INFLUENCE OF THE EMOTIONAL STATE ON BEHAVIOR IN EXTREME CONDITIONS OF COMPETITIVE SPORTS ACTIVITIES

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Annotation. *Purpose*: establish a communication pattern of emotional intensity and level of extreme environment in which activity is performed. *Materials*: in the study involved 600 men aged 18-22 years. *Results*: the effect of the emotional state on the efficiency of the motor activity that flowed under extreme conditions. Set individual characteristics flow sports activities in extreme conditions. First used in the special semantic space for the orderly presentation of research results parachute jumps. The monogram built in semantic fields allows to establish the frequency response range of individual heartbeats and the optimal frequency for maximum performance. On the basis of established regularities of the "reflex of readiness" assessment methodology given emotional stress, which reflects the readiness of an individual to perform a parachute jump. An objective indicator of preparedness measures is a violation of the symmetry of the flow and haptic reflex and serial dynamometry. *Conclusions*: in using semantic spaces reflects the flowing of reflex of biological caution and accompaniment reflex. In the basis of constructing estimates of emotional stress are the regularities of mean arterial pressure as nonspecific reactions. Measure of extent of confused is estimated by variability of accompaniment reflex. Breach of symmetry in mean arterial pressure and the amplitude - frequency response accompaniment reflex, determine the validity of staying in extreme conditions. Introduction of the measure in using semantic spaces allows by selective data to establish the overall structure of the studied process.
Keywords: extreme conditions, emotional stress, serial dynamometry, haptic reflex.

Introduction

In system of Olympic education scientific provisioning of training process, based on consideration of individual standards of mental and physical conditions, level of fitness and current functional state is one of main sectors of its content [1, 12].

Especially important in content of this sector are questions of personality's mental readiness to extreme conditions, in which it is necessary to carry out functioning. Appearance of great number of extreme kinds of sports and professions, connected with high risk especially sharpen the question about psycho-emotional training of persons, who carry out their functioning in such conditions [1, 3]. Among students especially popular are all kinds of parachute sports as the most extreme kind from military applied sports.

The most specific emotional state, which reduces effectiveness of professional functioning, is fear. In our case we regard fear as certain level of "reflex of biological cautiousness". Significance of studying of this reflex's nature lies in the fact that the level of its manifestation significantly influencers on correctness of real situation's apprehension and probability of of unfavorable result [5, 10, 11, 13-15].

Purpose, tasks of the work, material and methods

The purpose of the work is to work out semantic spaces of ordered apprehension of empiric data; to determine regularities, connecting emotional tension and effectiveness of the fulfilled work.

The materials and methods: our researches were carried out on the base of Zhytomir military hospital during medical examination of military officers of 95-th aero-mobile brigade, who passed parachute training. Total quantity of the examined was 600 men of 18-22 years old age. We used methods of physiological control, visual analysis, statistic processing of data, methods of mathematical simulation.

Results of the researches:

Reflex of biological cautiousness is connected with evaluation of danger and choice of behavior, which reduces it up to level of assurance in positive result. In case if such choice is absent anxiety and wish to avoid functioning in existing extreme situation are increased. Conception of extremeness implies understood degree of solubility of the task in extreme situation. Anxiety appears as a result of imagining of final result in condition if any link of this task realization can not be fulfilled [7].

For complete understanding of fear and anxiety, which appear in extreme conditions of functioning it is necessary to regard "reflex of curiosity" –opposition to reflex of biological cautiousness – alongside with it. The first is connected with imagining of what will be achieved, is the task is fulfilled. The second is connected with imagining what will happen is fulfillment of the task fails. Full complex of anxiety's current is determined by choice of response "avoiding – achievement", which appears in extreme conditions. Both directions of the response of choice cause increased level of "readiness reflex's" tension, against the background of which decision "yes-no" is realized. Hesitation is characterized as "uncertainty". This response of choice passes in oscillation of amplitude and frequency of its direction's change against the background of "readiness reflex" or tension, which appear as a result of counter acting

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of dichotomy of "yes-no" choice. In both cases there appears anxiety, which transforms into fear to lose possible victory, or avoiding of after effects in case of failure that reflects qualitative structure of the survived tension and anxiety with evaluating of success or failure [8].

