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Plan physical activities for spring men based on their physical condition

Oles' Pryshva

Lesya Ukrainka Eastern National University,
Lutsk, Ukraine

Purpose: *to find the features of physical condition of men before their vigorous physical activity sessions in the winter season, and test their effectiveness.*

Material & Methods: *investigated body mass index, physical condition of method by Baevsky in men 35–48 years leading a healthy lifestyle. Research conducted morning and evening every day. Results were compared: the day before, the day of vigorous physical activity, and with average per month. Physical activity was studied by the IPAQ method.*

Results: *found significant ($p<0,05$) differences in the physical condition of men before and the day of physical activity of high intensity. Marked changes were: body weight, the heart rate, the adaptive capacity by Baevsky. The most significant figure identified as a marker. To test its effectiveness was offer to men plan individual vigorous physical activity under this marker. The result was significant ($p<0,05$) increase the number and duration of vigorous physical activity, better physical condition to 10,73%.*

Conclusions: *the physical condition of age men plays an important role in planning their vigorous physical activity. Comparative deconditioning from the previous day for the test Baevsky 3,09%, can be used for operational planning of physical activity of high intensity on that day.*

Keywords: *vigorous physical activity, physical condition, planning of physical activity, IPAQ.*

Introduction

Physical State (PS) of a person is, at the same time, the display and the subconscious purpose of his life. All activity of a person is closely connected from his PS and directed to his improvement. An adequate adaptation of a human body to changeable external conditions is rewarded by positive health and perfect PS. The way of life of a person as an intelligent adaptation, during all his historical development depended on seasonal changes of the external environment. The external conditions of the environment have No such influence on a way of life of a person in current trends of globalization of the society. But the genetically put information on changes of a way of life according to seasonal changes is confirmed by neurohumoral processes of an organism [3; 4; 12; 20] and physical activity (PA) of a person [7; 18]. Enough researches on identification of changes of PS according to seasonal changes, both at teenagers, and among people of mature age are carried out. The supervision over teenagers of 12–13 years old found the increase in their PS by 1–2% with each increase for 10 °C of the ambient temperature [11]. Investigating PA by means of the accelerometer of Japanese of 65–83 years old within a year, the reduction of PA was revealed in the winter. The highest PA fell on spring and fall. Indicators of PA were up to standard average annual in the summer, and PA duration was more in the summer, than during other seasons [24]. Other researches claim that PA decreases in connection with a bad physical condition of people of the advanced age [10] in the winter. The weekly expense of energy in PA of men of mature age was 15-20% higher in the spring and in the summer [19]. The research of PA at teenagers 9, 15 years old also found big activity in the spring, than in the winter [17]. The analysis of references confirms the priority value of the spring season in PA of a person.

Aerobic physical activity of average and high intensity is especially effective for maintenance of an optimum functional condition of a person [8; 9; 13]. Physical activity of high intensity (PAHI) has a special value for health of which positive changes in PS are result, – pressure decrease, improvements of a metabolism, optimization, and height-weight indicators [15; 16]. The research of Gebel K., et al (2015) testifies to the value of PAHI, where for more, than 200000 Australians of 45–75 years old was observed within eight years. The mortality rate from different diseases during this time was investigated. Among people who weren't engaged in physical activity of average and high intensity it was 8,34%, among those who were engaged 10–149 min/week, – 4,81%; 150–299 min/week – 3,17%; 300 and more – 2,64%. Among those which weren't engaged PAHI, the mortality rate made 3,84%; at whom PAHI made less than 30%, the mortality rate made 2,35% and who had PAHI more than 30%, mortality rate made only 2,08% [13]. The number of classes of PAHI at men of mature age can vary from 3–4 for a week till 2–3 for a month [5]. Most of Europeans of mature age were never engaged regularly in PAHI or sport [21]. The existing recommendations of World Health Organization (WHO) concerning PAHI are limited to only a total of the recommended minutes for a week – not less than 75, and the number of classes – not less than two, or 20 min, three times for a week [14].

