COMPARATIVE STUDY REGARDING THE FITNESS OF JUNIOR BADMINTON PLAYERS AND JUNIOR TRACK AND FIELD ATHLETES

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ABSTRACT

This study aimed to evaluate the fitness and dexterity of badminton players and track and field athletes (U15 and U17). The evaluation used the Carlson fatigue curve test, the 6x20+20 meters test, and the eye-hand coordination test. The tested subjects belong to Clubul Sportiv Municipal Bacău (the track and field department) and to Clubul Sportiv Școlar Bacău (the badminton department), and were between 14 and 16 years old. These tests were used because the authors wanted to see all the athletes' training level.

The study contained 5 badminton players (3 males and 2 females) from CSS Bacău, and 5 track and field athletes (3 males and 2 females) from CSM Bacau. The badminton players performed 4 training sessions per week, while the track and field athletes, 5 training sessions per week.

The recorded results showed differences between badminton players and track and field athletes in regards to their cool down capacity and their dexterity.

The conclusions are that from the standpoint of their work capacity, the track and field athletes are better trained, however they encountered some difficulties during the eye-hand coordination test.

KEYWORDS: *fitness, track and field, badminton, evaluation.*

JEL CLASIFICATIONS: Z20, Z28, Z29

1. INTRODUCTION

In any sport, the psycho-motor skills are extremely important, their training leading to the improvement of the athletes' performances, at the same time increasing their work capacity and improving their cool down capacity. Endurance represents "the body's ability to work for a longer period of time without losing effectiveness." (Dragnea et al., 1996).

Dexterity is "the individual's ability to perform new movements with ease and efficiency." (Mârza Dănilă Doina, 2013).

Regardless of the sport, the basis must be good fitness and good training, which gives the ability to perform correctly the physical exercises; fitness improves athletic performance, but for that one must have a regular exercise program that would be a part of the daily training program; fitness presupposes physical activity, which leads to burning calories and maintaining one's weight.

Fitness refers to:

- muscle strength and endurance;

- body flexibility and composition;
- aerobic endurance;
- capacity to relax.

Fitness consists of:

- *dexterity*: meaning a good coordination of one's entire physical activity;

- *balance:* is the ability to perform and establish one's posture, in relation to the exercises that are to be performed;

- *elasticity:* is the capacity to extend one's muscles as much as possible without any injuries;
- *coordination:* is the capacity to perform multiple tasks at the same time;
- *mobility*: is the capacity to perform joint movements at a wider range as possible without any injuries;
- *strength:* presupposes an enduring muscle mass, speed and maximum power to be able to perform one's training with maximum effects; https://www.tenisaxyall.ro/blog/2016/06/22/pentru-sportivi-conditia-fizica-este-un-subiect-important-dar-pentru-restul/

In both track and field and badminton, the athletes need good endurance, strength and speed, and many times dexterity and mobility are neglected.

Effort is "the result of multiple demands (muscular, cardiorespiratory, endocrine-metabolic, mental, etc.) to which the human body is subjected while performing certain activities" (Dragnea, A., 2000).

Physical adaptation to effort is important for every individual, because the lack of it can lead to functional modifications of the cardiorespiratory, muscular, and bone systems.

Fitness is the ability to perform athletic activities, occupations, and daily life activities and is generally achieved through adequate nutrition moderate and vigorous, exercise and sufficient rest.

"In sports training, evaluation is necessary to assess the level of achievement of one's current goals. It is recommended that the assessment is performed periodically and even continuously, not just at the end of the athletic activity." (V. Tudor, 2005).

2. MATERIALS AND METHODS

The study contained 5 badminton players (3 males and 2 females) from CSS Bacau, and 5 track and field athletes (3 males and 2 females) from CSM Bacau. The badminton players performed 4 training sessions per week, while the track and field athletes, 5 training sessions per week. The subjects were between 14 and 16 years old.

The purpose of this paper is to emphasize the athletes' training level, their cool down capacity, and not in the least, their dexterity level.

The initial hypothesis was that presumably, there is a difference between the badminton players and track and field athletes' cool down capacity, and from a dexterity standpoint, the badminton players are better trained.

The research methods used were: the literature study, the testing method, the statistical-mathematical method.

Subjects

The study contained 5 badminton players (3 males and 2 females) from CSS Bacau, and 5 track and field athletes (3 males and 2 females) from CSM Bacau. The badminton players performed 4 training sessions per week, while the track and field athletes, 5 training sessions per week.

2.1.Test description

Carlson fatigue curve test

This test challenges the subjects very much, but the authors believe that only such a challenge can show the subjects' fitness. The subject runs in place, knees high, for 10 s, with a 10 s break. The subject performs 10 repetitions of 10 s running, with the aforementioned breaks, the tester recording the subject's heart rate as follows:

1. before the test, the subject in a sitting position;
2. 10 s after the 10 repetitions;
3. 2 min after the 10 repetitions;
4. 4 min after the 10 repetitions;
5. 5 min after the 10 repetitions;

The tester records also the number of contacts of the subject's right foot with the floor every series of 10 s, then calculates the total number of touches of the right foot. The interpretation takes into consideration both the heart rate values and the number of touches for the right foot. If the subject is seriously engaged in the challenge, the accumulating fatigue will determine also a decrease in the number of touches of the right foot with the floor. The authors think that this test is also a good means of training, with good results in this sense.