In both cases choice of behavior in extreme situation is carried out on the base of imagining of results of its solution. Depending on belief in success or failure there manifests degree of uniformity of behavior choice "see target, don't see obstacles" or "see obstacles, don't see target".

This process can be expressed in three dimensional semantic space, in which coordinate axes are orthogonal scales of "success-failure" evaluation, expressions of behavior forms of "achievement-avoiding" and "excitation-inhibition" activity. Extremeness of situation is determined by degree of readiness to it and presence of variants of choice in unpredictable situations. Actual extremeness is a function of readiness. The appearing suddenness shall be commensurable with speed of choice of adapting behavior and, naturally, with its presence in arsenal of previous training. The first component is determined by individual features of physiological processes, the second one – by multi sided character of training for behavior in possible non standard situations. That is, by presence of choice of variants of interactions, which ensure adaptation behavior. Therefore, the required stability of behavior is determined by presence of appropriate variants and appropriate speed of their choice [4, 9].

Objective methods of control over passing of "reflex of solution choice" and "reflex of readiness" is based on physiological processes, which are in the base. Reflex of readiness is determined by expectation of assumed intensity of the required response. As far as there is no certainty, then readiness of organism is realized in non specific responses, which include trophic processes and, first of all, functioning of cardio-vascular and respiratory systems. Just they, being clearly externally expressed, are the most effective in realization of control over tension of "readiness reflex". In our case control of hear beats rate and BP dynamic are necessary. In the same way it is possible to control external breathing, change of sensitivity of sensor systems and preservation of symmetry of motion functions.

"Reflex of choice of decision" or «reflex of accompanying" are characterized by change of amplitude of physiological function's fluctuations and by frequency of their manifestation that completely is observed in ideomotor responses. Effective evaluation of emotional excitation is manifestation of haptic (from Greek haptikos – tactile) reflex. At the same time it is interpreted as prehensile [9].

In every kind of sports and professional functioning the appearing extreme situations have different qualitative content, but in all cases they are characterized by general principles, which determine their influence on organism, resulting in changing of reflexes "readiness", "choice of decision", sensor sensitivity's dynamics. General essence of any extreme situation is characterized by degree of uncertainty and by qualitative characteristic of this uncertainty. In contrast to them from the side of individual his current functional state and arsenal of stereotype behavioral forms, trained for different non-standard situations, are manifested.

Sport is the most effective model for researching of emotional state's influence on professional functioning in extreme conditions. By intensity of extreme situations parachute sport is the most illustrative and, at the same time, it has great applied significance. As a part of professional training, parachute jumps are trained by different sub-divisions of Civil defense, special detachments police officers, in quick reaction troops; all these determined the purpose of our research: influence of emotional state on effectiveness of parachute –beginners' behavior in extreme situations.

He research was carried out on the base of Zhytomir military hospital, during medical examination of military officers of 95-th aero-mobile brigade. In our researches we used modified methods of processing of cardio vascular system's indicators, haptic reflex, serial dynamometry. Modification meant construction of semantic spaces and their application for ordered presentation of empiric data. For determination of of current processes' regularities in the used semantic spaces we introduced normalized standard of distribution density of measured indicators (elements of semantic space), which obeyed to normal law (law of Gauss). Such kind of modification of results' processing permitted to introduce quantitative expression of the measured state's tension and to determine qualitative orientation of its manifestation. Validity of introduction of normal law of elements' density distribution in the used semantic spaces results from the fact that all controlled indicators obeyed to normal law of distribution of all measured characteristics' ranks' density [10].

Control of all indicators was fulfilled three minutes before jump, BP was measured continuously on both hands with instrument BAT-41-2. In the used diagram of results' presentation we marked all three characteristics of BP. On the base of pulse pressure we determined mean pressure. All received characteristics from left and right hands correlated with each other for evaluation of their symmetry. On the base of obtained results we determined dynamic of symmetry of blood circulation of left and right sides of body in re-distribution of circulated blood [6].

