

Evaluation of dribbling speed technique in female field hockey players

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Abstract

Field hockey is a high-intensity team sport that requires the rapid execution of technical skills under dynamic, competitive conditions. Among these skills, dribbling speed combined with precise ball control is a key determinant of successful performance, particularly during offensive actions and transitions. The development of speed technique at a young age is therefore essential for long-term athletic progression. The present study aimed to evaluate the level of dribbling speed technique in female national field hockey players using the author's “Forehand Slalom Dribble – Double Grip” test and to compare the obtained results with data from a previous assessment conducted in 2016. The study involved 13 female players from the Bulgarian national junior team (mean age 14.46 ± 1.26 years). Performance was assessed through timed slalom dribbling trials, and the results were analysed using descriptive statistics and comparative methods. The findings showed a statistically significant improvement in dribbling speed performance over the period examined. The mean time for completing the slalom in 2025 was 12.23 ± 1.07 s, compared to 13.27 ± 1.50 s recorded in 2016, representing an improvement of 7.8%. The difference between the two groups was statistically significant ($t = 2.14$, $p = 0.045$) and demonstrated a large practical effect (Cohen's $d = 0.80$). The lower coefficient of variation in the 2025 group also indicates greater homogeneity and more stable technical performance. According to the proposed evaluation scale, the 2025 results correspond to a “very good” level of speed technique, whereas the 2016 results were classified as “good.” These findings indicate a positive trend in the development of dribbling speed technique among female field hockey players, likely reflecting improvements in training methodology, technical preparation, and overall sports specialisation. Based on the present results, the applied test is a reliable and sensitive tool for monitoring speed technique in youth field hockey players and can be used effectively for performance evaluation and long-term athlete development.

Keywords: field hockey, speed technique, dribbling, athletic performance, performance testing

Introduction

Speed is a highly specific motor ability. When developing it, it is important to consider that the most pronounced gains in speed development typically begin around the age of ten. Individuals may perform certain movements very quickly while executing others more slowly. Training reaction speed has little effect on movement frequency, and transfer of speed abilities occurs mainly between motor actions that are similar in coordination (Shumikhina et al., 2005).

Speed and speed endurance are key components of field hockey players' physical conditioning and, together with technical proficiency, form the foundation for success in the sport (Keogh et al., 2003; Brechue, 2011; Lemmink & Visscher, 2003; Lemmink et al., 2004).

Field hockey is a team sport that warrants attention because it uses the “right grip”, which is typically associated with left-handed coordination patterns. As left-handed individuals account for about 15% of the population, many right-handed players need to retrain aspects of their motor coordination, with a greater reliance on right-hemisphere processing during skill acquisition. The earlier hockey technique is introduced, the easier, faster, and more effective adaptation to training tends to be. The right hemisphere is commonly linked to creativity, attention control, and aspects of emotional and creative intelligence, which are widely regarded as important for holistic development. Regular field hockey practice can contribute to improvements in these cognitive and emotional domains (Shishkov, 2021).

Modern field hockey, as well as ice hockey and bandy (ball hockey), places increasing demands on the speed, dynamism, and precision of all technical movements (Shishkov, 2023).

During a competitive match, movement without the ball accounts for 96 to 97% of total active playing time, while dribbling, tackling, passing, and other ball-contact actions occupy no more than two minutes (3 to 4% of active play) (Antonov, 2006).

Dribbling speed also requires a high level of agility, as field hockey involves frequent changes of direction as well as repeated accelerations and decelerations (Sharma & Kailashiya, 2018). Attempts to increase

movement speed beyond what can be safely controlled for a given technical action may compromise the execution of hockey technique (Antonov et al., 2008; Gadev, 2015; Volkov, 2002; Filin, 1979).

Research indicates that establishing the technical foundation for maximal-speed execution requires well-developed speed abilities in play without the ball (Antonov et al., 2001; Volkov, 2002). Therefore, developing speed abilities, both with and without the hockey stick, is a crucial component of training for adolescent players. These abilities are key to mastering high-speed technical performance in modern field hockey (Antonov, 2020).