PA of average intensity doesn't demand considerable physical activities and can be implemented in the course of household or social activity. It is necessary certain physical pre-

paredness of an organism for the physical activity of high intensity (PAHI) at mature age which is displayed in a physical condition of a person, health and desire, to be engaged in it. The feature of planning of such PA at men of mature age has their independence [1], desire to derive pleasure and to improve the emotional state [22]. The realization of this desire is connected with a healthy organism and the corresponding physical state. Therefore, in our opinion, there will be actual data on features of their PS that precede, and it is possible, and induce to such type of PA in the spring period for planning and management of PAHI of men of mature age.

The purpose of the research

To define features of a physical condition of men of mature age which can be used for operational planning of PAHI in the spring and check their efficiency.

Material and Methods of the research

The experiment consisted of two parts, laboratory and forming. 29 people of 35–50 years old were selected without chronic diseases for the experiment which hold a healthy lifestyle and independently PAHI in the form of jogging, swimming, classes in a gym which physical condition in days of researches didn't exceed average monthly conditional norm of the adaptation potential of Bayevsky (APB) in 1,80 absolute units are engaged (a. u.) [2]. The research was conducted in the south of Ukraine in the spring within 30 days of the laboratory experiment and 30 days of the forming experiment.

The body weight index (BWI) was studied for studying of physical development of men ($kg \cdot m^{-2}$). Estimations of a physical state were carried out two times per day: in the morning and in the evening by the APB index which values calculated on a formula:

$$APB=0,011 \cdot HR +0,014 \cdot APs+0,008 \cdot APd+0,014 \cdot Age+0,009 \cdot BW–0,009 \cdot LB–0,273,$$

where HR – heart rate bpm^{-1}); APs – systolic arterial pressure (mm of mercury.); APd – diastolic arterial pressure (mm of mercury.); BW – body weight (kg); LB – length of a body (sm); Age – age of an investigated.

Body weight was measured by electronic scales with a margin error till 50 gr. Arterial pressure and heart rate (HR) were measured by automatic tonometers of Contec 08a. APB was calculated every morning after a night dream and every evening before going to bed with observance of necessary recommendations of WHO (1999). PAHI was investigated according to the international questionnaire IPAQ (International Physical Activity Questionnaire) [5; 23]. The number of classes for week and their duration were studied. The received results were fixed in individual diaries. The laboratory experiment included comparison of average monthly day indicators of PS of men with indicators the day before and in day of PAHI. The indicators of PS of men measured in the morning (M), in the evening (E) and the difference between them in a day (M-E), and for the last night (E-M) were compared. Also we gave the difference between PS indicators as a percentage, by a formula:

$$x=(b–a):a \cdot 100\%,$$

where x – percent size; a – the previous indicator, b – the following indicator of the compared couple of numbers.

The percent was considered only before the first day in case of PAHI of men which is recorded several days in succession.

Men were engaged in PAHI (run, swimming, sports, riding by bicycle) in the schedule habitual for themselves in the laboratory experiment. It was offered to them to plan PAHI according to the every day information on PS in the forming experiment. Results of the forming experiment are processed according to weekly data.

Statistical calculation was carried out by methods of nonparametric statistics as some results didn't answer normal distribution. Interquartile scopes (IS), median (Me) were defined. The comparison between groups of indicators was carried out by means of criteria of sign ranks of Wilkokson. The programs EXEL and Statgraphics16 were used.

Results of the research and their discussion

Investigating the existence of differences between usual days and days from PAHI of men, we compared their PS (tab. 1). The ssential differences were found only in some studied indicators. In usual days the body weight of men (M) was statistically identical with days of PAHI. HR (M) had also No reliable difference. APB (M) in days of PAHI was authentically big for 1,21% in comparison with usual days, and APB (E) – for 1,14%. Authentically differences in change of APB of men during the day (M-E) and for the previous PAHI night (E-M) aren't revealed.

The search of differences in PS of men the day before and in days of their PAHI (tab. 2) was the major. Body weight (M) was authentically big in days of PAHI for 0,32%, HR (M) is also 2,37% more, APB (RM) – for 3,09%, APB (E) – for 2,89%. Differences between APB indicators in a day (M-E) and for the last night (E-M) – weren't.

