

Modern methods of increasing working capacity and recovery processes of sportsmen in the system of organization of sports training

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Abstract.

Nowadays different physiotherapeutic methods of influence on the sportsman's organism were widely used in creation of the training process. *Methods:* the art therapy method is distinguished among enjoying popularity worldwide and perspective directions. *Results and conclusions:* at the present stage of use of this method especially much attention is paid to studying of the general psycho-physiological mechanisms which define efficiency of its influence on physical condition of organism and condition which allow reaching its individual use taking into account features of physical development.

Key Words: art therapy, emotional state,

Introduction

Relevance of the research. The main reason for the reversible decrease in efficiency of professional or sports activity is the exhaustion which develops as a result of transferable loads. The most various means, accelerating this process, are used for the purpose of more quick restoration of the initial working condition. Any their influences on the tired organism come down to the problem of compensation of the lost potential. In this problem it is important to consider the reversible decrease in the lost potential and its restoration as the uniform process which can proceed with various speed, force of expressiveness and prevalence of manifestation. Representation of its passing in the three-dimensional space «mobility-force-extendibility» as the certain process allows investigating inter-conditionality of quantitative ratio of the defining parameters on its high-quality manifestations. The mechanism of this process as expression of the final result of inter-conditionality of such relations represents the essence of the nature of vitauct [2]. At this stage of comprehensive investigation of this mechanism as the evolutionary process, which is directed to the preservation of long-term steady condition of organism in the environment of its stay, is possible only on the basis of use of the method of mathematical modeling.

Analysis of the last publications. The aspiration to increase efficiency of sportsmen and to accelerate their recovery processes by not pharmacological means on organism attracts use of «nonconventional» methods of influence which can give a similar effect [9]. Art therapeutic means, which attract to themselves attention of *researchers* in many countries of the world recently, take the special place among the large number of «nonconventional» physiotherapeutic and ergonomic means. However there is no clear understanding of the mechanism which provides high activity of potential opportunities of organism and acceleration of recovery processes after their considerable decrease. It naturally complicates the development of evidence-based methods of their application. The large volume of literature on use of art therapeutic means allows creating their classification, to systematize various ways of their application on the basis of purely empiric results of the conducted researches. In this regard the history of emergence of art therapeutic ways of influence on human body is of special interest [5].

The number of works is met among the numerous volumes of publications on the matter in which attempts of the research of the psycho-physiological mechanisms, defining efficiency of nonconventional methods of treatment, are put and made. Bio-therapeutic, art therapeutic and art pedagogical means are considered among such orientation of works [7].

Actually the whole this orientation of researches can be concerned to psychotherapeutic influence of auditory, visual means for the purpose of emotional management of the current state of organism [8]. Such orientation of the search of mechanisms of management of the current state of organism expands the circle of

works which are based on psycho-physiological researches and objective control methods of result of influence of art means in increase in activity of recovery processes [1].

Purpose of the work consists in definition of psycho-physiological mechanisms of art therapeutic effect of impact on human body.

Design of researches

Object of researches. The mechanism of recovery processes of organism after the temporary decrease in its working capacity.

Research problems. To analyze the available scientific-methodical literature considering mechanisms of psycho-physiological regulation of emotional states; to determine consistent patterns of the course of physiological processes in various conditions of organism when performing the work in extreme and special working conditions; to allocate basic provisions of regulation of neuro-humoral mechanisms of the interdependent relations of systems of organism.

Methods of researches. The following methods of the researches were defined for the solution of objectives: analysis of scientific literature; method of analogies; method of natural experiment; physiological control methods of dynamics of work of cardiovascular system and haemo-cardio-respiratory relations; method of the ordered submission of empirical data in semantic sign spaces with the entered uniform measure of their comparison; method of mathematical modeling in tolerant spaces.