Methodology

The present study aims to compare the results of the Forehand Slalom Dribble test among female field hockey players from the Bulgarian national team in 2016 and 2025. Through this test, we seek to determine whether the current national junior team demonstrates better technical and speed performance than their predecessors from 2016.

The first measurement was conducted in Sofia (NSA “Vasil Levski”) in 2016, and the second one took place in Nedelino in 2025.

The main objective of the research is to evaluate the speed technique of forehand slalom dribbling among the players of the Bulgarian national girls’ team in field hockey.

Research Tasks

1. To provide a theoretical justification of the research problem;
2. To analyze and present the data obtained from the field experiment;
3. To draw conclusions and provide recommendations.

The object of the study is the performance of the Forehand Slalom Dribble with a double grip, while the **subject** of the study is the speed of movement through the slalom and the comparison of results based on the evaluation scale.

The sample consisted of 13 female athletes aged 14.46 ± 1.26 years from the Bulgarian National Field Hockey Team.

To achieve the research objective, the “Forehand Slalom Dribble – Double Grip” test was applied. This test was originally developed and standardised by the author, and the same evaluation scale used in the 2016 study was employed in the 2025 testing.

The collected data were processed using mathematical and statistical analysis in Microsoft Excel, including variation analysis, comparative analysis of results, and standard deviation.

A key element of control in sports is evaluation, i.e., assessing an athlete’s performance in a specific test to provide an objective understanding of their physical and technical characteristics. The primary task of evaluation is to compare athletes’ performances against established norms for a given age group or level of preparation.

The evaluation system developed by the author is based on comparative norms used to assess individuals within the same population group. These norms are typically presented through point-based rating scales, but they can also be derived from the mean value ($\bar{X}$) and standard deviation (SD), usually organised into 3-, 5-, or 7-level classification groups (Zatsiorsky, 1982). Such systems are appropriate when the available data allow the calculation of $\bar{X}$ and SD for the analysed group.

In the present study, the diagnostic results can be used as control norms in the preparation of field hockey players during the sports specialisation phase, as they are based on expert analysis of the key qualities needed to meet the conditioning and technical demands of the sport.

These norms are considered to reflect the level of Bulgarian female field hockey players, as the test was standardised on a representative sample of the country’s best athletes during the advanced training stage.

During the test development in 2016, the Coefficient of Special Game Speed (CSGS) was calculated. This coefficient reflects the relationship between the time for free slalom performance with a stick (without dribbling) and the time for slalom performance with a ball (forehand dribbling). A smaller difference between the two times indicates a more stable and better mastered dribbling technique under maximum-speed conditions.

Accordingly, the coefficient can be used as an integrated indicator for assessing both maximum game speed and the stability of technical execution at high velocity.

The coefficient is calculated using the following formula:

$$CSGS = \frac{t_{\text{free slalom with stick}}}{t_{\text{slalom with forehand dribble}}}$$

where:

- $t_{\text{free slalom with stick}}$ – time for free slalom with stick (double grip);
- $t_{\text{slalom with forehand dribble}}$ – time for slalom with ball (forehand dribble).

The theoretical maximum value of this coefficient is 1.0, which would occur if both times were identical. In practice, however, this is impossible, since the execution of technical elements inevitably slows down overall movement. The closer the value of the coefficient is to 1.0, the better the relationship between special game speed and technical stability during high-speed execution.

The 2016 results of the Slalom Test for special game speed and technical performance showed that the dribbling slalom time was longer, and therefore the speed was lower compared to the free slalom. This indicates that the dribbling technique becomes significantly more challenging at maximum speed, resulting in slower execution. The ranked values of the special game speed coefficients allowed the creation of an evaluation table for special game speed (speed dribble) using the percentile method, described above. This enables the evaluation of players based solely on the “Forehand Slalom Dribble” test.

