Sport of explosion, based on a special technique and a relatively small movement, badminton requires an excellent physical condition. In this context, coordinative capabilities are designed to ensure rapid learning of technical procedures and tactical structures. The purpose of this study is to analyze both the coordinative capabilities and the capacity of sport performance to juniors groups in badminton. To obtain more relevant results for identifying the level of coordinative capabilities, we used the following variables: time-space orientation, kinesthetic differentiation, motor response and rhythmicity capabilities.

In terms of sport performance capacity, to obtain significant results, we used a wide range of observation protocols of techniques used by athletes during games. The obtained results are solid basis for establishing causal relationships between coordinative capabilities and achieving sports performance in badminton.

Keywords: Badminton, coordinative capabilities, performance, juniors.

JEL classification: I 19, I 29

1. Introduction

Badminton is one of the most popular sports of the world due to easiness which it can be practiced by people of all ages regardless of gender or training, aiming recreation or sport performances according to the level of practitioners.

Like other racquet sports, on short term, badminton is characterized by series of maximal and submaximal efforts, the level of motric qualities together with anticipation capacity were accepted as premises for obtaining performances.

By the side of high level technical skills, in badminton of performance, several capabilities are also requested: speed, endurance, muscle strength or agility. The quality of performance of all fundamental motor skills, the rhythm, flow, accuracy or amplitude are improved by coordinative ability, which directly helps in developing very fine extra technical skills.

Badminton is a sport that demands execution of complex skills with repetition and great intensity, especially at the competitive level. A performance of the correct
technique is very important for athletes’ success from the early stage of learning.

In order to develop a correct scientific way to identify the positive and the negative aspects of the coordinative abilities of beginners or the technical and tactical skills in badminton, it is important to establish relations between these abilities and to find the best means and tests to measure their levels.

**Research design**

**Purpose of the study**

This research study aimed to establish the initial level of coordinative abilities of a 16 badminton junior’s group. In the same time we tried to see if there is any relationship between those capabilities and the capacity of sport performance in badminton.

We are interested in collecting clear evidence concerning this relationship in order to develop a coordinative program and to measure its effects on the performance capacity in badminton.

In this initial study, the following objectives were stated: identifying other studies reflecting this theme, assessing the level of the coordinative capabilities and the capacity of performance, verifying the procedures, methods and tests and identifying the conclusions and establishing the future strategies.

**Methods**

Our study was held during period February – April 2014 and involved application of the tests for evaluation of coordinative capabilities and also the registration of some aspects regarding the technical procedures and tactical actions used by the athletes. The subjects of our tests are 16 athletes (6 girls and 10 boys) with ages between 14-16 years, components of juniors groups from School Sport Club no. 6 – Bucharest.

In order to identify the level of coordinative capacity, we used a number of 5 cases:

- Shuttle run between numbered medicinal balls – object testing – determination of orientation capacity Fig. 1 (a);
- Throwing back of the medicinal ball – object testing – determination of kinesthetic differentiation Fig. 1 (b);
- Motric reaction test - object testing – determination of motric reaction Fig. 2 (a);
- Walk in balance on gym bench – object testing – determination of balance capacity Fig. 2 (b);
- Running in a required rhythm – object testing – determination of rhythmicity capacity Fig. 3 (a).

The above mentioned tests were applied at the beginning of trainings, during the period of 2 months.
Fig. 1. (a) Shuttle run; (b) Throwing back of the medicinal ball

Fig. 2. (a) Motoric reaction; (b) Walk in balance

Fig. 3. (a) Running in required rhythm
For identifying the level of performance capacity, the athletes were evaluated during trainings, in a bilateral game. Regarding the technical procedures and tactical actions, we will analyze them in comparison with coordinative capacities, as following:

**Table 1. Technical procedures**

<table>
<thead>
<tr>
<th>Technical procedure</th>
<th>Technical procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long service</td>
<td>Attack stoke (Smeciul)</td>
</tr>
<tr>
<td>Consecutive return of long service</td>
<td>Lobe</td>
</tr>
<tr>
<td>Short service</td>
<td>Backhand</td>
</tr>
<tr>
<td>Consecutive return of short service</td>
<td>Short stroke (Drop)</td>
</tr>
</tbody>
</table>