Results. The change of activity of the exchange processes of organism, which are directed to preservation of the stable equilibrium in the interdependent relations with the environment, represents the continuously proceeding adaptation, which is directed to replenishment of potential of its viability. The interaction of organism with the stay environment, which has a probabilistic character of the organization, defines the same nature of the organization of the mechanism, which provides with it preservation of the equilibrium state. The most in-depth and comprehensive investigation of this mechanism is conducted in gerontology. In works of V. V. Frolkis this mechanism is defined as *vitaut* (Latin *vita* – life, *auctum* – to increase) [4]. According to the developed by him adaptation-regulatory theory, it follows that processes of *vitaut*, which are directed to increase in its viability, occurred along with the process of decrease in viability of organism, during evolution.

For the clarification of the essence of mechanisms, which provide these relations, it is necessary to carry out model experiences which have to be rather reasonable criteria of the validity of the considered hypotheses of decrease in viability as the reversible process and establishment of regularities of its trend.

Processes of *vitaut*, which not only return, but also increase viability, are developed during ontogeny along with exhaustion as the process of temporary decrease in viability. The consideration of physiological mechanisms from the position of these dichotomizing interactions is the important direction of the whole considered problem in general. Accumulation of exhaustion finally leads to the restriction of adaptive opportunities of organism, to weakening of functions. It defines the importance of studying of physiological mechanisms of exhaustion.

More and more studying in the search of the truth of the considered process, according to B. Shaw results in knowledge of all ... about anything. Now the process of integration in studying of mechanisms of exhaustion becomes more and more necessary with the deep analysis. The defining role is played by the method of mathematical modeling as the strongest means of allocation of the general in various things in development of this way. Processes, which are described by the identical mathematical equations, reflect the uniform essence of their organization that is the basis of the principle of analogy. The method of mathematical modeling has the higher resolvability of objective which is almost inaccessible to classical methods in physiological researches.

The analogy in processes of self-organization is shown in isomorphism and invariance of morphofunctional formations, in similarity of the subsequent previous, in community of laws of self-organization and generation of similar from similar, unity of the general and frequent. The analogy acts as the defining factor in formation of the process of self-organization and unity of the principles of self-organization and the relation of the object and the environment of its existence. The developing object in its concrete form-building environment has the inversion of its display in its structurally-functional organization. In turn, the formation of behavior, which provides preservation of the equilibrium relations of the object with the environment, is the inversion of its internal organization.

Actually there is the continuous process of expression of results of the interdependent relations of the environment and shaping of the developing object in it.

Thus, the continuous process of expression of results of the passing functional activity is the defining factor of change of the environment and the formation of mechanism of adaptation behavior. It defines the fact of unity of the relations of the object and the environment of existence in it which is shown in the formation of individual adaptation behavior of the object [3]. Efficiency of individual behavior decides by its coherence on changes by the environment.

The individual behavior under natural conditions expresses itself the powerful population universal adaptation system of the mediated training which is formed on the basis of congenital feature to imitation. The feature of the mediated training consists that the trainee can't see the direct irritant, and he can see only reaction

on him people around. In the subsequent the individual meets already the developed adaptation form of behavior and specific features of its manifestation at acquaintance to the direct irritant.

In this case the potential of protective behavior on certain factors of the forming activity environment is created. The corresponding system of universal adaptation form of ensuring viability acts as satisfaction of necessary forms of inquiries of the arising needs for interaction with the form-building environment of stay. Potential of the general preparedness for ensuring response to action of factors of the environment (nonspecific reaction), which is shown in increase in activity or its decrease in need of flight or attack, aggressive or peaceful behavior suppressed or enthusiastic state, is formed.

Therefore, the formation of universal adaptation system of the mediated training creates the potential of long-term preparedness for providing to the accompanying interaction with the environment. The nature of universality of creation of such potential reflects the statistical structure of the educational environment of training in ratio of nature of action of force, speed of the passing changes and the existential caused interactions of its factors.

Definitions can be used in the course of ontogeny on the basis of the potential of long-term preparedness and as synonyms of this concept: either universal adaptability, or nonspecific reactions; the concrete reaction of reciprocal interaction is formed on the concrete environment factors. In this case the answer goes on the specifically certain prearranged signal which according to the spatial-temporary and power characteristics fits into the created statistical structure of universal long-term potential. Thus, the caused interactions of organism with the environment of its stay are formed which can be presented as the reaction of preparedness and the reaction of maintenance of dynamics of change of the environment and the level of its tension.

