

**PHYSICAL CONDITION AND DEVELOPMENT OF STUDENTS
PRACTICING FIELD HOCKEY AT TODOR KABLESHKOV
UNIVERSITY OF TRANSPORT – SOFIA
AND TRAKIA UNIVERSITY – STARA ZAGORA**

Marina Nedkova, Diana Peeva, Nela Gocheva
marina_nedkova@yahoo.com, diana2616@abv.bg

*Department of Sport, Sofia University St. Kliment Ohridski
South West University – Blagoevgrad
Trakia University – Stara Zagora
BULGARIA*

Key words: *physical development, students, condition, field hockey.*

Abstract: *The paper presents information about the current condition of physical development and the capacities of female students practicing field hockey in regular classes in Physical Education and Sport (PES). The study was performed at the Todor Kableshkov University of Transport – Sofia and Trakia University – Stara Zagora at the beginning and the end of the academic year.*

Field hockey is part of the curriculum and activities of the subject "Physical Education and Sports" (PES). The paper discusses the level of physical condition, development and capacities of female students practicing field hockey in PES classes and sports improvement classes at the Todor Kableshkov University of Transport in Sofia and Trakia University in Stara Zagora.

The study aimed to obtain information at the beginning and end of the academic year and the tasks set included:

1. Research and analyse changes in anthropometric data of students participating in the field hockey classes.
2. Study and evaluate changes in the physical performance of students participating in field hockey classes within an academic year.

The object of this study was 23 female students from various major programs at the two universities and the subject was to find out the effect of playing field hockey.

The students under examination practiced field hockey in PES classes and classes for sports improvement. They were in year 1 up to year 4, at different ages within the range of 19-23. The methods applied included standard tests, and the study was carried out in sportswear in available sports halls and fields where the learning process in Physical Education and Sports is held.

Classes were held according to a uniform methodology, which complies with the methodological requirements, the physical level and the development of students.

A test battery was applied to find out the level of physical condition, development and dynamics of physical capacity. It includes 13 tests – 5 for anthropometric indicators and 8 for measuring physical capacity (Table 1).

Table 1. Test battery

№	Indicators	Measurement unit	Accuracy of measurement	Direction of increase
I. ANTHROPOMETRIC INDICATORS				
1	Height in an upright position	cm	1	+
2	Weight	kg	1	+
3	Chest	cm	1	+
4	Waist	cm	1	-
5	Skin fold	mm	1	-
II. TESTS FOR MEASURING PHYSICAL CAPACITY				
1	Running – 36 m	s	0.1	-
2	Beep test		0.1	+
3	Ball throwing – 3 kg	cm	1	+
4	Deadlift strength	kg	1	+
5	Squats (30 s)	number	1	+
6	Long jump	cm	1	+
7	High jump	cm	1	+
8	Lean depth	cm	1	+

The female students playing field hockey passed an entry-level test. Table 2 presents the average values of each indicator.

Table 2. Data of the entry test indicators

№	Indicators	Measurement Unit	X₁	S₁
1	Height	cm	162,7	5,1
2	Weight	kg	57,2	12
3	Chest	cm	90,3	9,1
4	Waist	cm	72,3	10,5
5	BMI		21,3	7,4
6	Running – 36 m	s	7,2	0,7
7	Beep test		5,1	1,2
8	Throwing a ball – 3 kg	cm	478,6	89,2
9	Deadlift strength	kg	87,3	18,4
10	Squats (30 s)	number	26,4	3,4
11	Long jump	cm	166	27,9
12	High jump	cm	24,9	8,4
13	Lean depth	cm	111,2	8,1

Legend:

- X₁, S₁ – mean value and dispersion at the beginning of the experiment, N = 23 students

After regular visits to classes in Physical Education and Sports and classes for sports improvement during the winter and summer semesters, the second test of female students was conducted. Table 3 presents the average values of each indicator at the end of the academic year.

Table 3. Date of exit test indicators

№	Indicators	Measurement unit	X₂	S₂
1	Height	cm	162,7	5
2	Weigh	kg	57,1	11,8
3	Chest	cm	90,2	9,9
4	Waist	cm	72	10,6
5	BMI		21,2	5,8
6	Running – 36 m	s	6,9	0,8
7	Beep test		5,4	1,4
8	Throwing ball – 3 kg	cm	489,8	89,8
9	Deadlift strength	kg	96,1	22,4
10	Squats (30 сек)	number	26,9	2,6
11	Long jump	cm	169	28,2
12	High jump	cm	25,8	8,7
13	Lean depth	cm	111,8	7,7

Legend:

- X₂, S₂ – mean value and dispersion at the end of the experiment, N = 23 students

Table 4 presents the average values of each indicator at the beginning and at the end of the academic year as well as the difference between them.