6x20+20 meters test

This is a field test, easy to apply and interpret; its goal is to assess the lactacid anaerobe capacity.

Materials needed: measuring tape, chalk, timer, or photo-electrical cells. The tester measures and traces two lines 20 meters apart. The subjects must be equipped with appropriate shoes for the court where the test is performed, so that the ground adherence is optimal.

Description of the test: after the warm-up, the subject has to run for 20 m, back and forth. This is repeated six times, with a 20 s break between repetitions. The subjects must be encouraged to get through the 20 m at a maximum of their abilities, each time. The start command is always the same: get ready-set-start. The tester records the time for each run.

Results: the tester calculates the percentage between the first and last run and interprets the results using the marks presented below.

Table 1 – Test interpretation

Percentage difference	Mark
0 - 1 %	Very good
1 - 3 %	Good
3 - 5 %	Average
< 5 %	Poor

Eye-hand coordination test

Factor: the test monitors the subjects' capacity to coordinate the information received through the eye so that they would be able to catch the ball (eye-hand coordination);

Materials needed: timer, tennis ball, a flat wall.

Description of the test: the subject must throw the tennis ball to a wall, then catch it.

Indications: a 5-7 minutes warm-up is performed; the subject is at a 2 meters distance from the wall; at the start command, the timer starts; the subject throws the ball with the right hand and tries to catch it with the left hand, then the subject throws the ball with the left hand and catches it with the right, repeating this drill for 30 s.

Result: The tester records the number of catches within 30 s.

Table 2 – Test interpretation

Age	Very good	Good	Average	Satisfactory	Poor
15-16 y.o.	>35	30-35	25 - 29	20-24	<20 S

3.RESULTS AND DISCUSSIONS

The following tables present the results recorded by the athletes during the aforementioned tests.

Table 3 - Badminton players' results for the Carlson drill

No.	Surname/ first name	No. of repetitions per series										Pulse after effort				Initial pulse
		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	10 sec	2 min	4 min	5 min	
1.	I. A	17	16	14	15	15	15	15	16	15	16	195	118	114	114	86
2.	S.D.	17	16	15	16	15	16	15	16	17	16	174	106	96	98	74
3.	V.M.	17	16	17	15	16	16	16	15	15	16	186	112	98	98	82
4.	I.T.	17	16	17	16	15	16	15	15	15	15	175	112	103	103	83
5.	M.I.	16	15	17	15	16	15	16	16	15	16	178	114	106	108	82
Arithmetical mean		16.8	15.8	16	15.4	15.4	15.6	15.4	15.6	15.4	15.8	181.6	112.4	103.4	104.2	81.4
Max		17	16	17	16	16	16	16	16	17	16	195	118	114	114	86
Val.		16	15	14	15	15	15	15	15	15	15	174	106	96	98	74

Table 3 shows that the lowest number of right knee lifts recorded by the badminton players was 14, and the highest was 17. The heart rate of the badminton players recorded a drop in the first 2 post-effort minutes. The highest pulse after effort in badminton players was 195.

Table 4 - Track and field athletes' results for the Carlson drill

No.	Surname/ first name	No. of repetitions per series										Pulse after effort				Initial pulse
		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	10 sec	2 min	4 min	5 min	
1.	P. C.	19	19	20	20	19	19	19	20	20	21	121	96	82	79	70
2.	M.T.	18	19	19	18	19	19	20	20	19	20	154	82	76	90	83
3.	M.I.	18	20	20	20	19	19	19	20	20	20	130	92	78	80	74
4.	M.M.	17	16	17	16	15	16	15	15	15	15	164	81	74	88	81
5.	M.E.	16	15	17	15	16	15	16	16	15	16	159	79	75	84	71
Arithmetical mean		17.6	17.8	18.6	17.8	17.6	17.6	17.8	18.2	17.8	18.4	145.6	86	77	84.2	75.8
Max		19	20	20	20	19	19	20	20	20	21	164	96	82	90	83
Val.		16	15	17	15	15	15	15	15	15	15	121	81	74	79	70

Table 4 shows that the lowest number of right knee lifts recorded by the track and field athletes was 15, and the highest was 20. The highest pulse after effort in track and field athletes was 164. After the 5 minutes of break, the track and field athletes' pulse was closer to their initial pulse.

