

Physical Condition Markers of Men of Mature Age in High Intensity Physical Activity During the Summer Season

Lesya Ukrainka Eastern European National University (Lutsk)

Abstract:

Topicality. Physical activity of average and high intensity is an important component of health and longevity of men of mature age. Physical activity of average intensity may be provided in the process of everyday, social activities. For physical activity of high intensity it is required physical readiness of an organism which is reflected in physical conditions of a human. And it may change under the influence of seasonal factors. **Objective.** To identify peculiarities of physical condition of men of mature age on the eve of high intensity physical activity in summer which may be used as informative markers for individual operational planning of high intensity physical activity. **Methods.** It was investigated the body mass index, physical condition according to the method of Baevsky among men aged 35–50 who lead a healthy lifestyle. The study was conducted every day in the morning and evening. Results were compared: the day before, the day of high intensity physical activity and with an average index per month. Physical activity was studied by the IPAQ method. **Results.** It was found significant ($p < 0,05$) differences in the physical condition of men the day before and the day of physical activity of high intensity. Found changes were: body weight, heart rate, physical condition of men according to the estimation of adaptive potential by Baevsky. The most significant indices were identified as a marker. For testing its effectiveness men were offered during a month to plan individual physical activity of high intensity according to this marker. The result was the significant ($p < 0,05$) increase of the number and duration of high intensity physical activity, better physical condition to 5,66 % in the complex test by Baevsky. **Conclusions.** The important role in planning of high intensity physical activity plays the physical condition of mature men. Informative marker in the summer season may be deteriorating of physical condition of men according to estimation of the Baevsky potential to 3,29 % for prompt planning of physical activity of high intensity for this day.

Key words:

physical activity of high intensity, physical condition, individual planning of physical activity.

Introduction. Physical activity (PA) is one of the most important functions of human existence, the foundation of health, longevity, physical and mental condition, in adolescence and in adulthood period. Aerobic physical activity of medium and high intensity is especially effective for maintaining men's optimal functional state of mature age. (PAMH) [4; 10; 17]. Which include: running, swimming, cycling, sports and others. According to the study [7], number of such classes of PAMH can range from 3–4 to 2–3 a week for a month. At that most men prefer independent training [1] guided only by habit of training of previous years, health and free time. The desire to do PAMH and its realization in people of middle age is associated with excellent physical condition (FC) and the desire to receive pleasure from it [11; 19]. Consistency of trainings, among other factors, is related to the physical condition of the person. Favourable environmental conditions and modern sports facilities provide the opportunity to do PA at any time, so it is decisive in taking the decisions just before training.

Thus, we know the recommendations of the World Health Organization (WHO) on PAMH is limited to the total number of minutes per week recommended – at least 75, and the number of classes – at least two [13; 18], or 20 min., three times a week [14]. In recent guidelines of PA for the European Region for 2016–2025 increasing time employment PAMH as additional health benefits for all segments of the population [12; 17]. At the same time, seasonal recommendations for PC man are not given, although the studies [9; 15] convince us of the need to take account of them. It should be noted that the current study [3; 5] in the examining assessment PC rights in the individualization of physical activity did not disclose the problem of operational planning PAMH men of mature age.

The aim of the study. Identify the features of men's PC before PAMH classes that can be used as informative markers for individual operational planning PAMH in the summer season.

Material and methods. The study contains two parts, laboratory and formative experiment. We selected 27 men, 35–50 years old, without chronic diseases who keep a healthy lifestyle and self-dealing PAMH as jogging, swimming, playing in the gym. PC are investigated, using adaptive capacity of Baevsky (ACB) does not exceed

monthly average rate of 1.80 absolute units (AU) [2]. The study was conducted in southern Ukraine in the summer at the Kherson State University in 2014.