The data of BP dynamic in right and left sides of body were plotted on general diagram and it permitted to compare asymmetry's degree in the observed process and duration of this process. Results of BP measurements of parachute-beginners in three minute readiness are presented in fig. 1.

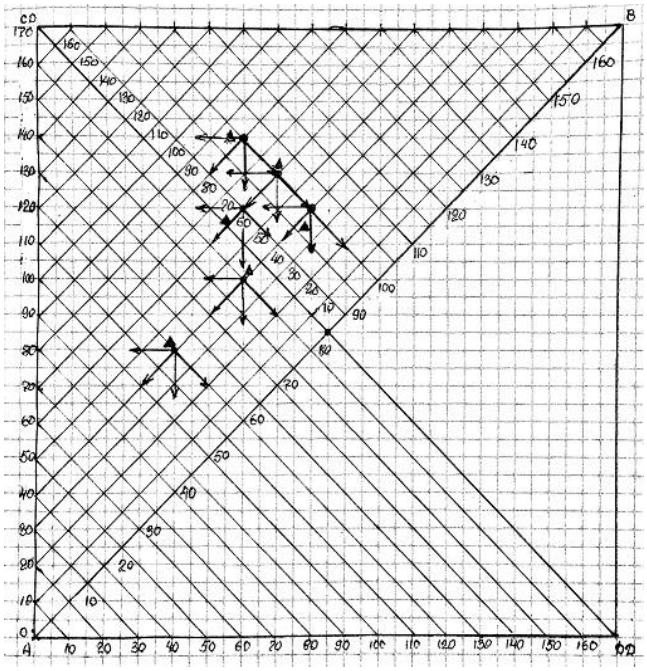

Fig.1. Bunch graph of BP changes in pre-start state

Vertical – systolic BP (SBP); horizontal – diastolic BP (DBP); line of SBP and DBP connecting point – pulse pressure; perpendicular to this line diagonal AB – mean BP (MBP); point (●) – change of mean BP (MBP) at left side of body; triangle (▲) - change of mean BP (MBP) at right side of body.

In the diagram we presented dynamic of change of mean-statistical BP of the examined contingent. Coefficient of correlation of mean-statistical BP deviation, measured in right and left sides of body was in rest state $1 \pm 0{,}24$. Three minutes before parachute jump variability of deviation from balanced relation increased up to $1 \pm 0{,}36$, that witnesses about changes of haemo-dynamics, accompanied by a number of observed abnormalities.

With increasing of absolute MBP and coefficient of its asymmetry in left and right sides of body we observed such deviations as flushing or paling of skin, pulse instability, sweating. With maximal value of MBP asymmetry we registered syncopic state of 10 persons that was 1.7% from total quantity of the examined.

Fluctuations of MBP duration and amplitude in respect to its symmetric value are a natural process with regulation of circularity of blood function. This is physiological mechanism of blood distribution between actively working functional structures of organism. Depending on level of activity increased blood flow in working structures is required. Elastic and muscular vessels, which are main part of arterial system, are main accumulator of heart contraction's energy with rising of BP [9].

Reflex of readiness, as non-specific response to assumed suddenness (uncertainty) reflects emotional tension of expectation. Similar to static muscular tension, high emotional tension can not maintain for long period of time that results in its local fluctuations. Depending on significance of share role of appropriate functional structures in reflex of accompanying we observed required local fluctuations of MBP.

Re-distribution of MBP potential energy with inconsistent request results in its insufficiency for normal functioning in working structures. In this fluctuating process there happens a process of "beats" in interaction "request-satisfaction", which is characterized by system's coming behind functional optimum of its norm. It is accompanied by acute dehematizing in some zones that causes defensive response as syncopic state or faint.

Application of modified presentation of BP dynamic's changes permits to more completely evaluate individual responses of cardio-vascular system's to extreme conditions and more profound reflect symmetric responses of MBP changes. With population picture of screening result of the examined contingent, its mean-statistical field of BP distribution obeys to normal law. Extreme situation results in reducing of BP scattering's density and shifting of mathematical expectation without breaching of normal law of distribution. In its turn, individual responses of BP changes, being constant in their expression, are rather variable in directions. The used diagram of BP presentation permits to reflect both quantitative (value) and qualitative (orientation) of MBP asymmetry.