**Table 2. Tactical actions**

<table>
<thead>
<tr>
<th>Tactical actions</th>
<th>0-2 points</th>
<th>3-5 points</th>
<th>6-7 points</th>
<th>8-10 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length shots</td>
<td>Short shot</td>
<td>Long shot, but stretched</td>
<td>Long and short shots</td>
<td>Long and short shots, different heights</td>
</tr>
<tr>
<td>Placements shot</td>
<td>In the axis field</td>
<td>Short shots on the right or left corner of the field</td>
<td>Long shots on the right or left corner of the field</td>
<td>Shots in 4 corners of the field</td>
</tr>
<tr>
<td>Settlement on the field</td>
<td>Without movement</td>
<td>Imbalance after kicking the ball</td>
<td>Stop during shot</td>
<td>Kicking the ball and repositioning in the field</td>
</tr>
<tr>
<td>Strategy</td>
<td>After the partner</td>
<td>Sending the ball as far away as it possible</td>
<td>Opponent’s movement</td>
<td>Quick and combinative game</td>
</tr>
</tbody>
</table>

**Results**

The obtained results were centralized in the tables using Microsoft Office Excel 2013, program that allows obtaining statistics and graphs, as following:
Table 3. Coordination ability

<table>
<thead>
<tr>
<th>Athletes</th>
<th>Orientation ability</th>
<th>Throwing back of the medicinal ball</th>
<th>Motric Reaction</th>
<th>Walk in balance</th>
<th>Running in a required rhythm</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.I.</td>
<td>6.50</td>
<td>12</td>
<td>1.70</td>
<td>9.72</td>
<td>1.00</td>
</tr>
<tr>
<td>I.I.</td>
<td>7.44</td>
<td>12</td>
<td>1.85</td>
<td>10.03</td>
<td>1.41</td>
</tr>
<tr>
<td>R.C.</td>
<td>6.97</td>
<td>11</td>
<td>1.70</td>
<td>7.07</td>
<td>0.69</td>
</tr>
<tr>
<td>A.D.</td>
<td>7.72</td>
<td>13</td>
<td>2.15</td>
<td>7.9</td>
<td>1.34</td>
</tr>
<tr>
<td>M.G.</td>
<td>7.69</td>
<td>14</td>
<td>1.80</td>
<td>5.94</td>
<td>0.70</td>
</tr>
<tr>
<td>M.D.</td>
<td>8.10</td>
<td>12</td>
<td>1.85</td>
<td>8.3</td>
<td>1.40</td>
</tr>
<tr>
<td>M.G.</td>
<td>6.40</td>
<td>10</td>
<td>1.50</td>
<td>5.72</td>
<td>1.36</td>
</tr>
<tr>
<td>F.G.</td>
<td>6.18</td>
<td>14</td>
<td>1.65</td>
<td>7.94</td>
<td>1.03</td>
</tr>
<tr>
<td>E.S.</td>
<td>6.19</td>
<td>13</td>
<td>1.80</td>
<td>7.32</td>
<td>1.21</td>
</tr>
<tr>
<td>C.F.</td>
<td>5.94</td>
<td>11</td>
<td>1.45</td>
<td>6.4</td>
<td>0.84</td>
</tr>
<tr>
<td>A.O.</td>
<td>6.40</td>
<td>10</td>
<td>1.95</td>
<td>6.02</td>
<td>1.44</td>
</tr>
<tr>
<td>R.D.</td>
<td>7.56</td>
<td>11</td>
<td>1.75</td>
<td>6.59</td>
<td>1.38</td>
</tr>
<tr>
<td>A.C.</td>
<td>7.50</td>
<td>8</td>
<td>1.70</td>
<td>6.56</td>
<td>1.31</td>
</tr>
<tr>
<td>A.F.</td>
<td>7.35</td>
<td>14</td>
<td>1.75</td>
<td>8.1</td>
<td>1.43</td>
</tr>
<tr>
<td>P.C.</td>
<td>7.75</td>
<td>15</td>
<td>1.55</td>
<td>6.65</td>
<td>1.08</td>
</tr>
<tr>
<td>M.C.</td>
<td>6.31</td>
<td>14</td>
<td>1.55</td>
<td>5.94</td>
<td>0.71</td>
</tr>
</tbody>
</table>

From the above presented data series, the relative dispersion of the results for testing orientation capacity and motric reaction, we identified a variability coefficient of 10% according to a high homogeneity. The rest of the 3 tests showed a moderate level.

Fig. 4. (a) Orientation ability; (b) Footwork and positioning
Regarding the orientation capacity (shuttle run between numbered medicinal ball), from 16 participants at the tests, only 7 are below the trend group (Fig 4 a). This result highlights a better coordination capacity.

