered of definite post traumatic stress disorders signs (sleep disorders, mood and activity decrease) are very stable in the region (and typical for 32% of the patients). 13% of the patients could be characterized as suffering of post traumatic stress disorders in full.

As a result of our patients medication process (for patients who dramatically suffer of post traumatic stress disorders) with help of general extreme air cryotherapy, the important data has been obtained. These data are the evidences of patients’ asthenia indexes, neuropsychic strain, depression, emotional strain reduction, personal and situate anxiety levels reduction and life quality, personal activity, wellbeing and mood improvement as a result of cryotherapy course.



As a result of complex medical psychological approach to post stress disorders treatment, significant activity, mood and wellbeing improvements have been observed, together with neuro psychic strain decrease ( $p<0.01$ ) for the patients of the main group after general extreme air cryotherapy course. General extreme air cryotherapy could be recommended for complex rehabilitation approach for patients who suffer of various signs of post stress disorder manifestations.

Adres do korespondencji / Corresponding author

### O.A. Panchenko

Director of the State Institution  
"Scientific-Practical Medical Rehabilitation and Diagnostic  
Centre of the Ukrainian Ministry of Health"  
email: oap@ukr.net

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## Targi Rehabilitacji i Sprzętu Rehabilitacyjnego

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ul. Braci Mieroszewskich 124 | 41-219 Sosnowiec | tel. 32 788 75 23 | fax 32 788 75 25 | rehexpo@exposilesia.pl

**www.rehexpo.pl**