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# Physical Effect Of Feasible Physical Exertion On Platelet Activity In Overweight Young Men.

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**ABSTRACT**

In recent years, overweight is becoming increasingly common among today's young people, with a tendency to become obese, which disrupts platelet hemostasis. A highly effective non-pharmacological component of the correction of overweight and platelet dysfunction is dosed static and dynamic exercise. For this reason, this type of correction is highly indicated for overweight young men for possible leveling in them of developing platelet dysfunctions. As a result of application in the conducted study of individually selected physical activities in overweight men with a hereditary predisposition to the metabolic syndrome, their body weight was normalized, enhanced lipid peroxidation and the disturbed platelet hemostasis were close to normal. The use of rational physical training for 12 months. fully optimized the increased adhesion and aggregation functions of platelets in vitro, which was consolidated with continued training for 3 years. It becomes clear that the use of dosed physical exertion in overweight young people reduces it by reducing the fat depots, weakening their lipid peroxidation, bringing the increased activity of platelet hemostasis to normal. These changes are largely prevented in overweight young men with an increase in platelet hemostasis in the future, eliminating the cause of the development of their future metabolic syndrome.

**Keywords**: overweight, exercise, platelets, adolescence, hereditary predisposition to metabolic syndrome.

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## INTRODUCTION

In recent years, overweight is becoming increasingly common among today's young people [1,2,3], with a tendency to transition to obesity [4]. It has been noted that signs of platelet activation activation observed in overweight may subsequently be exacerbated with an increase in body weight [5, 6], quickly leading to a deterioration in the rheological properties of platelets [7–10]. At the same time, the peculiarities of the violation of the functional state of the blood plates in young people with overweight with burdened heredity in the development of obesity are not well understood.

A highly effective non-drug component of the correction of overweight and platelet dysfunction is dosed static and dynamic exercise [11–13]. At the same time, this type of correction was not used in overweight young people in terms of leveling their developing platelet dysfunctions.

In this regard, the goal has been set - to assess the correctional possibilities of the dosed physical loads of disturbances with an increase in platelet functions in young people with overweight.

## MATERIAL AND METHODS

The research was approved by the Ethics Committee of Russian State Social University (record №5 from 12.05.2014).

The study included 34 young men at the age of 18 with overweight, including 18 males and 16 females with hereditary burden of abdominal obesity and metabolic syndrome (two or more close relatives). Somatometric indicators were evaluated as follows. The control group consisted of 147 healthy young people of similar age, without bad habits and hereditary burdens, regularly experiencing physical exertion in the general physical training section. The survey included the determination of anthropometric indicators: body weight, body mass index, waist circumference, hip circumference with the calculation of the ratio of waist circumference / hip circumference.

The value of the index of functional reactivity of the cardiovascular system was traditionally determined. According to the value of its increment against the background of psycho-emotional load, the type of reactivity of the cardiovascular system was assessed: when the value of the functional reactivity index was more than 20 standard units reactivity was considered hyperfunctional, with the value of the functional reactivity index of less than 10 conventional units the response to the load was assessed as hypofunctional, and with the values of the functional reactivity index from 10 to 20 used units the type of functional reactivity was normal. Plasma lipid peroxidation activity was determined by the content of thiobarbituric acid-active products using the Agat-Med kit and the antioxidant potential of the liquid part of blood, and intraplatelet lipid peroxidation by basal malondialdehyde concentration (MDA) in the thiobarbituric acid reduction reaction. The number of platelets in capillary blood in the Goryaev chamber was counted. Platelet aggregation (AP) was studied by a visual micromethod using as inducers ADP ($0.5\times10^{-4}$ M), collagen (dilution 1:2 of the main suspension), thrombin (0.125 units/ml), ristomycin (0.8 mg/ml), adrenaline ($5\times10^{-6}$ M) and hydrogen peroxide ($7.3\times10^{-3}$ M).

All 34 obese overweight young people were taken under regular regular physical training exercises according to the scheme developed by the authors, including morning hygienic gymnastics, therapeutic and preventive gymnastics and fractional exercise during the day. The study design included an initial assessment of the studied parameters and the determination of their dynamics after 1, 2 and 4 years of regular physical activity and three years after the termination of regular workouts. Statistical processing of the results obtained was carried out using Student's t-test.

## RESEARCH RESULTS

In the initial state, the average body weight of the examined was 84.1±0.17 kg, with a body mass index of 29.5±0.15 kg / m2 and a waist / hips ratio of 1.05±0.015.

After 1 year of regular dosed physical training in young people who were overweight at 18, their body weight dropped to 71.2±0.17 kg, with a decrease in body mass index to 24.9±0.11 kg / m2 and a decrease in volume waist / hip volume up to 0.96±0.09.