To study the physical development (PD) of men [8] we studied body mass index (BMI) (kg / m²). PC is estimated according to the index ACB, whose value is calculated using the formula:

$$ACB = 0.011 + 0.014 \cdot HR \cdot PBX \cdot s \cdot DBP + 0.008 + 0.014 \cdot e \cdot Age \cdot BW - 0,009 + \cdot BL - 0,09 \cdot 0.273,$$

where HR – heart rate (beats / min) PBX – systolic blood pressure (mmHg) DBP – diastolic blood pressure (mm Hg. c) BW – body weight (kg) BL – body length (cm) Age – the age of the subject (years). Body weight was measured with an accuracy of electronic scales to 50g. BP was measured with automatic blood pressure monitor Contec 08A. ACB was calculated in every morning after a night's sleep and every night before sleep and in compliance with the necessary recommendations WHO and the Russian Scientific Society of Cardiology (2001), [6].

PAMH is investigated in accordance with international questionnaire IPAQ (International Physical Activity Questionnaire) [8, 20]. We have studied number of classes per week and their duration. The results were recorded, in individual diaries.

Laboratory experiment included a comparison of average daily indicators men's PC with indicators before and the day of PAMH. Men's PC compared indicators were measured in the morning (M), evening (E) and the difference between day (M–E) and night (E–M). Also, the difference between the rates of PC is calculated in percentage using the formula:

$$x = (b-a) : a \cdot 100\%$$

where, x – the value of interest; a – previous figure, b – next figure comparable pairs.

The PAMH was recorded during several days, the percentage was calculated just before the first day.

In a laboratory experiment men did PAMH in usual schedule. In forming experiment to men were offered to plan PAMH according to the information on their PC. The results of forming experiment were processed on weekly data.

Statistical calculation was conducted using nonparametric statistics, because some results did not respond to the normal distribution. Determination: interquartile scope (IS), median (Me). Comparisons between groups were made using performance criterion Wilcoxon sign ranks. Used programs EXCEL and Statgraphics16.

Results of the study .Discussion. To search the differences men's PC we compared the results of PC in ordinary days and the day with PAMH (Table 1). We have used PC results of 684 men in ordinary days and 138 results in days with PAMH. We have found that significant differences exist in most of the studied parameters PC of men. In the days of PAMH men's body weight (P) were significantly higher at 0,27 %. HR (R) was higher 0,8 %. ACB (R) was at 1,29 % higher and ACB (B) – at 1,21 %. Significant differences were found in the change of men's ACB during day and night.

Table 1

Comparison of men's PC in ordinary days and days of high-intensity physical activity

№	Indicators	Usual days (n=684)	PAMH (n=138)	difference (%)	W (p)
		<i>Me</i> (95%IP)	<i>Me</i> (95%IP)		
1.	Body weight M (кг)	84,46 (81,32;87,6)	84,69 (81,85;87,53)	0,27	76735 <0,05
2.	Heart Rate M (beats/min)	49,02 (46,17;51,87)	49,41 (46,12;52,7)	0,8	84158 <0,05
3.	ACB M	1,55 (1,54;1,57)	1,57 (1,54;1,6)	1,29	84721,5 <0,05
4.	ACB E	1,65 (1,64;1,67)	1,67 (1,64;1,7)	1,21	84684 <0,05
5.	Difference ACB M-E	-0,11 (-0,13;-0,09)	-0,12 (-0,16;-0,08)	-	62158,5 >0,05
6.	Difference ACB E-M	0,13 (0,07;0,19)	0,14 (0,05;0,24)	-	63451 >0,05

During the search for informative indicators of men's PC we paid attention on differences between the previous days and the day of PAMH (Table 2). In comparison we have used PC results of 106 men before the PAMH days and 138 days results in PAMH days. Body weight (M) was higher in the days of PAMH to 0,34 %. HR (M), as more than 0,84 %. ACB (M) 3,29 %. ACB (B) at 1,83 %. The differences were between indicators ACB in day (M-E) and in night (E-M).

