BEEP TEST MEASUREMENT OF THE AEROBIC CAPACITY OF FEMALE FIELD HOCKEY PLAYERS

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(Preliminary communication)

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Abstract
The aim of the present research is to measure the input level of the aerobic capacity of the field hockey team players at the South-West University Neofit Rilski, Blagoevgrad by employing the degree of their training as a major criterion. The informants (n=10; 21.9±2.9 years of age; height=164.9±5.4 cm; weight=59.07±8.9 kg; BMI=21.66±2.6 kg/m²) were subject to an experimental research base on a 20 m. shuttle run test (Beep test) to measure indirectly the VO₂ max. Variation analysis with the PRZM statistical package (Ver. 3.02) was applied toward the output data. The value (X ±SD) of VO₂ max received as a result of the test is 32.07±1.7 ml/min/kg. This result leads to the following conclusions: 1) the aerobic capacity measured in the test is too low for the grass hockey players; 2) it indicates a necessity for deliberation of goal-oriented aerobic training; 3) it initiates a demand for designing of additional training programs toward improving the aerobic activity and to increase the anaerobic threshold of the female field hockey players.

Key words: VO₂ max, aerobic activity, additional training programs, variation analysis, functional condition

INTRODUCTION
Field hockey is the oldest popular sports played with a ball and club which was practiced by ancient civilizations. Assumingly, in its modern form it appeared 200 hundred years ago in England. In Bulgaria, the first testimonials of the game occurred at the end of the XIX and the beginning of the XX c. Today there are 37 field hockey clubs which are members of the Bulgarian Federation of Grass Hockey (Аттракшън (Антонов) & Dimitrova (Димитрова), 2009). Throughout its long history, the grass hockey has undergone fast and often radical transformations. The appearance of the artificial surface, the change of the material from which the playing field is made, as well as the growing competition, established high standard requirements for the technical skills and the functional condition of players. The grass hockey is a sport which demands a high level of the players’ aerobic capacity because of the myriad of movements during the game (Montgomery, 2006.; Quinney, Dewart, Game, Snydmiller, Warburton, & Bell, 2008.; Tarter, L. Kirisci, Tarter, S., Weatherbee, Jannik, McGuire, & Gledhill, 2009.). The aerobic capacities of field hockey players have an important role in modern hockey and seriously affect the players’ technical skills and their choice of tactics. During the game it is often necessary to alternate walking, slow running, dashing in diverse directions with or without a ball. Commonly, after the attack, all the players have to resume a defense position very quickly, which requires that they should cover a large part of the field. For this reason, good hockey players need a high level of aerobic capacity (Elferink-Gemser, Visscher, van Duijn & Lemmink, 2006., Hinrichs, Franke, Voss, Bloch, Schänzer, & Platen, 2010.). The eclectic character of the provision of energy in a game of field hockey motivates the importance of the evaluation of the players’ aerobic capacity and makes it as a very important indicator of the player’s training level. The following factors plays the crucial role of this evaluation (Lin & Chang, 2009.).

• It helps explore the effect of the training process;
• It increases players’ motivation to train;
• It poses clear goals for the athlete during the training process;
• It is informative with respect to the players’ physical fitness and technical skills;
• It gives ground for the designing of a plan for short-term and long-term training programs.
• It helps determine a players’ condition in the aftermath period of a trauma.

There is a great variety of field tests which measure the physiological characteristics of field hockey players. One of the well-known and widely used functional tests for indirect evaluation of VO₂ max is the 20 m. shuttle run test (Beep test).

The technology of its administration is according to the frequent halts, the changes of the direction of movement and the locomotive acceleration typical for the field hockey. In fact, the Beep test not only offers the athletes and coaches an opportunity to keep a track of the
aerobic capacity of separate players, but, can serve as a training technique, by itself.

