



RESEARCH ARTICLE

# Gender differences in the stickhandling technique of young field hockey players

Shishkov Igor Yurievich

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## Abstract

The article presents preliminary results of research of technical fitness of young field hockey players (boys and girls) of 9-16 years old using the test "Dribbling on the spot in 15 sec.", which evaluates the number of left hand turns as an indicator of hockey player's technical fitness. And also a comparative analysis of the strength of the left and right hands of young hockey players depending on age was given. It is revealed that from the age of 14 the girls have the dominance of the left hand strength over the right hand, as the left hand in field hockey has the leading value.

Key words: field hockey, dribbling, frequency of left-hand movements, hand strength, youth sports.

## INTRODUCTION

The basis of coordination abilities are the properties of the nervous system. Formation of physical qualities in humans does not occur simultaneously and has age specific features [10], in particular strength in the younger school age increases slowly, as its growth is associated with an increase in the thickness and strength of individual muscle fibers in the composition of muscles and a general increase in muscle mass [12]. The greatest increase in absolute strength is observed in adolescents and young men at 13-14 years and 16-18 years, and in girls and young women at 11-12 years and 16-17 years [4,5]. Human quickness is a very specific ability, so when developing it, it is necessary to remember that the main acceleration of quickness development begins at the age of 10. A person can perform some movements with great speed and relatively slower - other movements. Training of reaction quickness will have practically no effect on the frequency of movements, and the direct transfer of speed abilities is observed only in coordinately similar motor actions [3].

Field hockey is a team sport. It deserves special attention because in field hockey athletes use the so-called

"right grip", which is characteristic of left-handed players. Since there are no more than 15% of left-handed people in the human population, most right-handed people have to retrain their brains by automatically developing the right hemisphere. The earlier the process of learning field hockey technique begins, the easier, faster and better the adaptation to the training process. It has been proven that the right hemisphere of the brain is responsible for creativity, success in learning languages, attention control, emotional, creative and other types of intelligence, the importance of the development of which is now stated by scientists. Regular practice of field hockey leads to qualitative changes in the development of mental qualities [11].

Modern field hockey, puck hockey and ball hockey (bandy) imposes increased demands on the speed of all technical techniques, their dynamism and high accuracy of execution.

In our study, we tried to consider the differences in hand speed and strength of boys and girls of different age groups.

Purpose: To analyze the frequency of movements of the left hand in young hockey players of different ages and to evaluate the strength indices of the hands of both hands.

Moscow State Academy of Physical Culture, Moscow

*\*) corresponding author*

Shishkov Igor Yurievich  
Associate professor, candidate of pedagogical sciences,  
associate professor of theory and methodology of soccer  
and hockey at Moscow State Academy of Physical Culture,  
Moscow, Honored coach of Russia

Email: igorshishkov8@gmail.com

## MATERIAL AND METHODS

Young men of 9-12 years old and girls of 11-16 years old took part in the study n=60. Dynamometry indices of the right and left hands, the frequency of club rotation with the left hand for 15 seconds were recorded. Hand strength was determined in isometric mode of work. The forearm muscle group including the ulnar wrist flexor muscle, radial wrist flexor muscle and long palmar muscle were investigated.

Carpal dynamometry, measuring the strength of the finger flexor muscles is performed with a hand dynamometer. The subject in a standing position grasps the dynamometer with the hand with the dial to the palm of the hand (in order not to hold the hand with fingers during compression), then without tension in the shoulder raises the arm to the side and compresses the dynamometer with maximum force (it is not allowed to bend the arm in the elbow joint and move out of place), the measurement is repeated 2-3 times and record the best result. Permission to test the children was obtained from the head of the sports school.

The stick rotation frequency was determined by the number of movements "pronation-supination" of the left hand. To control the stick rotation frequency when dribbling

the ball, we used a sensor MPU9250 (manufacturer TDK) providing registration of the stick rotation. The sensor was mounted on the base of the stick 15 cm from the hook. The information from the sensor was transmitted via wi-fi to a laptop where it was processed by a specially developed program.

## RESULTS AND DISCUSSION

Table 1 shows the comparative data of the mean scores of the result of the test "Dribbling the ball on the spot in 15 seconds" of girls of 11-12 and 14-16 years old.

**Table 1.**  
Comparative data of average indicators of the result of the test "Dribbling the ball on the spot in 15 seconds" of girls of 11-12 and 14-16 years old.

