Volume 05 Issue 03 (2024) Pages 139-157

INSPIREE:
INDONESIAN SPORT INNOVATION REVIEW
ISSN 2746-6965 (Online), 2774-2520 (Print)
Journal Homepage: https://inspiree.review/index.php/inspiree

BASIC SCIENCES

OPEN ACCESS

Results of Indoor Hockey Training on Mastery of Dribble Techniques in Hockey Games

https://doi.org/10.53905/59rmkm18

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A B S T R A C T

The purpose of the study. Mastery of fundamental techniques in hockey is essential for players. Mastery enables player cooperation to achieve the game's objective. Key techniques include dribbling and pushing the ball, applicable in both indoor and field hockey. These techniques are vital for effective gameplay. In indoor hockey, only dribbling techniques are permitted according to regulations. Practice enhances dribbling skills, requiring repetitive training. This study aims to compare indoor and field hockey training effectiveness on dribbling mastery.

Materials and methods. An experimental method was employed, utilizing 24 athletes from Sambas Hockey Club, divided into two groups.

Results. The results indicate a significant improvement in dribbling technique mastery in the indoor training group.

Conclusions. The research concludes that indoor hockey training significantly enhances basic dribbling technique mastery compared to field hockey training.

Keywords: *Hockey Training; Dribble Techniques.*

A R T I C L E I N F O

Article History:
Received: June 27, 2024
Accepted: August 28, 2023
Published: September 27, 2024

INTRODUCTION

Field hockey is a sport that requires a high level of skill and dexterity, particularly in the area of ball control and dribbling. Despite its long history as a popular sport, there has been relatively little research conducted on the development and assessment of field hockey skills. One aspect of field hockey skills that has received some attention is the importance of ball speed and accuracy in shooting, which has been shown to be a key determinant of player performance. (Manaf et al., 2021) However, the impact of training on the development of other fundamental skills, such as dribbling, has not been as well studied. (Thiel et al., 2012) (Sunderland et al., 2006).

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abcdeAuthors'Contribution: a-Study design; b-Data collection; c-Statistical analysis; d-Manuscript preparation; e-Funds collection.

Proficiency in hockey dribbling abilities is a critical component of successful gameplay, as it enables players to retain possession, generate scoring chances, and outmaneuver adversaries (Iuliano et al., 2023). Existing literature has mainly examined dribbling proficiency in sports other than hockey, such as basketball and soccer. However, there is a need to specifically evaluate the influence of indoor hockey training on the acquisition of dribbling techniques in the context of hockey matches (Garbeloto et al., 2021)(Novák et al., 2020)(Lemoyne et al., 2022). Hockey constitutes a collective sport that necessitates the collaborative engagement of each participant. In order to facilitate this collaboration, a systematic coaching and training regimen is essential. In nations characterized by a four-season climate, certain periods will present challenges, as hockey training, typically conducted outdoors, is hindered during the winter months due to disruptions in the training schedule. To mitigate this issue, countries with four distinct seasons have developed indoor hockey, adapting the regulations from field hockey accordingly.

International standards have mandated that all international tournaments must be conducted on synthetic surfaces, thereby presenting minimal difficulty for European nations accustomed to indoor hockey, as they require only minor adjustments to transition to play on synthetic fields, given that indoor hockey shares similarities with a flat synthetic surface, which ultimately contributes to the advancement of the sport. Within hockey, there exists a repertoire of fundamental techniques that athletes must acquire, which includes essential dribbling techniques (pushing the ball), primary dribbling techniques (dribbling the ball), foundational hitting techniques (striking the ball), basic scoop techniques (lifting the ball), essential flick techniques (gouging the ball), fundamental tackling techniques (securing the ball), and basic jab techniques (reaching for the ball). In the context of indoor hockey, there are also parallels in fundamental techniques, such as basic dribbling techniques, primary dribbling techniques, and essential jab techniques.

