

PHYSICAL ACTIVITY AND FITNESS OF YOUNG MEN IN ASPECT OF BIOLOGICAL MATURITY DESCRIBED BY ELECTROFORETIC MOTILITY OF NUCLEI METHOD (EMN)

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ABSTRACT: In the study of physical activity it is usually accepted a priori that the group similar in terms of the calendar age satisfies the uniformity assumption. This fact should be verified using methods which allow to establish objectively the degree of biological maturity. One of them is a determinant of biological age which also allows for an assessment of the biological value of a system, irrespective of the traindness level, sport or limitations of physical activity. The aim of the study is to show differences in the level of physical fitness of young men uniform in terms of biological maturity and different in terms of calendar age.

The study covered 189 young men aged 19 to 24. Their motor fitness was determining by using Eurofit test. The subjects' preferred form of physical activity as well as its level was established in interviews. Their EMN indicators were established on the basis of the degree of electroforetical mobility of cell nuclei by the ratio of cells with motile nuclei to all observed cells meeting the selection criterion. The biological material was the oral epithelium.

The subjects varied in terms of calendar age did not differ significantly in terms of their biological maturity. The differences in some tests of can be linked to the level of physical fitness more than to the preferred forms. motor fitness.

KEY WORDS: physical activity, motor fitness, electroforetic motility of cells nuclei

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INTRODUCTION

After the completion of the period of body growth young men are characterised by a set level of motor fitness. They also have a firm attitude towards their own physical activity. In the study of physical fitness it is usually accepted a priori that a group is uniform on the basis of the calendar age criterion. However, in the assessment of physical fitness it is important to know the degree of biological maturity of the body. The indicator of electroforetic motility of nuclei (EMN) is one of the methods to establish it. It allows for an assessment of the biological value of a system, irrespective of the trainedness level, practised sport or limitations of physical activity [4].

The aim of the study is to show differences of physical fitness depending on various forms and levels of physical activity of young men uniform in terms of biological maturity and different in terms of calendar age.

MATERIALS AND METHODS

The study covered 189 students of physical education and physiotherapy aged 19 to 24. Their EMN indicators were established on the basis of the degree of electroforetic motility of nuclei in variable

electric field. The biological material was the oral epithelium placed in 0.09% solution of NaCl. The prepared material was observed under a microscope in order to establish the ratio of cells with motile nuclei to all observed cells meeting the selection criteria [7]. The motor fitness of the subjects was determined using the EUROFIT test [1], in which the bent arm hang test was replaced with the pull-up on a bar test [5]. The fitness test was completed with a measurement of complex reaction using the Piórkowski's apparatus, sending 125 impulses per minute [3]. The subjects' preferred forms of physical activity were established in interviews. They were divided into two groups: sports games and other sports. In order to establish the level of physical activity (PA) two criteria were adopted: high PA (1.5 hours at least three times a week) and low PA (less than above) [6].

RESULTS

Table 1 shows that the EMN indicator does not differentiate the subjects along the division resulting from the calendar age. Thus, it may be assumed that the group is uniform in terms of biological maturity.

TABLE 1. EMN INDICATOR BY AGE GROUPS

Age in years	n	Mean	SD	p
19	27	58,18	9,61	
20	64	56,35	9,47	
21	37	56,18	12,03	
22	24	54,75	10,37	0,9714
23	19	57,25	8,46	
24	18	56,31	9,19	
total	189	56,39	10,07	

Table 2. shows numerical characteristics of motor fitness taking into account two groups isolated by level of physical activity. The group of the higher level of physical activity is represented in larger numbers of subjects than the other group. Statistically significant differences occurred between means of three tests i.e. standing broad jump, shuttle run 10 x 5 m and endurance 20 m shuttle run test.

Table 3. shows a comparison of numerical characteristics divided by dominating forms of physical activity. In this case we can see that the groups divided in regard of dominant forms of activity are quite equal. A uniformity of the level in most tests of motor fitness is

evident, irrespective of whether sports games (football, handball, basketball and volleyball) or other sports have been selected for increased physical activity. The exceptions are the hand grip test and the pull-ups on the bar test.