Table 4. Average values at the beginning and at the end of the experiment

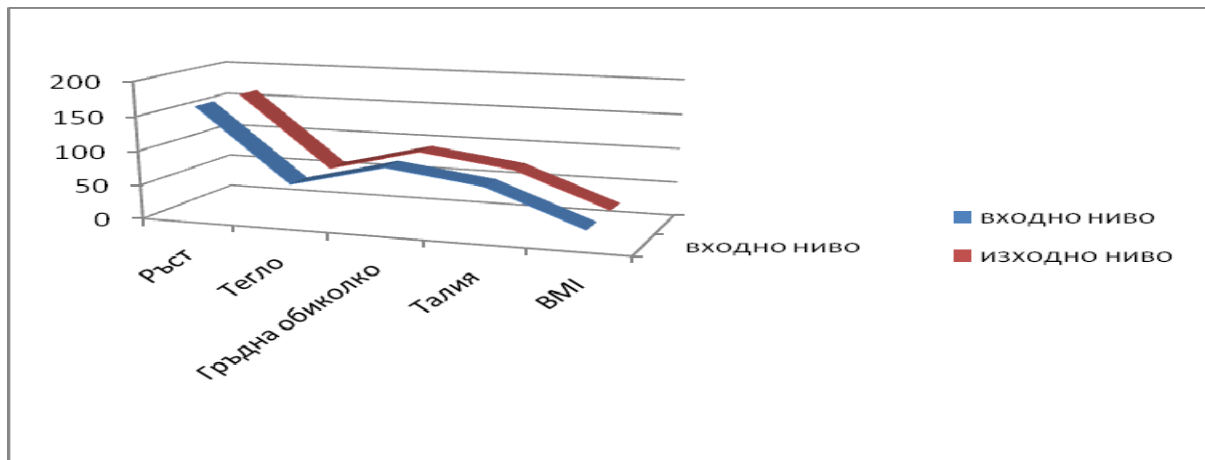
№	Indicators	Measurement units	X₁	S₁	X₂	S₂	DIFF
1	Heigh	cm	162,7	5,1	162,7	5	0
2	Weight	kg	57,2	12	57,1	11,8	-0,1
3	Chest	cm	90,3	9,1	90,2	9,9	0,1
4	Waist	cm	72,3	10,5	72	10,6	0,3
5	BMI		21,3	7,4	21,2	5,8	0,1
6	Running – 36 m	s	7,2	0,7	6,9	0,8	+0,3
7	Beep test		5,1	1,2	5,4	1,4	+0,3
8	Ball throwing – 3 kg	cm	478,6	89,2	489,8	89,8	+11,2
9	Deadlift strength	kg	87,3	18,4	96,1	22,4	+8,8
10	Squats (30 sec)	number	26,4	3,4	26,9	2,6	+0,5
11	Long jump	cm	166	27,9	169	28,2	+3
12	High jump	cm	24,9	8,4	25,8	8,7	+0,9
13	Lean depth	cm	111,2	8,1	111,8	7,7	+0,6

Legend:

- Signs in column "DIFF" for (X₂): „-“, lower result; „+“ better result;
- X₁, S₁ – mean value and dispersion at the beginning of the experiment, N = 23 students
- X₂, S₂ – mean value and dispersion at the end of the experiment, N = 23 students

Graph 1 shows the average values of anthropometric indicators at the beginning and at the end of the experiment. As it is known, those anthropometric indicators related to physical development are too conservative and within the measurement in the experiment for one

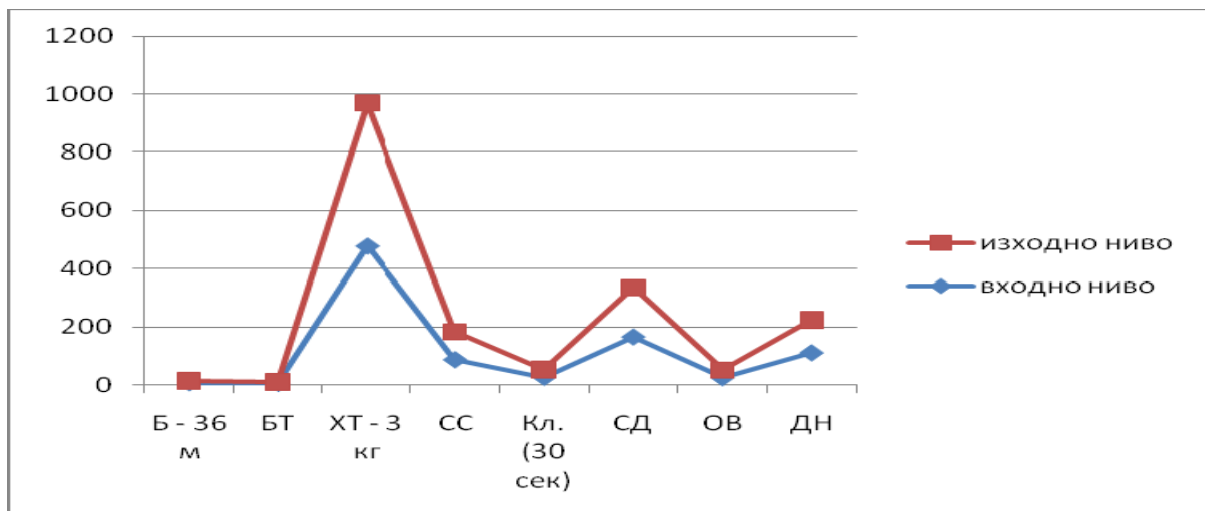
academic year, most of them would not change significantly and reliably within the range of measurement statistical error.