In parallel with this test, can be analyzed the results from the footwork test and movement on the field. The comparison of the results indicates that four athletes with the best orientation capacity have also the best field works (Fig 4 b). On the other side, there were athletes that although they had good results at coordination test, but on the field works were less remarkable.

To establish the balance capacity, the athletes had to walk on gym bench with 1 kilo medicinal ball in a hand and with the fingers of the other hand holding the opposite earlobe. The results revealed values between 5.72s and 10.03s. On this interval, the same athletes had the best results (5.72s, 5.94s, 6.4s).

At the rhythmicity capacity was registered a variability coefficient of 24% representing a moderate homogeneity of the results.

![Fig. 5. (a) The smash; (b) The positioning of shots](image)

As in case of analyzing the footwork and movement on the field, the technical procedures for hitting the ball indicate a number of 3-4 athletes whose execution is above the group average. So, from a total of 46 or 48 smashes, 28 or 30 were successful executions (60% and 62% success rate). The smashes were executed with the body aligned on the trajectory of the ball. The contact with it took place at the height and the movement of the wrist had a powerful execution. These results are exponential values for the group which represented our sample (Fig 5 a). Eliminating the results of these two athletes, the average of executed smashes as a great skill is 41%.
The placement of the shots is another studied element. Here was identified an average of alternating strokes from the four corners of the field representing 28% from total shots placed over the net (8-10 points). Also, were noted a number of athletes with a percentage of execution between de 37% and 39% (Fig 5 b).

As strategy applied, were highlighted athletes with 35 or 38 situations when they managed a quick and combinative game. In contrast, were athletes who managed only 6 or 8. For them, the transmission of the ball as far as they could was representative.

Conclusions and discussion

Badminton requires hard training in sprints area, stoppages, jumps, turning directions or variety of strokes.

In this context, one of the fitness components is coordinative capacity, aspect that was analyzed in this preliminary study.

The results of the study revealed initial level of coordinative capacity and performing capacity of 16 athletes, components of juniors groups from School Sport Club no. 6 – Bucharest.

The record of the results didn’t show significant relationship between performance and coordinative capacities. For this is necessary to introduce training programs whose theme will be coordination development

Moreover, out of 16 athletes who were part of initial test, were highlighted four athletes whose results were above the average group in most samples. One of them confirmed at the level of participation, being the first Romanian athlete qualified at Junior World Championship held in Kuala Lumpur.

Through the objectives set for this stage, we were able to identify an average of smashes from a game, or the maximum (48 smashes) and minimum (23 smashes). Another aspect that caught our attention was the field where the athletes placed shots (140 shots placed in the four corners of the field). Footwork and movement in the field were analyzed in relation with the orientation capability of the subjects.

In samples where was investigated the coordination capacity, we could identify different homogeneity, depending on sample, the recorded values were between 10% and 24%. Regarding the tactical actions were athletes who used a fast and combined game, imposing the rhythm of the game (38 cases), while others played according to the partner.

As a conclusion, through this preliminary study, we were able to check a series of tests by which we can assess our research variables. For performance capability, the study results led to the construction of protocols for recording technical and tactical skills of athletes. After examining our sample, we consider useful to
increase the number of subjects, the establishment of experimental and control
groups.
Regarding the experimental study that will follow, we want to see if the growth
rates of successful outcome in the technical execution and tactical actions are due
to training programs that rely on coordinative capacity development.
Also, in the next stage of the research, we have identified the need for more
detailed analysis on causal relationships between coordinative ability of athletes
and their performance ability.

REFERENCES

2. Gursewak Singh, Praveen Kumar Mishra, (2012). Comparative Study of Co-
Ordinative Abilities of Taekwondo Players in Different Weight Categories.
Indian Journal of Movement Education and Exercises Sciences (IJMEES), Vol.
II No. 2.
3. Radmila Kostić et all., (2009). The relations between anthropometric
characteristics and coordination skills, Facta Universitatis, Physical Education
and Sport, Vol 7, Nr. 1, 101-112
badminton skills acquisition and retention, Perceptual and Motor Skills, 102,
275-284
5. Karen E. French et all., (1996) The Effects of a 3-Week Unit of Tactical, Skill,
or Combined Tactical and Skill Instruction on Badminton Performance of
4, 418-438
6. Amar Kumar Minz, (2003), Relationship of coordinative abilities to performance
in badminton, Lakshmibai National Institute of Physical Education, Master of
Physical Education
7. Sunil Bhardwaj (2007). Coordinative abilities and physiological characteristics
of badminton players of Delhi State at different levels, Lakshmibai National
Institute of Physical Education, Degree of Doctor of Philosophy in Physical
Education