The defining characteristics of the indoor hockey game are delineated as follows: a. The presence of a level playing surface facilitates the progression of the game. b. The

size of the player contingent is relatively limited. c. The dimensions of the field are predetermined, thereby necessitating rapid movement and responsive actions from the players. d. The offside regulation is inapplicable. Among the fundamental techniques, the skill of dribbling assumes a particularly significant role, due to its applicability in both indoor hockey and field hockey. Field hockey, or hockey contests conducted on outdoor pitches, involve teams comprising eleven players each. The characteristics of the field hockey game are articulated as follows: a. The playing field encompasses a broader area. b. The number of participants is augmented. c. A greater variety of fundamental techniques are employed. Consequently, players have the opportunity to enhance both individual and collaborative techniques. Participants can cultivate self-discipline through adherence to the established game regulations. A common challenge encountered is that novice players frequently struggle with the practice of foundational techniques, as the field for field hockey is often uneven, with dense grass impeding the learning of these essential skills. Fundamental dribbling and ball-handling techniques are frequently utilized and are particularly effective for facilitating passes to teammates (Peterson and West, 1971). These two foundational techniques demonstrate efficacy in both indoor hockey and field hockey contexts(Novák et al., 2020). This proficiency can only be attained if the player possesses a certain level of skill in the sport of hockey. The indoor hockey game is governed by specific regulations designed to assist novice players in mastering the foundational techniques (USA Hockey Officiating Rulebook, 2023).(Fédération Internationale de Hockey, 2023). Every participant in indoor hockey is required to engage in both offensive and defensive roles, with the capacity to transition between these roles as necessary. The movement space available to an indoor hockey player is diminished by two-thirds in comparison to that of field hockey.

The constrained area available for players to maneuver is attributable to the dimensions of the field, which measures 36-44 meters in length and 18-22 meters in width, thereby necessitating that a player engages in rapid cognitive processing, swift reactions, and precise ball distribution in the form of a well-executed, comprehensive

pass, alongside effective movement. Indoor hockey serves to enhance individual competencies that are functional and advantageous for the rapid, precise, and purposeful execution of passing the ball. The proficient acquisition of these skills facilitates the evolution of a player's movement patterns. By considering various factual elements, dimensions, and numerous other factors, it is anticipated that training in indoor hockey can yield enhanced benefits and insights into the realm of field hockey. The justifications that can be presented include: 1. A level playing surface enables novice players to practice fundamental hockey techniques with greater ease. 2. Athletes who engage in indoor hockey can transfer the skills acquired during their training to field hockey gameplay. 3. Given a specified playing area, the mastery of fundamental techniques is likely to be more pronounced. In the course of foundational technical training, all forms of technical training requisite in a sport must be meticulously studied, effectively implemented, and rigorously practiced to achieve automaticity and efficiency in movements, culminating in robust, swift, and precise actions. The significance of fundamental dribbling techniques within the sport of hockey, as articulated by various experts, is as follows: 1. (Peterson and West, 1971) assert that dribbling is effective for executing short passes or shots on goal. 2. (Fison, 1970) posits that dribbling is beneficial for executing careful short passes and enables rapid and unforeseen directional changes during gameplay, thereby complicating the defender's task. 3. (Whitaker, 1986) indicates that the majority of dribbles are skill-based passes, particularly on expansive surfaces, characterized by swift execution and without prior signaling regarding the intended direction of the pass, even when the ball is not struck or propelled forcefully. Beyond dribbling, the fundamental technique of dribbling constitutes a critical component in the domain of hockey, encompassing actions such as ball carrying and ball dribbling, particularly for the purpose of safeguarding the ball against opposing attacks.

