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MORPHOFUNCTIONAL CONDITION OF YOUNG MALES USING DRUGS

ABSTRACT. The paper presents the results of the research of the morphofunctional state of males using drugs periodically. 205 young men at the age ranging from 17 to 21 years old were examined. Among them 65 persons had drug (psychoactive substances (PAS): alcohol) dependent parents (one or both); 40 tested persons who had no PAS dependent parents formed the second group. 100 healthy students of Tyumen State University, who deny facts of drug taking composed the third, control, group. The experimental group demonstrated physiological changes of their cardio-vascular and breathing systems and reduction of their functional activity. We have obtained data testifying to reduction of the main indexes of physical development. Young men taking drug substances differ in their asthenic constitution. The revealed changes are more typical of the young males having PAS dependent parents. .

KEY WORDS. Young men, psychoactive substance, cardiovascular systems.

Introduction. Changes in the spiritual, political, social and economic spheres of life in the 1990-s have led to a large-scale growth of people using non-medical psychoactive substances (PAS).

PAS consumption statistics is critical in our country [1-2] and poses a serious medical and social issue in connection with its wide-spread occurrence and systemic complications causing early disability and high mortality rate among the patients.

The main “risk group” consuming drugs and suffering from drug addiction consists of teenagers and young people which aggravates drug addiction consequences.

In the existing conditions of narcogenocide the topicality of the issue of PAS abuse prevention among the modern Russian youth is doubtless. In the prophylactic work a person’s liability to drug abuse and definition of the groups of high biological risk of PAS abuse are very important. In connection with this, it is necessary to study the status of PAS-dependent persons singling out the parameters which are acquired by them as a result of this addiction as well as those which are characteristic of them before PAS impact. Lack of knowledge on a number of issues related to the causes and mechanisms of drug addiction development and the absence of a uniform concept of pathogenesis of this dependence have defined the main direction for our researches.

The aim of the research: to reveal the peculiarities of the morphofunctional parameters of young males periodically using drugs.

Tasks:

1. To study the main parameters of the physical development, functional conditions of the cardiovascular and respiratory systems of the bodies of young males who use drugs periodically.

2. To carry out a comparative analysis of the morphofunctional parameters of people with different levels of negative genetic load (parents having a drug addiction pathology).

Materials and methods. To carry out the tasks set we have done a complex study of the morphofunctional condition of the bodies of 105 young males who periodically abuse drugs (opium group PAS) at the age of 17-21. 65 males out of them (group I) had parents (one or both) with PAS addiction (alcohol); group II included 40 persons without PAS addicted parents. Control group III included 100 healthy students denying ever trying drugs. The study was carried out in 2002-2012 in the Tyumen State University supported by the Administration of the Federal Service on Drug Control of RF in Tyumen region.

The examination of the basic parameters of physical development (length, body weight and chest circumference (CC)) was performed according to the generally accepted methodologies [3-4]. On the basis of the obtained values the weight-height correlations have been calculated.

The functional state of the cardiovascular system (CVS) has been estimated according to: values of the heart rate (HR), systolic and diastolic arterial pressure (SAP and DAP). Calculation methods were applied in order to define pulse pressure (PP), mean arterial pressure (MAP), systolic blood volume (SBV), minute volume of blood circulation (MVBC), heart index (HI), specific vascular resistance (SVR) and peripheral vascular resistance (PVR) [5-7], Robinson index (RI), vegetation index Kerdo (VIK) [8] and endurance coefficient (EC) [9].

The study of the functional state of the respiratory system included definition of the vital lung capacity (VLC) and Stange's functional test. The results received were compared with the "estimated" values for men [6]; the birth-death ratio (BDR) was calculated. For the complex analysis of the cardiovascular and respiratory systems we calculated Skibinski's circulatory-respiratory coefficient (SCRC) [10].

The statistical analysis has been carried out with MicrosoftExcel and "SPSSStatistics". In the course of the investigation we defined the following parameters: the arithmetic mean (M), arithmetic mean error (m), proportion (p) and its error (S_p). To compare the sample means and sample proportions we used Student's t-test; statistically significant results are at $p < 0.05$ [11-12]. All the tests comply with the order of the Ministry of Health care RF No. 226 dated 19.06.2003 "Rules of clinical practice in RF".

Research findings and their discussion. Comparison of the values for the males' physical development in the test and control groups has revealed peculiarities of somatic development of PAS-periodically abusing persons.

The persons with aggravated drug-related pathology of their parents have the smallest weight values (165.2 ± 2.15 kg), body length (49.41 ± 1.43 cm) and CC (84.5 ± 1.4 cm) (table 1) ($P < 0.05$). It is difficult to compare the obtained data with the existing ones as there has been no relevant research devoted to the physical condition of people over 7 years of age who prenatally experienced PAS impact. The results of the earlier research [13] directly indicate slowing down of the growth processes among

children of 3-7 years of age; further studies are hampered by the difficulty of exclusion of the influence of various environmental factors and the direct impact of the drug.

