

# The Functional State of Athletes Addicted to Exercises during Exercise Deprivation

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## Introduction

In recent years, the researchers' interest is focused on a special non-chemical form of addiction, which is called an exercises addiction. The exercises addiction is characterized by person's obsession of physical exercises. This condition is characterized by compulsive, obsessive attraction to the human behavioural patterns such as sports activities [1-3]. It's still a hypothesis if the exercises addiction has any physiological base.

The withdrawal symptom in the case of exercises addiction's deprivation is characterized by some changes in the psycho-physiological human state. One of them is the sympathetic nervous system activation in a deprivation state. We suppose the psycho-physiological changes are one of the most important markers of a pathological human state (status) in the deprivation period. The abstinence intensity is the main indicator (marker) in the human differentiation if they are addicted or not-addicted to the sport exercises [3,4].

The withdrawal syndrome is the set of symptoms vary in combinations and severity that can occur following the interruption of the drugs addiction or physical dependence and can result both in psychological and psychological disorders (like anxiety, irritability, asthenia, insomnia etc.). Withdrawal syndrome, also known as discontinuation syndrome, occurs in individuals who have developed physiological or psychological dependence on drugs, alcohol and who discontinue or reduce their use of it.

## Behavioural Addiction Withdrawal Symptoms

It seems that all behavioural addictions have withdrawal symptoms and these usually involve irritability, restlessness, anxiety and cravings, the same symptoms seen in addicts quitting drugs and alcohol.

The withdrawal syndrome is a general and a standard consequence of addiction. The researchers consider the abstinence itself is the general evidence of addiction and this way can be used as an addiction marker [5,6].

The investigations of withdrawal syndrome's symptoms that were realized in deprived people, who used to train excessive and regularly, provided significant support to the concept of physical training like a potentially addictive process. The exercises addiction term means a physical activity desire expressed in compulsive, uncontrolled and excessive training and other physiological and psychological symptoms.

During a deprivation period the exercise addicted people can demonstrate such withdrawal syndrome symptoms as: anxiety,

anorexia, insomnia, headaches, depression, increased heart rate, ideatory stiffness, anhedonia, muscle aches and others.

The withdrawal syndrome in case of addictive disorders is characterized by certain changes in the psycho-physiological human state. Many authors pay substantial attention to the EEG (Electroencephalogram) markers in identifying the predictors of athletic addictive disorders that can act like predictors of the pathological craving actualization for physical activity in the period of abstinence. It's known that the abstinence state while addictive disorders characterized by low bioelectric brain activity [6].

It is noted that the major changes while the affective disorders are fixed in the alpha rhythm range. It is known that the alpha rhythm generation is associated with reverb impulse activity through intracortical and thalamocortical neural networks and the severity of its causes a synchronization of the functional activity of the different brain systems

As known, people realize the muscle tension well, which associated with voluntary movements, but the high muscle tone during a state of stress is beyond perception (eg, the front of the forehead muscles that are poorly controlled by consciousness). In this regard, the myographic control is considered to be one of the stress markers, as well as one of the withdrawal states. In clinical practice myographic indicators (EMG) are often used as an indicator of the affective field. Experts consider the muscle tension (tone) and the hands temperature that reflects the degree of vasodilation, as an indicator of negative psycho-emotional state and increased anxiety. The connection between an emotional state and a skin temperature changes manifested in the experience of various emotions like: confusion, depression, anxiety (finger temperature decrease), erotic arousal and a state of relaxation (the fingers temperature rise). Also, the clinical effects of temperature and electromyographic biofeedback training among patients with psychosomatic diseases are demonstrated. Thus, there are parallels between the symptomatic manifestations of mood disorders and addictive symptoms among athletes during the period of physical activity deprivation.

Physiological criteria of the athletes' "withdrawal syndrome" is not enough described in the literature.

We examined 50 professional male athletes (football players) aged 20 to 25 years (the average age is  $23 \pm 1.5$  years) were involved in the research [7]. For psychological indicators research the following methods were used:

-The Hospital Anxiety and Depression Scale (HADS), (1983). The scale is designed for primary detection and assessment of an anxiety severity level and a patient depressive status in a general medical practice.