Objective physiological indicators for control of nature of course of «reflex of preparedness» and «reflex of maintenance», which are included into the general structure of emotional state, have allowed to use and define features of its manifestation in practical researches of control of dynamics of changes of physiological indicators of arterial pressure on such characteristics as average arterial and pulse pressure, emotional pressure and emotional nervousness [8]. Such dependence can be presented as follows (Fig. 1):

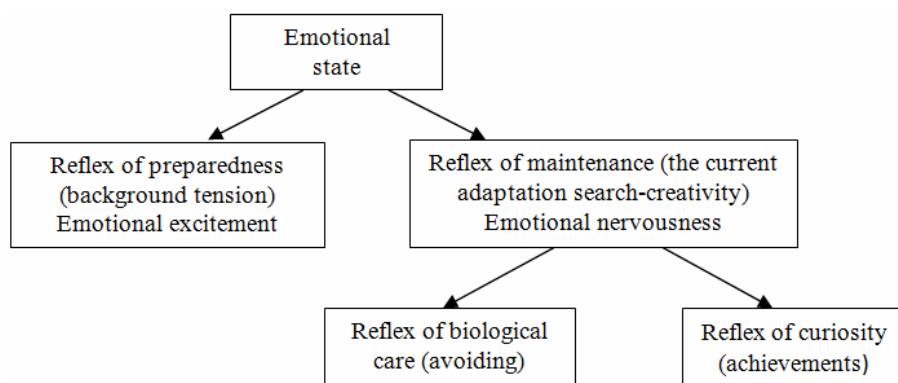


Fig. 1. Structure of representation of emotional state of the person.

The assessment of «success and failure», which is carried out on the basis of the previous experience of the individual behavior developed as a result of the mediated training and the selected as the beginning of initial counting, is in the cornerstone of the choice of form of behavior. The emotional tension of expectation as reflection of reflex of preparedness passes in extreme conditions of uncertainty, against the background of which the maintenance reflex as reflection of the search of adequate adaptive behavior proceeds, which is characterized as emotional nervousness. The made amendments at discrepancy of alleged expectation by the principle of feedback are carried out by the search of the decision from the available arsenal with various accuracy (tolerance) of its comparison. Different specification of comparison yields significantly distinguishable results of the choice of reflex of maintenance. Characteristics of its course depend on the current preference of the choice of avoiding, fade, which provide success of behavior.

The control system of perception and assessment has the general structure of creation of process of observation, providing the necessary level and form of creativity of behavior in the conditions of extreme situations and the corresponding emotional state. It has allowed to present the organization of process of life support which part reflexes of «biological safety» and «search and approximate» in the sign semantic space in the form of «single cube» where variables act as coordinate axes are: concentration («irradiation-concentration»), speed of distribution («slow-accelerated») and expressiveness force («deep-superficial»).

Such representation of options of the search explains the organization of the process of creative behavior, which is regulated by change of emotional state of the person, depending on achievement of result of success or failure in extreme and special conditions of its course. Thus, the main factor, which changes the level of activity of functional activity, is the emotional state. The structure of creation of the mediated training as in

the formation of potential of the general preparedness or emotional pressure and emotional nervousness or expeditious adaptation maintenance has the identical probabilistic construction. Its formation was based on the basis of perception of the environment of sensory system of distant perception of the forming environment. The developed dynamic stereotypes of behavior on this basis are the basis of emotional nervousness or expeditious adaptation maintenance.

Owing to the fact that emotional nervousness is included into uniform structure of dynamic stereotype of behavior, the perceived conventionally-reflex educations, which are created on the base of distant analyzers, bear information on dynamics of the environment. It is displayed in the corresponding emotional pressure which reflects the degree of preparedness to the adequate earlier developed response form. The degree of uncertainty, which is observed at discrepancy of the developed stereotype of behavior and the perceived changes of the environment, causes the reaction of the increased preparedness. Depending on an uncertainty measure for existential and power deviations of the previous experience of behavior, the dying down reaction comes, allowing estimating more substantially further taken protective actions for stay in these conditions.