The significance of the fundamental dribbling technique, as articulated by (Whitaker, 1986), lies in the notion that the primary aspect of dribbling involves the dexterity of the hands in maneuvering the ball. In fact, this skill can confer a tactical

advantage by creating space for ball advancement, despite the fact that the ball typically traverses rapidly while being effectively controlled. Furthermore, (Fison,1971) posits that dribbling is analogous to running while maintaining possession of the ball, where the ball remains under the player's control. Dribbling is employed during ball movement, allowing for rapid assessments of the optimal passing direction, enticing the opponent into erroneous positions, and thereby outsmarting them, in addition to facilitating other fundamental advantages associated with running while possessing the ball, such as effortlessly passing to teammates. Drawing from the perspectives of various experts regarding foundational dribbling and dribbling methodologies, one may infer that fundamental dribbling techniques are critically significant in the context of hockey; these foundational skills enable players to deliver precise, forceful passes to their teammates, with a heightened focus on their intended target. Similarly, the application of fundamental dribbling techniques, particularly in the midfield accompanied by proficient ball control, is capable of advancing the ball towards the desired goal. Consequently, the mastery of robust fundamental techniques within the realm of hockey is essential for enhancing the performance of any hockey player, whether engaged in indoor or field hockey. Dribble Motion Analysis. Dribbling represents a fundamental technical training exercise involving the propulsion of the ball, which is frequently utilized in hockey to facilitate short-distance passes to teammates, as well as for executing passes and shots on goal. With the application of proficient fundamental dribbling techniques, a player is capable of delivering rapid, precise passes to teammates, characterized by enhanced directional control, rendering it challenging for opponents to anticipate the ball's trajectory. In summary, the methodology for executing a dribble can be delineated as follows: 1) The grip on the stick. The left hand grips the stick in a 'shake hands' position situated above the right hand, maintaining an approximate distance of 20 to 25 centimeters, 2) The initial body posture. The feet are positioned shoulder-width apart, with the left foot positioned anterior to the right foot, the right knee exhibiting a slight bend, and the body weight predominantly resting on the right foot. The ball is aligned parallel to the left foot, at a

distance of approximately 30 centimeters, while the gaze is directed towards the ball, 3) Upon making contact with the ball. The right hand propels the ball, the body progresses forward, the right leg extends, the left leg bends, and the center of body weight transitions to the left leg.

Final posture of the body is characterized by a forward lean, with the gaze directed straight ahead, the right arm extended directly in front of the body until the right shoulder aligns beneath the chin, and the left hand positioned in a bent manner. In order to execute fundamental dribbling techniques proficiently, it is imperative that the dribbling motion is fundamentally connected to the principles of mechanics, as these principles encompass the analysis of all movements ranging from the elementary to the more complex. Utilizing this framework, movements that exhibit a multifaceted nature and configuration may be subjected to rigorous analysis. The examination of the components of movement during dribbling necessitates consideration of the body posture while executing basic dribbling techniques, as the posture can significantly affect the trajectory of the ball, thereby influencing the precision of passing the ball towards a designated target. To achieve precision in ball passing, the body must engage in translational movements throughout the dribbling process. The translational motion inherent in the basic dribbling technique transpires from the initial dribbling stance to the position wherein the implement makes contact with the ball. In order to derive speed from the resultant thrust:

$$K \times s = \tfrac{1}{2} MV2$$

Wherein: K denotes strength, M signifies the mass of the object, S represents distance, and V indicates speed. The relationship illustrates that an increase in distance (S) correlates with an increase in speed (V). This principle is exemplified in the initial push stance, which illustrates the spatial separation between the implement and the ball.

The straight dribble represents a fundamental technique that holds significant importance within the sport of hockey; by attaining proficiency in this essential dribbling technique, one will be capable of maneuvering the ball towards the goal while simultaneously evading opponents, thereby maintaining possession of the ball and preventing it from falling within the opponent's reach. In summary, the methodology for executing the straight dribble can be delineated as follows: 1. Stick Grip. The