-“The determinant of exercise addiction (EIA-Exercise Addiction Inventory, 2005)”.

The test is based on the six addiction components by Brown-Griffiths and displayed in the six scales:

1. The feature “super-value” (salience)
2. Euphoria (euphoria) or “mood modification” (mood modification)
3. The tolerance growth (tolerance)
4. The withdrawal symptoms (withdrawal symptoms)
5. The others and oneself conflict (conflict)
6. The relapse (relapse).

The test consists of 6 claims; the subject is invited to note the degree of their agreement with the proposed statements.

-“The Questionnaire subscales self-loathing” [Self Loathing Sub Scale (SLSS) Questionnaire] to determine the athletes sport addiction. The questionnaire was designed by [8] and consists of 8 statements to which the subject notes according to their degree of agreement with them.

According to the psychological research, the subjects were divided into two groups, according to the criteria of severity of addictive tendencies (the “Control” group and the “Addicts” group).

On the basis of tests to determine the severity of sports addiction the athletes with the addictive symptoms were identified.

The feature extraction of addictive characteristics was based on the questionnaires results interpretation: “The determinant of addiction sport exercises–EIA (Exercise Addiction Inventory)” (24 points or more-high probability sports addiction) and “Questionnaire subscales self-loathing–SLSS” (16 or more points are the presence of the exercise addiction). The data is demonstrated in Table 1. For further analysis were formed 2 groups of 12 people with the most obvious differences on these scales (Group “addicts”) and the non-addicts group (Control)

Group	Test EIA	Test SLSS
Addicts	26.9	24.0
Control	10.6	11.5

**Table 1:** The average level of severity of sports addiction in subjects on the test “The determinant of an addiction to the sport exercises” (EIA) and “An inquirer of the self-loathing” subscale (SLSS) (scores) (N = 24).

The experimental part of the monitoring and recording the psychophysiological indicators (EEG voltage vegetative index) was conducted in both athletes groups in 2 states:

- a) During the active Physical Activity “(PA)”
- b) During the period of forced deprivation “(DEP)” of physical activity in accordance with the experiment condition for a 7 days period.

For psycho-physiological indicators registration used a hardware and software system.

The results of our research have shown the following:

1. While being deprived of usual physical activity the addicted athletes demonstrate an increase of personal anxiety, a depressive symptoms occurrence, as well as an emotional-motivational personality changes.

2. The abstinence status of the addicted athletes while the exercise deprivation is characterized by a low bioelectric activity in alpha EEG range.

3. Index of regulation Strain (SI) characterizes the activity of sympathetic or central regulation. Activation of the central loop or sympathetic regulation during mental or physical stresses manifests itself by rhythm stabilization, decrease of the range of interval duration.

4. During the physical activity deprivation period the addicted athletes demonstrate physiological responses of the sympathetic nervous system activation, vasoconstriction and a muscle tone increase.

5. The physical activity deprivation among the addicted athletes is the major factor affecting the changes of the athletes’ psychophysiological status.

Thus, the obtained results indicate the influence of the deprivation factor on the changes of frequency-amplitude characteristics of the EEG (amplitude, alpha-rhythm frequency, an individual width of the frequency range, power of alpha1 and alpha2 rhythms). This statement is confirmed by the EEG index and the reduction of bioelectric activity in the EEG alpha range in particular. The data of the EEG dynamic while addiction we received coincide with the results of Gapin et al. [6]. The frequency-amplitude characteristics of EEG studying during the active physical activity period and the deprivation period, demonstrated the most obvious differences for alpha rhythm in addicted group in the deprivation period than in the exercise period.

One of the physiological reasons of sport addictive disorders considered to be a reduced production of “internal tranquilizers” such as an endorphin, as well as catecholamines, which provide the mood and attention control as well as the cardiovascular and endocrine systems response control [9]. The excessive physical activity, particularly among the sports-addicted professional athletes, can cause the release of catecholamines, which leads to the hyper activation of the sympathetic part of the nervous system. During the deprivation period the addicted person is in the state of mental discomfort, in particular the athlete is in the anhedonia state, due to lower level of dopamine receptors.

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