For more complete understanding of cardio-vascular system's response to extreme conditions we studied heart beats rate characteristics. Owing to the fact that increasing of HBR is accompanied by quicker shortening of diastole, there appears a moment, when durations of systole and diastole become equal. This means maximal rate of possible beats. If to build ranged raw of consequent by duration rates of heart beats, they will form geometrical progression, in which systole and diastole have different denominators. In its turn correlation of systole time to diastole time also results in geometric progression.

This regularity permits to determine maximal limits of heart beats. Maximally high rate and maximally short cycle are registered if durations of systole and diastole are equal. The most seldom rate and the highest cycle are

registered, when effect of recreational processes equals to volume of required compensatory provisioning; in time this is determined by condition of equity to unit of production of denominators of geometric progressions' ranged raws of systole's and diastole's duration.

In interval of determined range of heart beats rate characteristic, on the base of mathematical analysis we determined the curve, reflecting admissible duration of heart muscle's work in the set frequency mode, among which we determined the most effective rate characteristic, presented in fig.2.

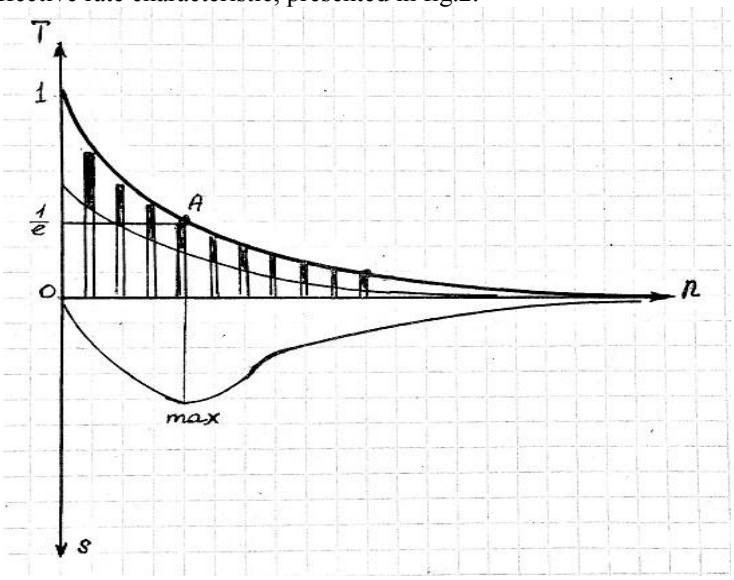

Fig.2. Interconnection of ranged raw of systole' and diastole's time in every period of heart beats and determination of optimal heart beats rate.

Upper curve – is ranged duration of heart beats; lower one – ranged duration of systole in every period of heart beats; point A on upper curve, contouring ranged raw of heart beats' periods, corresponds to the most durable rate of heart beats; integral curve of fulfilled work with every rate of heart beats within certain rate. Point max of heart efficiency corresponds to its frequency 1/e from maximal period of heart beat. The curve is plotted in SON system.

The fulfilled analysis of comparing of characteristics of BP and heart beats rate with visually noticeable symptoms, which reflect substantial deviation from normal state, shows that any deviation in their values, which approximates to zone of two-sigmoid border, causes emotional tension, resulting in faint.

The observed asymmetry in blood supply indicators of left and right sides of body is accompanied also by disordering of coordination indicators from the side of motion analyzer, which appear under physical loads. As evaluation of motion coordination abilities' disordering we chose haptic reflex and serial dynamometry. These methodic were used in modified variant of results' representation. Owing to the fact that the essence of the research is determination of asymmetry effect in evaluation of muscular effort, which can be either duration or force produced by left or right hands, we used diagram, which reflects three dimensional dependence of effort on force, time and location of the observed deviation.