Investigating changes in PS of men, it was necessary to be convinced of really smaller indicators of PS of men on the eve of PAHI in comparison with usual days, have also compared indicators of PS of men on the eve of PAHI with usual days (tab. 3).

The majority of indicators of PS of men on the eve of PAHI had authentically smaller values ($p<0,05$) in comparison with usual days. So, body weight (M) is the day before 0,3% less, HR (M) is 2,56% less, APB (M) is 1,85% less, APB (E) – for 1,73%. Also reliable difference is observed between APB (E-M). In day on the eve of PAHI APB difference in a night made 0,14 a. u., and in usual days – 0,09 a. u., what is 35,71% more that demonstrates the best renewal of an organism in a night on the eve of PAHI. The essential difference in APB (E) the day before PAHI with usual days didn't appear.

Differences in PS of men of PAHI on the eve of them were used by us as markers for operational planning of PAHI in the forming experiment where it was offered to men to plan PAHI that day when APB (M) increased more than by 3,09% in comparison with previous day.

As a result of the forming monthly experiment positive changes, as in PA, so, and in PS of men (tab. 4) took place.

Table 1

Comparison of indicators of a physical condition of men of usual days with days of physical activity of high intensity

№	Indicators	Usual days (n=718)	PAHI (n=159)	Difference (%)	W (p)
		Me (95%IP)	Me (95%IP)		
1	Body weight (M), kg	88,05 (85,27;90,83)	88,07 (84,37;91,77)	–	62168> 0,05
2	HR (M), bpm^{-1}	50,53 (47,18;53,88)	50,44 (47,62;53,26)	–	55342 >0,05
3	APB (M), a. u.	1,65 (1,63;1,67)	1,67 (1,63;1,7)	1,21	76880,5 <0,05
4	APB (E), a. u.	1,76 (1,75;1,78)	1,78 (1,74;1,82)	1,14	74187,5 <0,05
5	Difference of APB (M-E), a. u.	–0,11 (–0,13;–0,09)	–0,12 (–0,16;–0,08)	–	63845,5 >0,05
6	Difference of APB (E-M), a. u.	0,09 (0,05;0,12)	0,1 (0,06;0,13)	–	57651 >0,05

Table 2

Comparisons of indicators of a physical condition of men the day before and in days of physical activity of high intensity

№	Indicator	The day before (n=131)	PAHI (n=159)	Difference (%)	W (p)
		Me (95%IP)	Me (95%IP)		
1	Body weight (M), kg	87,79 (84,04;90,84)	88,07 (84,37;91,77)	0,32	29347 <0,05
2	HR (M), bpm^{-1}	49,27 (46,82;51,72)	50,44 (47,62;53,26)	2,37	33231 <0,05
3	APB (M), a. u.	1,62 (1,57;1,67)	1,67 (1,63;1,7)	3,09	45151 <0,05
4	APB (E), a. u.	1,73 (1,70;1,77)	1,78 (1,74;1,82)	2,89	34640 <0,05
5	Difference of APB (M-E), a. u.	–0,11 (–0,15;–0,7)	–0,12 (–0,16;–0,08)	–	22531 >0,05
6	Difference of APB (E-M), a. u.	0,14 (0,94;0,18)	0,1 (0,06;0,13)	–	24878 >0,05

Table 3

Comparisons of indicators of a physical condition of men on the eve of physical activity of high intensity with usual days

№	Indicator	On the eve PAHI (n=159)	Usual days (n=718)	Difference (%)	W (p)
		Me (95%IP)	Me (95%IP)		
1.	Body weight (M), kg	87,79 (84,04;90,84)	88,05 (85,27;90,83)	0,3	68721 <0,05
2.	HR (M), bpm^{-1}	49,27 (46,82;51,72)	50,53 (47,18;53,88)	2,56	76484 <0,05
3.	APB (M), a. u.	1,62 (1,57;1,67)	1,65 (1,63;1,67)	1,85	66154 <0,05
4.	APB (E), a. u.	1,73 (1,70;1,77)	1,76 (1,75;1,78)	1,73	63478 <0,05
5.	Difference of APB (M-E), a. u.	–0,11 (–0,15;–0,7)	–0,11 (–0,13;–0,09)	–	32817 >0,05
6.	Difference of APB (E-M), a. u.	0,14 (0,94;0,18)	0,09 (0,05;0,12)	35,71	56750 <0,05