Table 1

Values of the physical development of drug-abusing young males and young males not using PAS (M±m)

Value	PAS abusing		Not abusing PAS (n=100)
	I (n=65)	II (n=40)	
Body length, cm	165,2±2,15*	169,4±2,37	170,7±2,23
Body weight, kg	49,41±1,50 *	52,52±1,65 *	71,50±1,20
CC, cm	84,5±1,4*	85,9±1,5*	89,0±1,4
Body mass index, kg/m ²	18,1±0,98*	18,3±0,83*	24,6±1,03

Note: * — differences are statistically significant between the control and test groups (P<0.05).

The young males without negative hereditary background (group II) are characterized by a lower body weight (52,52±1,65 and 71,50±1,20 kg) and CC (84,5±1,4 and 89,0±1,4 cm) in comparison with the healthy males with no difference in the body length.

The healthy young males differ in the normal body mass (BMI is 24.6±1.03 kg/m²), whereas the PAS-abusing persons are found in a condition of slim disease (BMI is 18.1±0.98 kg/m² and 18.3±0.83 kg/m²).

The mean PI values testify to a good body structure of the persons from the control group (table 2) and distribution of the young males according to their body structure displays strong (28.0±4.49%), good (37.0 ±4.83%) and average (30.0 ±4.58%) types. The normostenoid (50.0±5.00%) and hyperstenoid (33.0±4.70%) somatic types prevail (P<0.05).

Table 2

Distribution of somatic types and body structure of young males abusing and not abusing drugs (p±S_p)

Values		PAS abusers		Not using PAS (n=100)
		I (n=65)	II (n=40)	
Pinye index, score		31.2±0.5*	30.9±0.8	10.2±0.5
Somatic type	Asthenics	96,9±2,25 **	87,5±4,10 **	17,0±3,76
	Normostenics	3,1±2,15 **	12,5±3,00 **	50,0±5,00
	Hypersthenics	0,0±0,02 *	0,0±0,03 *	33,0±4,70
Body structure	strong	0,0±0,02 *	0,0±0,03 *	28,0±4,49
	good	0,0±0,02 *	0,0±0,03 *	37,0±4,83
	average	12,3±4,07 *	20,0±4,10 *	30,0±4,58
	weak	47,7±6,20 *	37,5±7,65 *	5,0±2,18
	very weak	40,0±6,08 *	42,5±7,81 *	0,0±0,01

Note: * differences are statistically significant between the control group and the test groups, # differences are statistically significant between groups I and II (P<0.05).

The young males periodically using PAS are characterized by an astenoid body structure which occurs both in group I and II much more often than in the control group ($P < 0.05$). The test groups have no people of a hyperstenoid somatic type.

Among the young males with genetic load there is an increased number of people of an asthenic type (96.9 ± 2.15 and $87.5 \pm 4.10\%$) and a decreased number with a normosthenic type (3.1 ± 2.15 and $12.5 \pm 4.10\%$) as compared to the young males without the negative genetic background ($P < 0.05$). The mean values for PI indicate a weak body structure (table 2) and the body structure distribution reveals prevalence of the weak (47.7 ± 6.20 in group I and $37.5 \pm 7.65\%$ in group II) and very weak (40.0 ± 6.08 in group I and $42.5 \pm 7.81\%$ in group II) types.

The shifts which we revealed in the morphological development of the young males using drugs both with a genetic load (parents' drug addiction) and without it let us suppose presence of certain modifications in functional capabilities as well.

The study has proved that HR of the drug users is significantly lower as compared to the healthy young males (table 3).

Table 3

Values of the functional state of the cardiovascular system of young males using and not using drugs ($M \pm m$)

Values	Males using drugs		Males not using drugs III (n=100)
	I (n=65)	II (n=40)	
HR, b/min.	$54,44 \pm 1,36$ *#	$57,03 \pm 1,58$ **	$69,50 \pm 1,02$
SAP mm Hg	$85,96 \pm 1,50$ *#	$89,59 \pm 2,10$ **	$118,20 \pm 1,86$
DAP mm Hg	$53,56 \pm 1,06$ *#	$55,84 \pm 1,21$ **	$73,89 \pm 0,93$
PP mm HG	$32,40 \pm 2,05$ *	$33,75 \pm 2,33$ *	$44,31 \pm 2,14$
MAP mm Hg	$67,17 \pm 1,29$ *#	$70,02 \pm 1,35$ **	$92,5 \pm 2,56$
VC, c.u.	$1,69 \pm 0,06$ *	$1,69 \pm 0,06$ *	$1,57 \pm 0,05$
VIK, points	$1,62 \pm 0,18$ *#	$2,09 \pm 0,21$ **	$- 6,32 \pm 1,12$
DP (double product), c.u.	$46,80 \pm 1,67$ *#	$51,10 \pm 2,05$ **	$82,15 \pm 3,18$
SBV, ml	$68,68 \pm 2,13$ *	$68,96 \pm 2,54$ *	$62,81 \pm 2,78$
MVBC, l/min.	$3,74 \pm 0,32$ *	$3,93 \pm 0,52$	$4,37 \pm 0,30$
HI, l/min./m ²	$2,48 \pm 0,51$	$2,49 \pm 0,83$	$2,36 \pm 0,65$
SVR mm Hg/l/min	$1424,6 \pm 119,8$ *	$1413,2 \pm 134,5$ *	$1679,1 \pm 126,0$
PVR, c.u.	$27,08 \pm 6,44$ *	$28,12 \pm 5,80$ *	$39,20 \pm 4,31$

Note: * differences are statistically significant between the control group and the test groups, # differences are statistically significant between groups I and II ($P < 0.05$).