Table 2

Comparison of men's PC before and in the days of high-intensity physical activity

№	Indicators	on the eve (n=106)	PAMH (n=138)	Difference (%)	W (p)
		<i>Me</i> (95%IP)	<i>Me</i> (95%IP)		
1.	Body weight M (κg)	84,4 (81,75;8;87,05)	84,69 (81,85;87,53)	0,34	22057 <0,05
2.	Heart Rate M (beats/min)	49,16 (46,22;52,1)	49,41 (46,12;52,7)	0,84	28641 <0,05
3.	ACB M	1,52 (1,48;1,55)	1,57 (1,54;1,6)	3,29	29455 <0,05
4.	ACB E	1,64 (1,6;1,69)	1,67 (1,64;1,7)	1,83	26217 <0,05
5.	Difference ACB M-E	-0,12 (-0,16;-0,08)	-0,12 (-0,16;-0,08)	-	11476 >0,05
6.	Difference ACB E-M	0,14 (0,09;0,19)	0,14 (0,05;0,24)	-	12382 >0,05

Exploring the men's PC results PAMH on the eve and on ordinary days (Table 3). In comparison we have used PC results of 106 men on the eve of PAMH days and 684 results in ordinary days. We have found that the body weight (M), heart rate (M) ACB (E), the difference ACB, daytime (M-E) and night (E-M) had no significant differences ($p > 0,05$). But, ACB (M) was significantly lower than in the normal day, 1,97 %.

Table 3

Comparison of men's PC on the eve of physical activity of high intensity with ordinary days

№	Indicators	on the eve (n=106)	Days (n=684)	difference (%)	W (p)
		<i>Me</i> (95%IP)	<i>Me</i> (95%IP)		
1.	Body weight M (κg)	84,4 (81,75;8;87,05)	84,46 (81,32;87,6)	-	53299 >0,05
2.	Heart Rate M (beats/min)	49,16 (46,22;52,1)	49,02 (46,17;51,87)	-	42984 >0,05
3.	ACB M	1,52 (1,48;1,55)	1,55 (1,54;1,57)	1,97	63410,5 <0,05
4.	ACB E	1,64 (1,6;1,69)	1,65 (1,64;1,67)	-	42634 >0,05
5.	Difference ACB M-E	-0,12 (-0,16;-0,08)	-0,11 (-0,13;-0,09)	-	42275 >0,05
6.	Difference ACB E-M	0,14 (0,09;0,19)	0,13 (0,07;0,19)	-	31677 >0,05

As a result, the comparative analysis of men's PC in days of PAMH, the days before, and on ordinary days contain some differences, that we decided to use as informative markers for operational planning PAMH. During the experiment men were asked to plan PAMH in the day when ACB (M) increased by more than 3,29 % in comparison to the previous day.

As a result, men have positive changes in their PC as well as in their PC (Table 4). Men's BMI decreased to 1,91 %. Number of classes PAMH increased to almost twice a week, 46,62 %, and the classes increased to 26,44 minutes a week, or to 78,89 %. ACB (M) also improved to 5,66 %.

Table 4

Comparison of physical activity and physical condition of men and formative laboratory experiment

№	Indicators	Before the experiment (n=95)	After the experiment (n=90)	Difference (%)	W (p)
		<i>Me</i> (95 % IP)	<i>Me</i> (95 % IP)		
1.	BMI (kg/m^2)	27,23 (25,12;29,34)	26,71 (28,64;28,79)	1,91	1935 <0,05
2.	PAMH	1,33 (0,02;2,64)	1,95 (0,57;3,33)	46,62	1447 <0,05
3.	PAHM (min/week)	14,78 (7,93;21,63)	26,44 (9,34;43,54)	78,89	2916 <0,05
4.	Heart Rate (beats/min)	49,45 (46,87;52,03)	48,86 (46,35;51,38)	-	896 >0,05
5.	ACB M	1,59 (1,47;1,71)	1,50 (1,38;1,62)	5,66	1506 <0,05

Exploring changes in men's PC in ordinary days and days PAMH has made it possible to estimate what impact has the PC (in ACB E) on the body of men, and prerequisites to employment PAMH. Differences in men's PC were available for all tests carried out in the morning (body weight, heart rate, ACB E). Significant increase in body weight, heart rate, and ACB before PAMH training can be explained by various factors of life. And gaining weight of men in the morning, and the deterioration of their heart rate, and ACB indicates the immediate effect of increasing nutrition, or reducing the PC before. That, perhaps, stimulate men's desire to do PAMH.