DISCUSSION

In the studies presented in this work the research material were physical education and physiotherapy students aged 19 to 24. In spite of varied calendar age they are a uniform group in terms of the status of biological maturity established on the basis of the method of electroforetic motility of nuclei (EMN). This indicator meets all conditions of an indicator of developmental age [4]. The main advantage of the EMN indicator is the occurrence of continuous directed changes during all ontogenesis [2]. It was found that the level of the EMN indicator is independent of the degree of development of morphological features: so while informing about completely different properties of the body, it allows for a more complete assessment of the biological development of the body.

Due to the subject of studies the studied group of students shows a higher physical activity than other students and after a closer analysis the physical activity turns out to be quite varied. The basis

TABLE 2. CHARACTERISTICS OF THE STUDIED FEATURES BY PHYSICAL ACTIVITY (PA) LEVEL

Item	Test	high PA n=96		low PA n=75		p
		Mean	SD	Mean	SD	
1	EMN	55,21	10,41	58,04	9,45	0,069
2	Complex reaction 125/min	99,5	15,94	96,69	18,2	0,2847
3	Standing broad jump (cm)	246,2	19,69	238,6	17,76	0,0098**
4	Sit-ups (number)	30,07	2,94	29,25	2,78	0,0662
5	Hand grip (kG)	55,21	7,54	54,64	6,76	0,6098
6	Pull-ups on the bar	9,19	5,47	8,58	4,14	0,423
7	Flamingo balance test (number)	7,84	4,17	7,33	3,64	0,4028
8	Flexibility (cm)	29,07	6,8	28,3	6,93	0,466
9	Shuttle run 10 x 5 m test (s)	17,93	0,95	18,3	1,04	0,0170**
10	Endurance shuttle run 20 m test ¹ (s)	625,8	94,72	583	96,59	0,0041**

¹ according to own modification of measurement [5,6],
* p<0,05 ** p<0,01

TABLE 3. CHARACTERISTICS OF STUDIED FEATURES BY FORMS OF PHYSICAL ACTIVITY (PA)

Item	Test	PA (games) n=50		PA (other sports) n=46		p
		Mean	SD	Mean	SD	
1	EMN	55,06	9,94	55,39	11,00	0,8771
2	Complex reaction 125/min	100,92	14,31	97,95	17,56	0,3656
3	Standing broad jump (cm)	245,1	19,03	247,4	20,52	0,5561
4	Sit-ups (number)	30,24	2,99	29,89	2,91	0,5651
5	Hand grip (kG)	53,24	7,03	57,23	7,62	0,0106*
6	Pull-ups on the bar	7,66	3,62	10,86	6,60	0,0036**
7	Flamingo balance test (number)	8,00	3,88	7,67	4,50	0,7042
8	Flexibility (cm)	28,86	5,96	29,30	7,68	0,7512
9	Shuttle run 10 x 5 m test (s)	17,73	0,89	18,15	0,98	0,0302*
10	Endurance shuttle run 20 m test ¹ (s)	642,3	85,17	607,98	102,1	0,0763

¹ according to own modification of measurement [5,6],
* p<0,05 ** p<0,01

for variation are two factors, namely its duration in a week and its preferred forms. In the forms of physical activity two groups were taken into account: sports games and other sports.

A more significant factor differentiating the level of motor fitness was the level of physical activity. The differences between groups were noted in such fitness tests which can be considered key. They reflected strength (lower limb strength), speed (shuttle run 10 x 5 m) and endurance motor abilities (endurance shuttle 20 m run test). The differences resulting from the choice of specific forms of physical activity are not numerous and relate only to upper limb strength abilities. Thus, they have a local significance.

To sum up, it has to be stated that among adults after the completion of the body growth period, similar in terms of the status of biological maturity, the basis for searching for differences in motor fitness does not have to be calendar age but some factors resulting from life style, such as physical activity manifested in its specific

level and preferred forms of motor behaviour. The evaluation of motor fitness of individuals of various of calendar age but the same degree of biological maturity is justified by a criterion specifying the attitude to their own physical activity.

CONCLUSIONS

1. The electroforetical mobility of cell nuclei method gives good basis for establishing uniformity of examined subjects being in the same developmental period but unlike in respect of calendar age.

2. Evaluation of motor fitness of individuals of not-like calendar age, but with the same degree of biological maturity is justified by the criterion specifying the relation to their own physical activity.

3. The level of physical activity is a strong factor describing differences in motor fitness. Such a role cannot be assigned in the same degree to forms of physical activity.

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