The persons who use PAS periodically typically have sinus bradycardia which is significantly more severe in the young males with a genetic load. A.G. Gorgaslidze et. al. [14] believes that heart rhythm disturbances among the opium-addicted patients are connected with the change of the function of automatism of the sinoatrial node (pacemaker).

In both test groups we have revealed low SAP values (85.96±1.50 in group I, 89.59±2.10 in group II and 118.20±1.86 mm Hg in group III) and DAP (53.56±1.06 in group I, 55.84±1.21 in group II and 73.89±0.93 mm Hg in group III) (P<0.05).

Increase in VC among the male-subjects of groups I and II, as compared to the healthy young males, indicates weakening of the CVS functional capabilities of PAS-using persons.

VIK values reveal a shift in the vegetative balance towards sympatitoktonia, facilitation of catabolic processes, intensification of functioning and exhausting of the body reserves (of which the positive VIK values speak) in the young males using PAS which are more severe among the persons in group II (2.09±0.21 and 1.62±0.18) (P<0.05). The negative VIK value in group III (-6.32±1.12) imply a dominating influence of the parasympathetic component of the autonomic nervous system in the CVS activity regulation and its economy mode of work among the young males in the control group [15]. S.G. Aleksandrov points out the prevalence of the tone of the sympathetic component of the autonomic nervous system and tension of the regulation mechanisms in the heroine-dependent males [16].

One of the most important values of the CVS reserve is the double product (DP) which reflects mechanical work of the left ventricle. This parameter is widely used in sports and clinical cardiology [7]. DP values at rest is much lower in both groups of the drug addicted persons (by 1.76 in group I and 1.61 in group II) as compared to the healthy young males. The lower values of the parameter at rest let us suppose decrease in the maximum aerobic capabilities and consequently decrease in the general level of somatic health among the young people using PAS with and without a genetic load.

The integral parameter characterizing the condition of the whole system of blood circulation is typically considered to be the minute volume of blood circulation (MVBC). The young males with a genetic load have a low MVBC than the males in the control group (3.74±0.32 and 4.37±0.30 l) (P<0.05), which indicates a decrease in the blood flow rate at rest and is probably explained by a decrease in the general metabolism. The persons without a genetic load have no significant differences with the control group.

Thus, the comparative analysis of the main parameters of the blood circulation system has revealed peculiarities of the CVS functional state among the young males using drugs which are indicated by the decrease in HR, SAP, DAP, DP, MAP, MVBC, SVR, PVR, and increase in SBV and VC.

According to T.V. Chernobrovkina et. al. [18] heart pathology is formed mainly not by a direct toxic influence of PAS but the genetic load or acquired (also with age) functional CVS weakness on the one hand and functional instability of the autonomic nervous system on the other which creates conditions for catecholamine and dysregulation disorders.

The study has identified a decrease in the main parameters of the system of external respiration among the persons using PAS. The mean VLC values among the young males in the control group are significantly higher than those of the PAS-users in

groups I and II (4.32 ± 0.51 in group III, 3.98 ± 0.45 in group II and 3.11 ± 0.41 in group I) ($P < 0.05$).

The VLC is below the norm in all the three study groups, however, it is only 7.9% below the norm in the healthy group and 14.0% in the group without the genetic load and 29.2% in the group of patients with a genetic load.

The breath-holding period after inhaling (Stange's test) is shorter among the PAS-users in comparison with the control group (40.11 ± 1.67 in group I, 42.35 ± 1.92 in group II and 52.40 ± 1.70 sec. in group III). Without doubt the revealed degradation of the body resistance of the young drug-users towards hypoxic conditions will limit their physical working capacity during the medium and heavy modes of work i.e. define their level of general endurance.

The persons with the negative genetic background demonstrate the lowest values of Skibinski's coefficient (22.91 ± 2.07 in group I, 29.56 ± 1.64 in group II and 32.57 ± 1.26 c.u. in group III).

Conclusions

1. The physical development of the young males who use drugs periodically is characterized by decreased parameters (weight, body length and chest circumference). The young males have an asthenoid body type.

2. The young males using drugs from the opium group display modifications in the physiological state of their cardiovascular system. At rest they have lower values of the heart rate, arterial pressure, and double product, specific and peripheral vascular resistance. The revealed changes of hemodynamics are more severe among the persons with a genetic load (parents' drug addiction). The decrease in the cardiac output and increased activity of the sympathetic component of the autonomic nervous system mean limitation of the CVS functional capabilities of drug users as compared to the young males not using PAS.

3. The young males using drugs have a lower level of development of the main parameters of the system of external breath: factual values of the vital lung capacity, periods of holding breath in hypoxia tests, Skibinski's index, and the degree of severity of which depends on the genetic load of their parents' drug addiction.

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