Comparison of men's PC in the days before and in days of PAMH confirmed our assumptions about gaining weight and the relative deterioration of PC at the bottom PAMH. Percentage of changes for PC tests were higher than in comparison with normal days. Thus, the test ACB (R) had the highest percentage – 3,29, which is appropriate for its use as a marker of individual PC for operational planning PAMH.

Comparison of men PC with PAMH with normal days showed that, on the eve of PAMH men's PC was the best not only at the days of PAMH, but better than routinely, indicating the importance of the PC in this day.

We haven't found significant differences in ACB morning-evening (M-E) between the comparable day, which may indicate on relatively adequate physical activity at the days of PAMH physical condition of men, and rapid restoration of their body.ACB researches at the evening the day before and the morning (M-E) showed a steady recovery process during sleep in different comparative days.

As a result of forming experiment we can say that consideration ACB (M), particularly its difference with previous day depends on weekly amount and duration men's PAMH, which in turn optimally affects men's PC, expressed in the reduction of ACB, which is confirmed by previous studies [3].

Conclusions. The physical condition of men is very important in individual planning of PAMH. Informative marker in the summer may be deteriorating of physical condition of men to assess adaptive capacity of Baevsky to 3,29 % for operational planning physical activity of high intensity on this day.

Prospects for further research are studied in the impact of lifestyle on men's PC stimulating PAMH.

References

1. Andryeyeva, O. V. (2014). *Teoretyko-metodolohichni zasady rekreatsinoi diyalnosti riznyh hrup naseleennia* [Theoretical-methodological basics of recreational activity of different groups of population] (Doctoral dissertation). Kyiv.
2. Baevskiy, R. M/, Berseneva, A. P. (1993). *Donozologicheskaya diagnostika v otsenke sostoyaniya zdorovya* [prenosological diagnostics in estimation of health condition]. *Valeologiya: diagnostika, sredstva i praktika obespecheniya zdorovya*, 33–48.
3. Bayev, O. A. (2014). *Doslidzhennia adaptatsiynoho potentsialu orhanizmu studentskoi molodi* [Studying the adaptive potential of student youth organisms]. *Problemy ekolohichnoi ta medychnoi henetyky i klinishnoi imunolohii*, 1, 283–289.