positioning of the left hand is at the distal end of the stick employing a conventional grip, while the right hand is situated beneath the left hand at an approximate distance of 15 to 20 centimeters. In this configuration, the right hand assumes a crucial role in propelling the ball. This motion generates two opposing forces; as elucidated by Hidayat (1985), the force is defined as follows: "The amalgamation of two forces exerted on an object or body, functioning in diametrically opposed directions to its axis, is referred to as a lever." This technique of straight dribbling embodies a third class lever, where K x Lk = B x Lb; a characteristic of third class levers is that K > B, necessitating greater force to be applied than the load itself. Hidayat (1985) further asserts, "Class III levers exhibit enhanced movement velocity." 2. Body Orientation. The optimal posture during straight dribbling necessitates the maintenance of bodily equilibrium while remaining in a relaxed state, with the arms extended and devoid of rigidity, the head not perpetually inclined downwards, allowing for intermittent observation of the game's progression. 3. Foot Positioning. The foot movement during straight dribbling entails executing a normal running pattern, which facilitates adaptability in one's footfalls, thereby easing the transition when passing the ball to a teammate. 4. Ball Placement. During the execution of a straight dribble, the ball should be positioned anterior to the body with the right foot aligned adjacent to the left foot; this positioning is imperative for maintaining a consistent dribble, whereas a placement of the ball behind the body or adjacent to the posterior foot would result in complications during the straight dribbling process. 5. Ball Contact (during propulsion). It is not invariably requisite to apply a constant touch with the stick; rather, the technique should incorporate brief strokes to ensure the ball remains under control. The straight dribble necessitates optimal velocity to effectively manage the trajectory of the ball, as articulated by (Hidayat, 1985), "Athletic endeavors conducted with maximum movement velocity can achieve superior control and enhanced speed."

When a spherical object traverses the grassy terrain, this phenomenon can also be characterized as resistance, whereby the resistance encountered by the rolling sphere arises from the interaction between the sphere and the grassy surface. In light

of this, to enhance the velocity in the trajectory of the sphere's motion, it is imperative to apply a more potent thrust force. Consequently, the magnitude of the exerted force is directly correlated with the anticipated velocity. In accordance with Newton's Second Law, the variation in velocity (acceleration) experienced by an object is directly proportional to the force that instigated such change.

$$K = m \times a$$

Information: K= force, m= mass of the object, a= acceleration

Indian dribble, alternatively referred to as the open-close dribble, represents a fundamental technique in ball control. The grip utilized for the fundamental open-close dribble technique is identical to that of the straight dribble grip technique, wherein the stick remains in close proximity to the ball and is consistently under observation. In the elementary open-close dribble technique, the left hand assumes a pivotal role in manipulating the stick while drawing the ball towards the right via a backhand motion; during this process, rotational actions occur at the wrist along with supination or exorotation movements, which denote an outward turning motion. This action transpires as the ball transitions from the left to the right, thereby necessitating a rotation of the stick by 180 degrees in both forehand and backhand directions; throughout the rotation of the stick, the grip of the right hand should be maintained in a slightly flexed and relaxed state, akin to a shaft or ring around the stick, facilitating the rotation of the stick when executing both forehand and backhand open-close dribbles.1) Body position. The positioning of the body involves a forward lean while ensuring balance and sustaining a relaxed posture; the arms are to remain unrigid, with the elbow of the right arm positioned away from the body during the coverage of the ball utilizing a backhand motion. The distribution of body weight shifts in accordance with bodily movements; when dribbling the ball to the left, the weight is predominantly on the left foot, and conversely, when dribbling to the right, the weight shifts to the right foot. 2) Foot position. The movements of the feet in the basic open-close dribble technique are executed through normal running, with the ball kept in front of the foot to facilitate a seamless transition to the subsequent directional movement. 3) Contact

of the stick with the ball. In the initial stance, the ball is directed to the left, with the body weight resting on the left foot; concurrently, the left hand rotates the stick by 180 degrees such that the head of the stick is oriented downward, while the right hand remains on the flat surface of the stick; at this juncture, the right foot advances in the direction that the ball traverses, leading to a shift in body weight to the right foot, followed by a subsequent rotation of the stick to reposition the head of the stick upwards. Consequently, this sequence of movements is perpetuated repeatedly, with this foundational technical movement being executed while ambulating and sprinting; obstacles may also be incorporated as part of the training regimen.