Table 5 - Results recorded by the badminton players during the 6x20+20 meters test and the eye-hand coordination test

No.	Surname/ first name	T series 1	T series 2	T series 3	T series 4	T series 5	T series 6	No. of throws/ 30 sec
1.	I. A	7.68	7.71	7.69	7.70	7.63	7.91	30
2.	S.D.	7.17	7.21	7.19	7.25	7.22	7.20	31
3.	V.M.	7.32	7.36	7.34	7.40	7.37	7.34	30
4.	I.T.	8.53	8.52	8.55	8.50	8.52	8.34	32
5.	M.I.	8.20	8.24	8.25	8.22	8.24	8.23	30
Arithmetical mean		7.76	7.80	7.80	7.81	7.79	7.84	30.6
Max		8.43	8.52	8.55	8.50	8.52	8.54	32
Val.		7.17	7.21	7.19	7.25	7.22	7.20	30

Table 5 shows that during the 6x20+20 meters test, the badminton players recorded a minimal value of 7.17 and a maximum of 8.55. The results between series recorded a difference of up to 9 seconds. During the eye-hand coordination test, all of the badminton players had the mark good. None of them dropped the ball.

Table 6 - Results recorded by the track and field athletes during the 6x20+20 meters test and the eye-hand coordination test

No.	Surname/ first name	T series 1	T series 2	T series 3	T series 4	T series 5	T series 6	No. of throws/ 30 sec
1.	P. C.	7.01	7.12	7.05	7.10	7.07	6.91	22
2.	M.T.	7.12	7.19	7.19	7.25	7.17	7.15	29
3.	M.I.	6.79	6.56	6.74	6.70	6.87	6.64	30
4.	M.M.	8.22	8.22	8.25	8.17	7.92	7.94	25
5.	M.E.	8.10	8.16	8.15	8.14	8.14	8.01	29
Arithmetical mean		7.44	7.45	7.47	7.47	7.43	7.33	27
Max		8.22	8.22	8.25	8.17	8.14	8.01	30
Val.		6.79	6.56	6.74	6.70	6.87	6.64	22

Table 6 shows that during the 6x20+20 meters test, the track and field athletes recorded a minimal value of 6.56 and a maximum of 8.22. During the run test, they recorded a better time than the badminton players. During the eye-hand coordination test, the track and field athletes had the marks good and satisfactory.

4.DISCUSSION

Some authors says that “the difference characteristics in each sport cause the need for a balance or fit of body type because in various sports there will be different physical and physiological characteristics. The characteristics of an athlete's body are determined by assessing his body type (somatotype) as a quantification of body composition and body shape which is important in athlete selection because it will affect the biomechanics of a sport” (Duncan et al., 2006; Gutnik et al., 2015), file:///C:/Users/Admin/Downloads/38147-110874-1-PB.pdf

In others opinion "badminton players use standing broad jump improvement as winning tool during competitions (Petersen D, 2015). Most vital determinant of success is motor performance ability and anthropological fitness (Choen, 2014). Anthropological fitness and training measures and quantifies relationship between bone mass, and body structure of athletes." (Tervo T., et al, 2010). file:///C:/Users/Admin/Downloads/9576-Article%20Text-18756-1-10-20210806.pdf

5. CONCLUSIONS

Following the tabulation of the results, the conclusion that can be drawn is that in regards to cool down, the track and field athletes are faster to recover than the badminton players, but at the same time they have a smaller increase in their heart rate. In the badminton players, the difference between the initial pulse and the pulse after effort is higher.
During the 6x20+20 meters test, the track and field athletes recorded a better time than the badminton players, the latter ones working more on the reaction speed.
During the eye-hand coordination test, the badminton players had better marks than the track and field athletes, who encountered difficulties in performing the challenge.
The difference between the sports is clear when looking at the results, the track and field athletes having a better general training than the badminton players.

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STUDY ON THE EFFORT CAPACITY OF MIDDLE SCHOOL STUDENTS

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ABSTRACT

The effort capacity of middle school students is crucial for their development and daily activities. This body's ability to sustain effort can be enhanced through physical activities. In physical education classes, the gradual implementation of various physical exercises is particularly important for improving the effort capacity of middle school students.
The development of effort capacity can be achieved with simple spatial materials, and the teacher must be attentive to the students' starting level to avoid overexertion. The purpose of this study was to identify the effort capacity of middle school students.
In this work, we started with the hypothesis that "the effort capacity of students can be influenced through physical education classes in middle school." The subjects of this study were fifth and sixth-grade students, 20 girls and 24 boys, from the Greek-Catholic highschool "Inochetie Micu" Cluj-Napoca.

KEYWORDS: *effort capacity, students, middle school, tests*

JEL CLASIFICATIONS: Z20, Z28, Z29

1. INTRODUCTION

"The intensity of demand represents the functional price paid by the body to exert effort and it depends on individual characteristics. Intensity of demand should not be confused with effort intensity, which represents the amount of mechanical work performed per unit of time. Efforts of the same intensity result in different functional changes from one individual to another and even within the same individual, depending on the level of training. The intensity of demand is assessed through various functional values: heart rate, respiratory rate, blood pressure. Heart rate indicates the level of oxygen consumption reached by the respective subject, from the maximum oxygen consumption they are capable of."

"The common characteristic of all actions of an individual, regardless of their nature, is energy consumption. When energy sources diminish to a certain level, fatigue ensues. Efforts specific to