Such reaction of behavior can be manifestation of the reflex of «biological care» causing avoiding of meeting with uncertainty, aspiration to reconciliation or reaction of aggressive attack as manifestation of «reflex of achievement». This effect of behavior is defined by the individual congenital form of ratio of reaction of «biological care» and reactions of «achievement». The unexpectedness degree in the met environment of stay is led not only to the raised expense of energy potential, but also to desynchronization of the interdependent relations by the morphofunctional systems that demands their restoration.

Thus, depending on form of the relation with the communication environment, the process of restoration has essential distinctions which consist in compliance of the general potential of viability and synchronization of inter-conditionality of the relations of functional systems in its providing at incoming of the corresponding compensatory providing of the external environment and the available depot of the internal environment.

The essence of effect of art therapy consists that creation of stereotypic forms of behavior is based on the distant analyzers, which provide visual information, audio information and olfactory information, which perception is transformed to the formation of dynamic stereotype and is implemented in the kinesiomotor behavior forms. Ideomotor reproduction of the corresponding stereotype of emotional pressure of preparedness and the relevant structure of emotional nervousness in the created share ratios kinesiomotor reactions occurs at the corresponding perceptions of the external behavior observed by these analyzers, thanks to the congenital form of imitation that defines synchronization of their relations.

The recovery period of the tired organism functional activity is entered by the mechanisms of vitaut, which are directed to return of the previous level of viability taking into account those desynchronizations, which have arisen at discrepancy of the developed dynamic stereotype of behavior in standard conditions of its manifestation. In such conditions strengthening of opportunities of «reflex of preparedness» with already known reaction of maintenance is observed, therefore emotional nervousness practically has the minimum level of the manifestation. It has the fluctuation range according to the same regular fluctuations of the expected actions of reaction of maintenance or operational adaptation potential. In this case the restored processes of vitaut are directed to the improvement of accuracy of operational behavior according to all three characteristics of the defining parameters: force, space and time. The received economy of metabolic cost on reaction of maintenance can be used on increase in potential of preparedness both on force of its manifestation, and on duration of its course.

The increase in emotional nervousness according to all characteristics of its manifestation (force, direction and prevalence of «throwing») occurs at stay in the conditions of unforeseen fluctuations of the environment and emergence of the unexpectedness, connected with discrepancy or total absence of the decision. It leads to growth of the general emotional tension of the reaching opportunity to carry out only unambiguous manifestation of the solution of problem of the search, up to full catalepsy.

The character of exhaustion and processes of reversible restoration will proceed absolutely differently in the environment of unforeseen behavior in which reaction is observed from full confusion to full catalepsy. The problem consists not only in restoration of the previous level of the general potential of viability, but also formation of new dynamic stereotype of adaptive maintenance.

The solution of this task is connected with change of structure of dynamic stereotype of behavior that is fully adequate to the process of transfer of skills [6]. The implementation of such transformations has absolutely other character and causes the most various emotional reactions which can be connected with the maximum activation of all reserves in organism expressed with the impetuous excitement brought to full exhaustion of organism and full depression. It leads to exhaustion of vital potential and impossibility of restoration of the arisen desynchronization of interdependent functional systems of organism both in one and in other case. Such level of state generates insufficiency of energy for functioning of mechanisms of vitaut. The duration of this state leads to the development of irreversible processes which can come to the end with the lethal outcome.

Discussion. Recovery of the general long-term energy potential by vitaut depends not only on conditions in which there was this process of reversible restoration, but also from age at which there are recovery processes.

Three stages of its features of manifestation were allocated in the course of studying of mechanisms of vitaut. **The first stage** covers the period from the birth to the final growth. At this time the shaping of morphofunctional systems of organism occurs and the existing possibility of extensive growth of functional systems allows increasing both the long-term potential of preparedness, and potential of adaptive expeditious maintenance.