Another merit of this fundamental technique lies in the inherent unpredictability of the ball's passing direction, thereby affording the player the capability to outmaneuver the opponent strategically. Through the meticulous analysis of movement, one can execute an effective pass that can be performed with maximal efficiency. Both linear dribbling motions and variable dribbling actions may be employed within the central region of the playing field. By leveraging these foundational techniques, players enhance their ability to shield the ball from adversarial interference and facilitate the expansion of the playing area. The proper execution of the fundamental pushing technique in conjunction with the basic dribbling technique renders these two essential skills in the game inseparable. The integration of these two foundational techniques will render the hockey match more engaging, thereby preventing rigidity in gameplay and fostering optimal movement dynamics.

MATERIALS AND METHODS

Study participants

The research sample consisted of 22 male and female students from the Sambas hockey club.

Study Organization

Research inquiries necessitate the employment of methodologies that are congruent with the specific issues at hand, thereby ensuring the acquisition of sufficient and pertinent data requisite for the resolution of said issues. Drawing upon the elucidation presented in the introductory section, a research inquiry has been

proposed, specifically focusing on the comparative analysis of indoor hockey training outcomes relative to the proficiency in fundamental dribbling techniques within hockey competitions. The two cohorts engaged in practices of both indoor hockey and field hockey. Upon the conclusion of the investigation, a comparative assessment of the results from the two cohorts was conducted to ascertain which group exhibited superior proficiency in the execution of fundamental push and dribble techniques. The objective of this research is to elucidate the comparative aspects between the two groups, thus affirming that the most suitable research methodology is the experimental approach.

Test and measurement procedures

The research methodology employed by the author is designed to evaluate the impact of indoor hockey training on the acquisition of fundamental dribbling techniques, specifically through the implementation of assessments targeting push techniques and dribbling techniques utilized during hockey competitions. The structure of the assessments is delineated as follows; 1. The push ball assessment is conducted over a distance of 10 meters, aiming at a Swedish board or bench measuring 3.6 meters in length, which is segmented into nine squares, each designated with a numerical value, with the central square assigned the number five, representing the maximum score for each successful ball push. This assessment is executed with five balls on two separate occasions. 2. The dribbling assessment involves a predefined distance, requiring participants to maneuver the ball through each specified obstacle that has been meticulously determined and quantified. Subsequent to the stages of measurement and data processing, results were elicited for each group, which were subsequently subjected to testing and data analysis concerning the two sample groups (Testing and analysis of the evolution of dribbling technique mastery within the indoor training cohort). This testing and analysis aimed to ascertain whether the progression in mastering the fundamental push and dribble techniques conducted in an indoor setting, as opposed to those executed in an outdoor environment, yielded significant or insignificant outcomes.

RESULTS AND DISCUSSION

Table 1. Results of computational analyses and significance assessments. Progression in the acquisition of fundamental dribbling methodologies for cohort A during indoor training sessions.

Groupt	T_{count}	T_{table}	Significant
Group A In indoor dribble	6,03	2,02	Significant
	4,18	2,02	Significant
Group B In indoor dribble	5,17	2,02	Significant
	2,56	2,02	Significant
	Testing at confidence level o.975 and df = n1 + n2 – 2.		

Based on the outcomes derived from the calculations and significance tests presented in Table 1 above, the analysis of the data can be articulated as follows: The findings from the calculations and significance tests regarding the advancement of dribbling technique mastery within the indoor training cohort and the field training cohort, utilizing the t-test methodology, indicate that the calculated t-value for Group A, representing the indoor cohort, exceeds the critical t-value at a confidence level of 0.975 with 38 degrees of freedom, thereby suggesting a statistically significant enhancement. Conversely, the results of the computations and significance assessments regarding the development of fundamental dribbling technique mastery in both the indoor cohort and Group B reveal that the calculated t-value surpasses the critical t-value at a confidence level of 0.975 with 38 degrees of freedom, signifying that the advancement of fundamental dribbling technique mastery in the indoor training cohort exhibits a significant improvement.

Table 2. Results derived from computational analysis and statistical significance assessments. Advancement of proficiency in fundamental dribbling methodologies for cohort B's indoor training regimen.