A significant increase in plasma lipid peroxidation was observed in the outcome of young people with overweight in the study. Thus, the concentration of thiobarbituric acid-active products in their plasma was 3.38 ± 0.12 µmol/l, in the control - 3.21±0.81 µmol/l ($p<0.05$). The level of MDA in platelets was also increased (0.60±0.17 nmol/$10^9$ platelets), in the control - 0.49±0.16 nmol/$10^9$ platelets ($p<0.01$). Activation of free-radical oxidation in overweight young people was made possible due to the weakening of the antioxidant activity of their body to 34.0±0.15% against 38.8±0.22% in control ($p<0.01$).

Use in overweight young people of rationally dosed physical exertion after a year of training normalized lipid peroxidation of plasma and platelets. Thus, in the plasma, the content of thiobarbituric acid-active products was 3.24 ± 0.12 µmol/l with an increase in its antioxidant activity of 38.2±0.09%. Against the background of regular training in young people, there was a decrease in the activity of

in platelets - the basal MDA in them was 0.50±0.21 nmol/$10^9$ platelets. The number of platelets in the blood of overweight young people before and during the correction was in the normal range. In those included in the study before the start of training, the acceleration of AP was found, most pronounced under the influence of collagen - 30.1±0.17 s (in control - 34.6±0.17 s). Somewhat slower AP developed in overweight individuals under the influence of ADP (40.9±0.24 s) and ristomycin (44.7±0.14s). AP with $H_2O_2$ in the group of persons with overweight was 45.6±0.19 s. Thrombin and adrenaline antibodies also developed faster than controls ($p<0.01$) and were equal in young people overweight to 51.2±0.09 s and 96.8±0.12 s, respectively.

Regular exercise in overweight young people contributed to an increase in AP time under the influence of all inductors tested. Against the background of 12 months workouts the most active inducer of AP they have collagen. ADP, ristomycin and $H_2O_2$ were somewhat less active. Later, AP developed ($p<0.01$) under the influence of thrombin and adrenaline.

The continuation by young people who were overweight at 18 years of regular physical training for three years did not reveal the negative dynamics of all normalized functional and laboratory parameters until the end of observation, while maintaining them at a similar level by the age of 25.

**DISCUSSION**

Regular dosed physical training for severe obesity can improve metabolism, lowering body weight and stimulating the body's hidden reserves [14, 15].

As a result of the use of physical training in overweight young people, a decrease in body weight was noted, reducing [16], thereby the degree of risk of subsequent obesity, primarily abdominal [17], as the most unfavorable in terms of the formation of metabolic disorders [18].

The initially enhanced free-radical oxidation in plasma and platelets in the examined young people who are overweight [19,20] was found to be possible as a result of a weakening of the antioxidant system of the body [21,22]. The increased formation of MDA by the platelets of the examined individuals, which is a marker of the beginning increase in the metabolism of membrane phosphoinositols and increasing thromboxane formation [23–28], under the influence of a complex of physical training decreased to the end of the first year of training [29,30]. The weakening of MDA in platelets in obese young people with overweight indicates a decrease in the activity of arachidonate metabolism enzymes in platelets with the achievement of the physiological level of thromboxane formation in them [31,32].

Inhibition of AP in young individuals with overweight on the background of the use of metered exercise, indicates their positive effect on platelet hemostasis [33,34]. The achieved effects are due to the improvement of metabolic processes, weight loss due to a decrease in the fat content in the body and optimization of POL in plasma and platelets [35]. The prolongation of AP time under the influence of ristomycin in obese young people with overweight during training indicates a decrease in von Willebrand

factor blood levels [36]. The positive dynamics of antibodies with $H_2O_2$ in them indicates an increase in the activity of the anti-oxidation system in platelets, primarily catalase and superoxide dismutase [37]. In other words, rational physical exertion in overweight young people is preferable to apply immediately after establishing the fact of weight gain, which effectively optimizes primarily fat metabolism and platelet hemostasis during the year of training [38]. Compliance with physical exertion over the next 3 years is able to consolidate the achieved optimization of body weight, lipid metabolism and platelet hemostasis activity in overweight young people, helping to reduce their risk of developing obesity and atherosclerosis of vessels of different localization at an older age [39,40].

## CONCLUSION

The use of dosed physical exertion in overweight young people reduces it due to fat depots, weakening their increased lipid peroxidation, bringing the increased activity of platelet hemostasis to normal. These changes reach a maximum by the end of the year of study, largely preventing young people who are overweight with an increase in platelet hemostasis in the future.

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