The second stage comes with the subsequent exhaustion of extensive passion of potential opportunities, in which there is intensification of opportunities of organism due to the further differentiation of the connected interdependent relations of systems of organism that allows increasing the general level of viability. The exhaustion of this potential of increase in viability of organism leads to **the third stage** of formation of mechanisms of vitaut when the competition of morphofunctional systems and their synchronization of providing is carried out on the extent of participation of everyone in activity of complete organism. There is stabilization of the interdependent relations due to optimization of the mode of their activity. It allows using the potential of the "situational" reliability having rare application.

All-amplifying system of the narrowly targeted fixed morphofunctional predestination reduces universality. There is loss of universality of operational adaptation to the changing conditions of the environment which already at this level of the development is not capable to provide necessary reaction of adaptation due to the return reorganization of dynamic stereotype of behavior. The strictly fixed morphological structure is tightly specialized and its universality is lost and consequently also reliability at action of changes of the environment. However, the higher precision of differentiation of separate operations is, the more it is difficult to construct coordinate actions. Therefore, the higher differentiation of separate operations is, the bigger improvisation of their compatibility and complexity of creation of adaptation operational behavior are. The higher variability of obtaining equifinal result in the stationary environment of stay occurs. In certain measure the loss of reliability is compensated by the increase in stability. Thus, vitaut already has absolutely other mechanism of reversibility of temporary decrease in working capacity or the arising exhaustion.

The process of reversibility or restoration of the previous state is always connected with two interdependent processes to which replenishment of the general energy potential of viability of organism and synchronization of interaction of morphofunctional systems of organism belong. The problem of synchronization is possible in the conditions of the identical level of universality when any variability of inter-conditional relations and synchronization of those interactions is possible which are most effective in the concrete environment of stay. It is carried out either at stimulation of opportunities of systems of organism for the sufficient period, which is necessary for synchronization of their interaction, or immersion in dream when activity of all systems is on an equal condition of provision of energy in necessary share interactions of their synchronized interaction. The sufficient duration of such state allows returning the system to the initial previous level that is characterized by its reversibility.

In this case the essence of art therapeutic impact on recovery processes consists in possible immersion in condition of abstract satisfaction and in it to form rhythm of emotional inspiration at full physical passivity. Stereotype of the developed behavior forms via the ideomotor mechanism of imitation carries out necessary synchronization of interaction of functional systems. Through use of art means, the melody of their interaction is restored, which in process of restoration of energy potential, can strengthen its sounding to the necessary level. The main condition of efficiency of use of art means is the individual choice of «melody» and mode of their application taking into account that condition of weariness in which organism is. The essence of the reached effect of this mechanism of influence consists in parametrical resonance on which vitaut is based.

Conclusions. The individual behavior, arising under natural conditions, expresses population universal system of the mediated training, which is formed on the basis of congenital feature to imitation and is based on perception by remote analyzers of dynamics of changes of the environment. Accuracy of assessment of observed changes defines adequacy of the formed behavior. The statistical property of the environment defines the similar structure of behavior in it. The initial need of the organization of environmental behavior is connected with the formation of nonspecific reaction of power providing on its power and its existential manifestation. The creation of individual adaptive maintenance of changes of the environment and the choice of proper response of interaction is possible on the basis of such created structure of initial base of energy of preparedness on the existential nature of its manifestation. The main factor of such regulation of behavior is the current emotional state.

At achievement of certain level of decrease in potential of preparedness, the process of its reversible restoration is carried out by the mechanism of vitaut. The feature of its manifestation depends on the level of exhaustion and biological age of the individual. The distant nature of creation of adaptation maintenance behind the change of the environment and ideomotor maintenance of its imitation is the basis for use of art means as the most effective and natural mechanism of synchronization of the interdependent relations of the systems of organism, which have been broken at exhaustion and which have arisen in interaction with the environment.

Prospects of further researches in this direction will be connected with the development of optimum individual modes of exposure of art means for reversibility of the working condition of organism and with the determination of admissible level of exhaustion at which use of art means gives the high effect of its use.

Conflict of Interest. The authors declare that there is no conflict of interests.

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