4. Drachuk, S. P. (2006). *Anaerobna ta aerobna produktyvnist orhanizmu yunakiv 17–19 rokiv pry zastisuvanni riznyh rezhymiv fizychnyh navantazhen* [Aerobic and anaerobic productivity of boys aged 17–19 while applying different regimes of physical loads] (PhD dissertation). Kyiv.
5. Dubchuk, O. V. (2012). Otsinka fizychnoho stanu studentiv hrupy fizychnoi reabilitatsii vyshchych navchalnyh zakladiv [Estimation of physical condition of students of the group of physical rehabilitation of higher educational establishments]. *Fizychnye vykhovannia, sport i kultura zdorovya u suchasnomu suspilstvi*, 4, 364–368.
6. Vserossiyskoe nauchnoe obshchestvo kardiologov. Rossiyskiy natsionalnyi kongress kardiologov [All-Russian scientific society of cardiologists. Russian national congress of cardiologists] (2001, October). *Natsionalnye rekomendatsii po profilaktike, diagnostike i lecheniyu arterialnoy gipertonii* [National recommendations on prophylaxis, diagnostics and treatment of arterial hypertension]. Retrieved from <http://www.cardiolog.ru/medical/recom-artgip.asp>
7. Pryshva, O. (2013). Osoblyvosti fizychnoi aktyvnosti cholovikiv zrioloho viku [Peculiarities of physical activity of men of mature age]. *Molodizhnyi naukovyi visnyk Skhidnoevropeyskoho natsionalnoho universytetu imeni Lesi Ukrainky : Fizychnye vykhovannia i sport*, 10, 59–63.
8. Pryshva, O. B. (2014). Vplyv intensyvnosti fizychnoi aktyvnosti cholovikiv zrioloho viku na ikhnyi fizychnyi stan [Influence of physical activity intensity of men of mature age on their physical condition]. *Fizychnye vykhovannia, sport i kultura zdorovya u suchasnomu suspilstvi*, 4, 77–83. Retrieved from http://nbuv.gov.ua/UJRN/Fvs_2014_4_20.
9. Pryshva, O. B. (2015). Sezonna dynamika fizychnoi aktyvnosti cholovikiv iz riznym rivnem fizychnoho stanu [Season dynamics of physical activity of men with different levels of physical condition]. *Pedahohika, psyholohiya ta medyko-biologichni problemy fizychnoho vykhovannia i sportu*, 10, 56–61.
10. Furman, Y. A. (2004). Vyznachennia optymalnoho diapazonu velychyn bihovych navantazhen za velychynoyu maksimalnoho spozhyvannia kysniu [Defining the optimal range of amount of running loads according to the amount of maximal consumption of oxygen]. *Fizychna kultura, sport ta zdorovya natsii*, 5, 505–509.
11. Tsos, A., Shevchuk, A., Kasarda, O. (2014). Rukhova aktyvnist u motyvatsiyno-tsinnisnykh orientatsiyakh studentiv [Motor activity in motivational-valuable orientations of students]. *Fizychnye vykhovannia, sport i kultura zdorovya u suchasnomu suspilstvi*, 4 (28), 83–87.
12. Tsos, A., Bergier, J., Sabirov, O. (2015). Riven fizychnoi aktyvnosti studentiv vyshchych navchalnykh zakladiv [Level of physical activity of students of higher educational establishments]. *Fizychnye vykhovannia, sport i kultura zdorovya u suchasnomu suspilstvi*, 3 (31), 202–210.
13. Global action plan for the prevention and control of noncommunicable diseases 2013–2020. (2013). *World Health Organization*. Retrieved from <http://www.who.int/nmh/publications/ncd-action-plan/en>
14. Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U. (2012). Global physical activity levels: surveillance progress, pitfalls, and prospects. *The Lancet*, 380(9838), 247–257.
15. McCormack, G. R. (2010). Sex- and age-specific seasonal variations in physical activity among adults. *J Epidemiol Community Health*, 64, 1010–1016.
16. Physical Activity Guidelines for Americans. (2008, October). *Office of Disease Prevention & Health Promotion, US Department of Health and Human Services*.
17. Physical activity strategy for the WHO European Region 2016–2025. (2015, September 14–17). *Regional Committee for Europe, 65th session*. Retrieved from http://www.euro.who.int/data/assets/pdf_file/0010/282961/65wd09e_PhysicalActivityStrategy_150474.pdf
18. Sport and physical activity report. Special Eurobarometer. (2014). *European Commission, Directorate-General for Education and Culture*. doi: 10.2766/73002.
19. Teixeira, P. J., Carraca, E. V., Markland, D., Silva, M. N., Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. *Int J Behav Nutr Phys Act.*, 9, 78.
20. International physical activity questionnaire (2011). *The IPAQ group*. Retrieved from <https://sites.google.com/site/theipaq/>.

Information about the Authors:

Pryshva Oles; <http://orcid.org/0000-0002-3727-5142>; ooobc@yahoo.com; Lesya Ukrainka Eastern European National University; 30 Vynnychenka Street, Lutsk, 43025, Ukraine.

Received 24.02.2016