Dribbling on the spot (number of "pronations-supinations) in 15 sec.	Girls 11-12 years old n=18	Girls 14-16 years old n=21	P
M±m	19,8±4,6	23,9±5,1	<0,05

According to the results of the test "dribbling the ball on the spot in 15 seconds", we found the reliability of differences in the average indicators of the frequency of

shifting the ball in girls 11-12 and 14-16 years old ( $p < 0,05$ ). After the test "Dribbling" we measured the hand strength by manual dynamometry.

**Table 2.**  
Comparative data of mean right and left hand strength (H) of girls 11-12 and 14-16 years old.

Hand force (Newtons) (H)	Girls 11-12 years old n=18	Girls 14-16 years old n=21	P
M±m right brush	17,8±3,9	23,6±3,7	<0,01
M±m left brush	17,1±4,6	24,35±3,4	<0,001

Significance of differences in mean right hand strength in girls 11-12 and 14-16 years old was  $p < 0,01$ , left hand  $p < 0,001$ . Thus, girls 14-16 years old had significantly better indicators of right and left hand strength than girls 11-12 years old, which is associated with a longer time of hockey.

It is worth to pay attention that the indicators of left hand dynamometry in girls of 14-16 years old. The indicators of left hand strength were higher than right hand strength. This is due to the fact that in field hockey the leading hand is the left hand, and the main technical fine-

motor movements are performed by the left hand. In turn, the girls of 11-12 years old had a stronger right hand. This is probably due to the fact that young field hockey players need more time to form the difference in hand strength.

The study of stick rotation technique and hand strength in young boys was interesting. We compared the obtained data between guys of different ages 9-10 years old and 11-12 years old. Table 3 shows comparative data of the average results of the test "Dribbling the ball on the spot in 15 seconds".

**Table 3.**  
Comparative data of average indicators of the result of the test "Dribbling the ball on the spot in 15 seconds" of boys 9-12 years old.

Dribbling on the spot (number of "pronations-supinations) in 15 sec.	Boys 9-10 years old n=12	Boys 11-12 years old n=15	P
M±m	7,75±1,14	13,5±1,7	<0,05

As can be seen from the table, the differences in the mean values of the index of the number of pronations-supinations of the club in 15 seconds between boys of 9-10 and 11-12 years old had a significant difference  $p < 0,05$ . It is

connected both with the periods of sensitive development of quickness, and with the difference in the stages of sports training of young hockey players.

**Table 4.**  
Comparative data of average strength (H) indices of the right and left hand of boys of 9-10 and 11-12 years old.

hand force (Newtons) (H)	Boys 9-10 (n=12)	Boys 11-12 (n=15)	P
M±m right brush	12,3±2,4	20,7±3,9	<0,001
M±m left brush	13±2,7	21,2±3,8	<0,001

The significance of the differences in mean right and left hand strength in boys 9-10 and 11-12 years old was  $p < 0.001$ .

Thus, boys 11-12 years old had significantly better right and left hand strength scores than boys 9-10 years old.

## CONCLUSIONS AND RECOMMENDATIONS

Frequency of stick rotations according to the results of the test "Dribbling on the spot" in girls showed progressive dynamics of the index growth from  $19.8 \pm 4.6$  at the age of 11-12 years to  $23.9 \pm 5.1$  in girls of 13-16 years, which indicates the growth of their technical skill. In boys 9-12 years old, there was also a significant  $p < 0.05$  increase in the index of left hand hand movement frequency from  $7.75 \pm 1.14$  in 9-10 year olds to  $13.5 \pm 1.7$  in 11-12 year old hockey players.

The results of hand dynamometry also showed a significant  $p < 0.001$  increase in hand strength of both right and left hands during ontogenesis. At the same time in boys at the age from 9 to 12, and in girls from 11 to 13 years of age the superiority of the right hand strength over the left hand was noted, and from 14 years of age in girls there comes the dominance of the left hand strength over the right hand, as the left hand in field hockey has a leading value.

## DECLARATIONS

### Consent For Publication

I fully agree that this thesis can be published for academic purposes and I am ready to provide support and additional information needed to facilitate the publication process.

### Availability Of Data And Material (ADM)

All of the data and materials used in this research have been collected well and are available for those who need them, both for academic purposes and further research.

### Competing Interests

The authors declare no conflict of interest.

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### Authors' Contributions

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