Height Weight Chest Waist BMI entry-level entry-level exit level

Graph 1. Average values at the beginning and the end of the experiment of anthropometric indicators

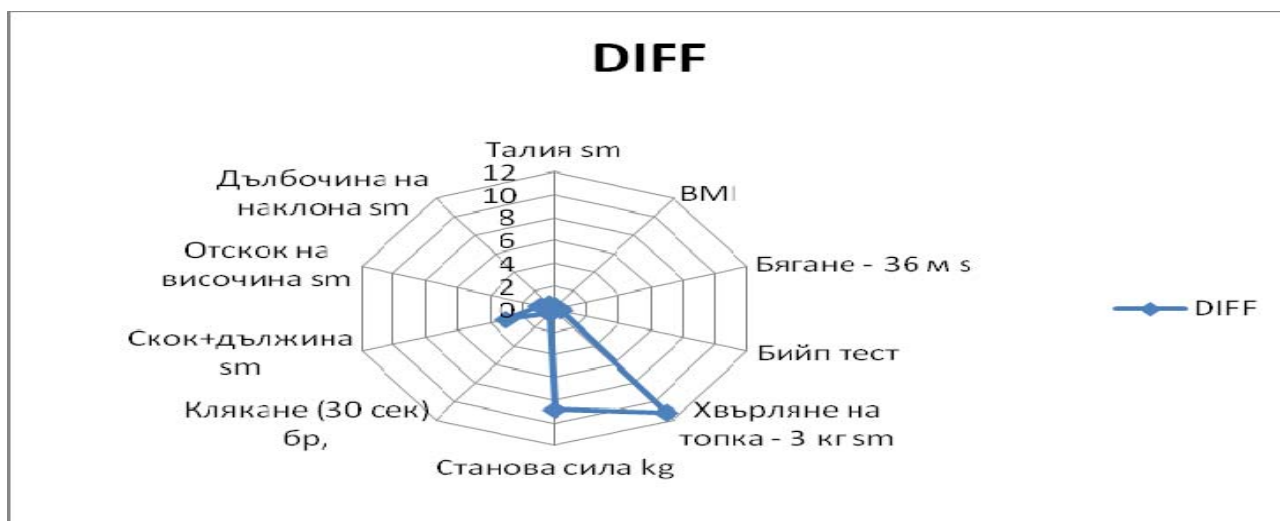
Graph 2 presents the average values of indicators of physical capacity at the beginning and the end of the experiment.



Running Beep test Ball throwing Deadlift strength Squats Long jump High jump Lean depth
entry-level exit-level

Graph 2. Average values of physical capacity indicators at the beginning and the end of the experiment

Graph 3 presents the difference between the first and the second measurements, the entry and exit levels.



Lean depth High jump Long jump Squats (30 s) Deadlift Ball throwing Beep test Running – 36 m

Graph 3. DIFF of average values of physical capacity indicators at the beginning and the end of the experiment

It is observed that there was an increase in all indicators: "Running – 36 m" – the result improved by 0.3 s; "Beep test" – the average level achieved by students at the end of the academic year was 0.3 higher; "Ball Throwing – 3 kg" marked an increase of 11.2 cm and "Deadlift strength" was improved by 8.8. The average number of squats in 30 seconds was 0.5 higher. The increase of results of tests "Long Jump", "High Jump" and "Lean Depth" was higher on average with 3 cm, 0.9 cm and 0.6 cm respectively. The average number of squats for 30 s is more with a squat.

The following conclusions can be drawn from these results:

1. An increase in all indicators of physical performance was observed in all female students playing field hockey.
2. It was reported that the efficiency of these activities is considerable and participation in them leads to constructive physical exertion.
3. The physical development of female students was characterized by a small variability of anthropometric indicators.
4. The results of this study showed that the implementation and practice of non-traditional sports at universities, in parallel with the traditional ones, will expand the content and impact effect in the educational and training process of physical education and sports.

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