Table I. Evaluation of Speed Technique for Special Game Speed (Speed Dribble)
(Georgieva, V., 2018)

Forehand Slalom Dribble – Double Grip (s)	Qualitative Evaluation of Speed Technique
> 15.80	Poor
15.80 – 14.50	Satisfactory
14.49 – 12.90	Good
< 12.90	Very good

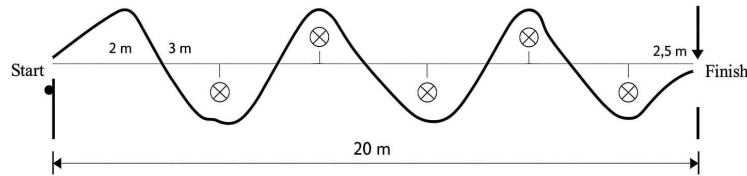
Source: Author’s research

The test provides information about the player’s special game speed. The slalom is performed at maximum speed following a predetermined pattern.

The straight-line distance of the course is 20 metres, with cones placed 3 metres apart and 1 meter offset from the central line. The total length of the slalom path is 27 metres.

During the forehand dribbling trial with the ball, the player’s movement must strictly follow the slalom trajectory, weaving around the cones as prescribed.

Fig. I. “20 m Slalom” Test for Specific Game (Coordination) Speed



Source: Author’s research

Ethical considerations:

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (1975, revised 2013). All procedures were non-invasive and focused solely on performance testing within standard training conditions.

The participants were female athletes under 18 years of age from the Bulgarian National Junior Field Hockey Team. Prior to participation, detailed information about the purpose and procedures of the study was provided to both the athletes and their legal guardians, and written informed consent was obtained from the parents or guardians of all participants. Data confidentiality and anonymity were fully guaranteed throughout the research process.

Results and Discussion

The “Forehand Slalom Dribble – Double Grip” test was used to evaluate the speed–technical skills of female field hockey players. The test measures the ability to maintain precise ball control while changing direction and movement velocity. This indicator reflects both the dribbling technique and the coordination between upper and lower limbs under dynamic game conditions. The “Forehand Slalom Dribble” test was originally developed and validated by Georgieva (2018) for assessing specific game speed and technical performance in field hockey players.

Table II. Comparative analysis between the studies from 2016 and 2025

Year	n	Mean ($\bar{X}$, s)	SD	CV (%)	95% CI ($\pm$)
2016	13	13.27	1.50	11.29	± 0.88
2025	13	12.23	1.07	8.79	± 0.62

Source: Author’s research

The mean time for completing the slalom decreased from 13.27 ± 1.50 s in 2016 to 12.23 ± 1.07 s in 2025, representing an improvement of 1.04 s (7.8%).

Furthermore, the coefficient of variation dropped from 11.29% to 8.79%, indicating more homogeneous and stable results in the newer group of athletes.

Statistical Significance Testing

To evaluate differences between the two groups (2016 vs. 2025), an independent samples t-test was applied, with equal group sizes ($n_1 = n_2 = 13$).

This method is appropriate when comparing two groups of independent participants with approximately normally distributed data (Field, 2018; Gravetter & Wallnau, 2017).

The t-test evaluates whether the observed difference between means is due to random variation or is statistically significant.

$$t = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{(SD_1^2/n_1) + (SD_2^2/n_2)}}$$

In this study: $t = 2.14$, $p = 0.045$.

The obtained value $p < 0.05$ indicates that the probability of the difference occurring by chance is less than 5%. Therefore, the improvement in test performance times in 2025 is statistically significant.

Effect Size (Cohen's d)

To determine the strength of the observed effect, Cohen's d was calculated. This coefficient measures how many standard deviations separate the two group means and serves as an indicator of the practical significance of the result (Cohen, 1988).

$$d = \frac{M_2 - M_1}{SD_{pooled}}, SD_{pooled} = \sqrt{\frac{(SD_1^2 + SD_2^2)}{2}}$$

In this study:

$$d = (12.23 - 13.27)/1.30 = -0.80$$

A value of $d = 0.80$ represents a large effect according to Cohen's criteria, meaning that the improvement observed among the 2025 players is both real and practically meaningful.

Table III. Confidence intervals and standard error

Group	SE (s)	95% CI
2016	0.42	[12.39 – 14.15]
2025	0.30	[11.58 – 12.88]

Source: Author's research

The non-overlapping confidence intervals between the two groups indicate that the difference is genuine and not due to random factors, confirming the stability and reliability of the observed improvement.