**METHODOLOGY**

The research contingent was the female field hockey team at the South-West University, Blagoevgrad. The research experiment was conducted at the university sports centre. The informants had preliminary knowledge of the design and the goal of the experiment and were asked to an informed consent form in advance. The participants (n=10; 21.9±2.9 years of age; height=164.9±5.4 cm; weight=59.07±8.9 kg; BMI=21.66±2.6 kg/m²) were subjected to a 20 m. shuttle run test (Beep test) for indirect evaluation of VO₂max. The test was concurrently performed by all the informants. The Beep test included a maximum of 20 m. dashes/running stages/, whose number was gradually increased. Each running stage implies the overcoming of the respective number of dashes for a limited period of time which remained the same throughout the experiment. The running speed for the onset level is 8.5 km. per hour and increases by 0.5 km. per hour for each subsequent level. The prediction of VO₂max is based on the maximum aerobic speed achieved as well as the age of the informants /calculated in years/, while the evaluation itself takes into account the highest level registered during the test, the number of dashes overcome before the moment when the athlete is unable to sustain the tempo in accord with the sound signals, as well as Vmax registered during the last running stage. The calculation of VO₂max employs the following equation (Ahmaidi, Collomp, Caillauce & Prefaut, 1992).

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VO₂max = 31.025 + 3.238*V - 3.248*A + 0.1536*A*V \]

VO₂max – relative maximum consumption of oxygen (ml/min/kg)

Vmax – running speed during the running stage achieved in the test (km/h)

A - age of the informant (in years)

The software package PRISZM 3.02 is used for the processing of the data and a variety analysis is employed to measure the mean values and the standard deviation (x±SD).

**RESULTS AND DISCUSSION**

The experimental data received during the research are presented in Table 1. Table 2 presents the values of VO₂max for the untrained subjects (ml/min/kg), available on the Internet (http://www.brianmac.co.uk/vo2max.htm).

The results of the experiment demonstrates that 20% of the informants have VO₂max values of 41.7 ml/min/kg and 40.1 ml/min/kg, while only one informant shows 39.6 ml/min/kg, which indicates adequate training of cardio-respiratory functions and thus predicates high training levels. The prediction of VO₂max of two of the players is below the minimum values of the norm for their age range - 29.2 ml/min/kg for one of the subjects and 19.2 ml/min/kg for the other. The second result is very low and the respective player requires a special attention and training.

These negative results are not unexpected in that the players which are members of a newly-formed sports team and have not conducted the goal-oriented aerobic training sessions so far.

**CONCLUSIONS**

1. The results of the experiment demonstrates that the aerobic capacity of the field hockey players subject to testing (33.84±6.44ml/min/kg) borders with the minimum values of the norm for untrained women (aged 20 – 29 - from 33 ml/min/kg to 42 ml/min/kg), which leads to the conclusion that the contingent has a low aerobic capacity and therefore, a low training level.

2. The data concerning the low aerobic capacity of the athletes implies a demand for designing the additional training programs aimed at:

- improving their aerobic activity;
- training their cardio-respiratory functions

**REFERENCES**


**ОЦЕНКА НА АЕРОБНИОТ КАПАЦИТЕТ КАЈ НАТПРЕВАРУВАЧКИТЕ ПО ХОКЕЈ НА ТРЕВА СО Беп тестот (Beep test)**

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*(Преїходно сооийшйение)*

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**Апстракт**

Целта на истражувањето беше да се оцени аеробниот капацитет како критериум за нивнатот тренираност кај репрезентативната за хокеј на трева на Југозападниот университет „Неофит Рилски“ – Благоевград. На примерокот на испитаниците (n=10; 21.9±2.9 год.; 164.9±5.4 см. телесна височина; 59.07±8.9 кг. телесна тежина; 21.66±2.6 кг/м², BMI), беше применим 20 м. „летечки“ тест (Beep test) за индиректно определување на VO2max. Добивните резултати беа анализирани со варијациона анализа на статистичкиот пакет Prizm (Ver. 3.02). Добениата вредности (x ±SD) на VO2max и ликува 32.07±1.7 ml/min/kg. Од тој резултат може да се извлечат следните заклуци: 1. аеробниот капацитет е мочне низок кај натпреварувачките во хокеј на трева; 2. потребен неопходен целосен аеробен тренинг; 3. потребна е заснованост за примена на тренингови програми за подобрување на аеробната работоспособност и зголемување на аеробниот праг кај натпреварувачките во хокеј на трева.

**Ключни зборови:** VO2max, аеробна рабочина способност, дополнителни тренинги, вариационо анализа, функционална способност

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