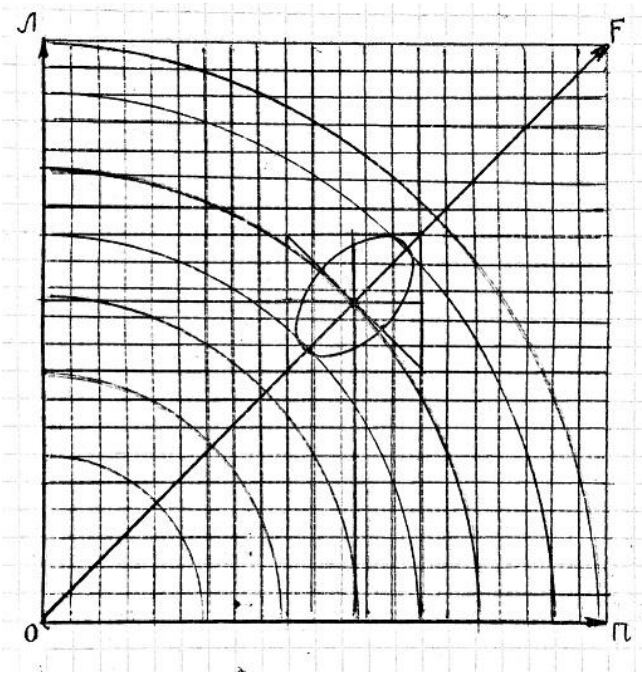

Fig.3. Reflection of accuracy of muscular effort with serial dynamometry and haptic reflex.
On vertical axis – effort of left hand; on horizontal axis – effort of right hand; bisector OF reflects value of effort; ellipse reflects dispersion of result of fulfilled effort; radial lines reflect duration of effort.

Such presentation of results of muscular efforts permits to note specificities of their manifestation, which, in their turn, permit to determine optimal tension with minimal error.

Ellipse of errors' dispersion is divided into eight sectors, which determine characteristic orientation of the registered error of fulfilled physical effort. Zone of ellipse of dispersion is sigmoid deviation of error from correct fulfillment of the task. Density of error's dispersion corresponds to normal law. Thus, the diagram reflects level of error and qualitative orientation of its changing. In individual evaluation of registered error we noticed systemic shifting of mathematical expectation of error, which is shifted in certain sector that reflects qualitative characteristic of deviation, while definite distance from the value reflects quantitative value of the error.

If to study results of researches with set fixed by value physical efforts, then with increasing of their deviations from optimal load, dispersion of error also increases. For every examined person density of dispersion increases exponentially that depend both on value of effort and level of tiredness. All mentioned regularities of made error are preserved with introducing of the third orthogonal coordinate for evaluation of accuracy of short-term physical tension's manifestation.

Conclusions:

Comparison of results of functional state's evaluation by objectively controlled physiological methods of cardio-vascular system's functioning and sensor sensitivity of coordination of physical effort's evaluation with visually noticeable deviations of the examined contingent's behavior permits to conclude the following:

1. In semantic spaces, built on general geometric principles of coordinate systems and introducing in them measure, corresponding to normal law of dispersion of controlled characteristics' density there manifest regularities of reflex of biological caution and reflex of accompanying, which permit to evaluate individual influence of emotional tension on efficiency of the fulfilled task (parachute jump).
2. Level of emotional tension is evaluated by non-specific responses in form of pulse and mean BP that characterize readiness as measure of expression of biological caution reflex in environment of high uncertainty of the task's prospects.
3. Level of uncertainty and level of anxiety in extreme conditions are reflected by variability of reflex of accompanying, which is characterized by amplitude and quickness of changing the way of adequate adapting decision's searching.
4. With deviation from symmetry between pulse and mean BP as well as increased variability of amplitude-frequency characteristics of adapting behavior under reflex of accompanying we observed effect of trophic processes' beats that manifests in not coordinated distribution of blood and appearance of red and pale spots on face and body in general. More acute manifestation of such response results in faint.
5. Rather big sample of the fulfilled researches proves action of normal law of distribution and possibility of its application for the used semantic spaces. By separate, selective data it permits to form total structure of the passing process and on the base of mathematical simulation to prognosticate possible results.

Further studies of emotional state's influence on uncertainty of extreme situations and ensuring of life functioning in such conditions will be oriented on working out of computer programs for individual prognostication of readiness to certain level of extreme.

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