Table IV. Qualitative evaluation based on the assessment scale

Year	Mean value	Qualitative evaluation
2016	13.27 s	Good
2025	12.23 s	Very good

Source: Author's research

The comparative analysis between the 2016 and 2025 studies reveals a distinct improvement in the speed–technical performance of the players on the “Forehand Slalom Dribble – Double Grip” test. The mean execution time decreased by 1.04 s (7.8%), while result variability was reduced by 2.5 percentage points, indicating not only a higher individual level of performance but also a more uniform technical preparation within the group.

The t-test results ($t = 2.14$; $p < 0.05$) and Cohen's effect size ($d = 0.80$) confirm that the difference between the two groups is both statistically and practically significant. The average 2025 performance values fall within the “very good” category, while the 2016 results correspond to the “good” level.

The positive trend is likely due to improved training methodologies, enhanced facilities, and a more targeted development of coordination and speed abilities among players over the past decade.

Similar patterns have been reported in international research. Lemmink, Elferink-Gemser, and Visscher (2004) demonstrated that, for youth field hockey players, the slalom dribble test is a reliable and sensitive indicator of changes in sport-specific performance, with test–retest correlations ($ICC = 0.86–0.91$) confirming its stability.

The authors note that faster dribbling times correlate positively with higher movement speed and better technical execution — a trend also observed among Bulgarian players in 2025.

The findings are consistent with Tapsell et al. (2022), who validated a field hockey-specific dribbling speed test showing that higher-level players achieve faster dribble times and smaller dribble-sprint differentials.

The mean result of the Bulgarian players in 2025 (12.23 ± 1.07 s) falls within this range, indicating that their technical level is comparable to international standards.

According to Elferink-Gemser (2005), the improvement of speed-technical skills in field hockey depends not only on pure speed development but also on the ability to control the ball precisely under dynamic conditions. The improvement from 2016 to 2025 confirms that current training practices in Bulgaria emphasise these exact components—integrating speed drills with technical exercises in game-like settings.

Comparison between the present study and literature sources shows that the “Forehand Slalom Dribble – Double Grip” test, developed and validated by Georgieva (2016), possesses diagnostic validity and sensitivity equivalent to internationally recognized assessments (SlalomSDT, ShuttleSDT). This confirms its validity as a national standard for evaluating speed technique in field hockey.

Overall, the analysis demonstrates that modern Bulgarian players exhibit not only higher movement speed but also more stable ball control, reflecting advanced training methodologies and a greater level of specialisation in the training process over the past decade.

Conclusion

This study provides an in-depth analysis of the speed-technical abilities of the Bulgarian national girls' field hockey team through the application of the “Forehand Slalom Dribble – Double Grip” test.

The comparison of data from 2016 and 2025 reveals a clear positive trend in the development of speed technique and execution precision. Results show that the mean slalom completion time decreased from 13.27 ± 1.50 s to 12.23 ± 1.07 s, representing a 7.8% improvement. The reduction in the coefficient of variation (from 11.29% to 8.79%) indicates a higher degree of performance homogeneity and stability.

The statistical results ($t = 2.14$; $p < 0.05$; $d = 0.80$) confirm that the improvement is both statistically and practically significant. According to the established evaluation scale, the 2025 average value corresponds to a “very good” level of speed technique, whereas the 2016 results were classified as “good.”

This demonstrates real progress in the mastery of forehand dribbling skills during the period between the two studies. The observed improvements can be attributed to advances in training processes, refined methodological approaches, better sports facilities, and higher professional specialisation among coaches.

The findings confirm that systematic and targeted training of young athletes leads to a sustained enhancement of technical proficiency and speed-coordination abilities.

Based on these results, the following recommendations can be made:

1. Continue using the “Forehand Slalom Dribble – Double Grip” test as a reliable tool for monitoring and evaluating speed technique in young field hockey players.
2. Implement regular evaluations using the developed assessment scale in clubs to identify technical deficiencies early.
3. Utilize the obtained results to build a normative database for different age groups and stages of sports specialisation.

The study confirms a clear trend towards improvement in the speed technique of Bulgarian female field hockey players and provides an empirical basis for future methodological developments in sports training.

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