Table 4

Comparisons of indicators of physical activity and physical condition of men of the laboratory and forming experiment

№	Indicator	Before the experiment (n=105)	After the experiment (n=96)	Difference (%)	W (p)
		Me (95% IP)	Me (95% IP)		
1.	BWI (kg·m^{-2})	28,33 (24,89;31,77)	27,89 (24,38;31,4)	1,55	1747 <0,05
2.	PAHI (quant./week)	1,58 (0,07;3,66)	1,88 (0,11;3,65)	18,99	2854 <0,05
3.	PAHI (min/week)	20,92 (14,39;27,45)	30,63 (21,61;39,63)	46,41	3487 <0,05
4.	HR M (bpm^{-1})	51,95 (46,17;57,73)	49,07 (46,84;51,3)	5,54	2309 <0,05
5.	APB M (a. u.)	1,77 (1,7;1,84)	1,58 (1,48;1,68)	10,73	2852 <0,05

BWI of men has increased by 1,55%. The number of classes of PAHI in a week increased by 18,99%. Time of classes increased by 46,41%. HR (M) decreased by 5,54%. APB (M) also improved for 3,13%.

The selected contingent for the research had insignificant increase in IBW (for 12%) that can be carried, at normal indicators of PS, to the most part of muscular tissue, than to fatty. PAHI made only 25% of the recommended number of classes for week and 27% of the recommended minutes. The physical condition of men was in relative norm; APB (M) was less than 1,80 a. u., HR (M) also testified to healthy cardiovascular system.

The search of features of PS of men included comparison of their PS in usual days and days from PAHI in the spring period. It gave the chance to estimate influence of PA on their organism. The insignificant increase in APB (E) testified to tension of the cardiovascular system as a result of PAHI. The reliable increase in APB (deterioration in PS) of men in days of PAHI defined in the morning informational content of PS this test in relation to classes of PAHI.

Differences of indicators of PS of men the day before and in days of PAHI were the most significant. The increase in body weight, the relative deterioration in HR, APB (M) in days of PAHI became a reason for the accounting of these changes in the subsequent operational planning. Percent of changes of PS of men were big in comparison with usual days. APB (M) had the greatest percent – 3,09 which we used in the subsequent research for operational planning of PAHI.

The comparison of PS of men on the eve of PAHI with usual days testified that PS of men was the best not only for days of PAHI in a threshold to PAHI, but also it is better, than in daily. It indicates importance of PS of men in a threshold to classes of PAHI that it can be significant in the made decisions to classes of PAHI next day. The research APB of evening of previous day and morning (E-M) found the best obnovitelny process during a dream on the eve of PAHI, than in usual days.

The reliable differences of APB morning-evening between the comparing days weren't found that displays adequate physical activity to a physical condition of men in all studied days.

Byresults of the forming experiment, we can claim that the accounting of APB (M), especially its differences with the previous day, depends the week number and duration of PAHI of men which in turn optimum influences PS of men during the spring period.

Conclusions

Physical state plays the importance in PAHI of men of mature age. APB (M) which increase by 3,09% during the spring period, can be a reason for the operational planning this day of PAHI, can be the most informative and available indicator of PS to the mass application. The accounting of this indicator has the efficiency in optimization of PAHI and PS of men of mature age who lead a healthy lifestyle.

Prospects of the subsequent researches consist in the studied features of a physical condition of men which promote PAHI in other seasonal periods.

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Oles' Pryshva *PhD (Pedagogy), Associate Professor; Lesya Ukrainka Eastern National University: av. Voli, 13, Lutsk, Volins'ka region, 43000, Ukraine.*
ORCID.ORG/0000-0002-3727-5142
E-mail: ooobc@yahoo.com