Groupt	x	s	T_{count}	T_{table}	Significant
Group A In indoor dribble	9,14	7,18	2,70	2,02	Significant
	4,5	3,87			
Group A In indoor dribble	8,71	8,11	2,70	2,02	Significant
	4,86	6,13			Significant

Note: Testing at a confidence level of 0.975 dk = n1 + n2 – 2.

A notable enhancement has been observed in the acquisition of fundamental indoor dribbling skills. The preliminary experimental assessment yielded an average score of 140.10, whereas the concluding experimental assessment produced an average score of 149.26. Additionally, in terms of dribbling, there was a recorded improvement from the initial experimental assessment, which yielded a score of 94.43, to the final experimental assessment, which recorded a score of 86.05.

Concurrently, the practice group in the field exhibited progress, as evidenced by the average score of 139.23 recorded in the initial experimental assessment for basic dribbling techniques, and an average score of 143.73 in the final experimental assessment. Regarding the basic dribbling technique, the initial assessment demonstrated an average score of 92.52, while the final experimental assessment reflected an average score of 88.66.

The findings derived from statistical analyses indicate that the enhancement of proficiency in fundamental push techniques yielded a value of 9.14, while the dribbling skill garnered a value of 8.71 within group A (designated as the indoor training cohort). This outcome demonstrates a greater efficacy in contrast to group B (identified as the field training cohort), wherein the score attained for the fundamental push technique was 4.5 and the basic dribble technique achieved a score of 4.86. The results of this analysis reveal that the improvement observed in the cohort subjected to indoor training was significantly greater when juxtaposed with the advancement noted in the group that underwent field training.

DISCUSSION

The findings of the current study indicate that the indoor hockey training regimen led to more significant improvements in the mastery of dribbling techniques compared to the outdoor field hockey training regimen(Thiel et al., 2012). These results can be attributed to the controlled and facilitated nature of the indoor training environment, which allowed for more focused and structured practice of dribbling skills.

These results can be attributed to the controlled and facilitated nature of the indoor training environment, which allowed for more focused and structured practice of dribbling skills(Pontes et al., 2023). Engaging in indoor hockey practice has the potential to enhance mastery over fundamental dribbling techniques (Daigle et al., 2022), given that this particular skill is exceedingly prominent in the context of indoor hockey(Morris-Binelli et al., 2020)(Chamberlain & Coelho, 1993). This assertion is substantiated by the data acquired, which indicates that the average score for

fundamental dribbling techniques during the initial experimental assessment was 140.10, with a subsequent final test score of 149.26.(Sunderland et al., 2006)(Chapman, 1982) Conversely, for the basic dribbling techniques, the initial experimental assessment yielded a score of 94.43, which subsequently decreased to 86.05 following the experimental intervention. From this data, it is evident that for fundamental push techniques, there was a recorded increase of 9.14, and similarly, for fundamental dribbling techniques, there was an increase of 8.71. This evidence underscores that indoor hockey training can serve as a foundational preparatory regimen for novice players transitioning to field hockey(Pavlů et al., 2021).

Indoor hockey serves as an effective platform for honing fundamental techniques that can enhance the performance in the sport of field hockey(Soberlak & Côté, 2003). It functions as a valuable training medium for cultivating proficiency in essential push and dribble skills within the domain of hockey. This assertion is reinforced by the statistical analyses, which indicate that the progression in mastering the fundamental push and dribble techniques conducted in an indoor setting, as opposed to those executed in an outdoor environment, yielded significant outcomes(Thiel et al., 2012)(Chapman, 1982).

CONCLUSION

The findings of this study suggest that indoor hockey training is significantly more effective in improving mastery of dribble techniques compared to outdoor field hockey training. The controlled and highly structured nature of the indoor training environment allows for more focused, repetitive, and targeted practice of dribbling skills, which is crucial for developing proficiency in this fundamental hockey technique. The data presented in the results section clearly demonstrates that the indoor training cohort exhibited markedly greater improvements in dribbling performance compared to the outdoor field hockey training group.

These results have important implications for the design and implementation of hockey training programs, highlighting the value of incorporating structured indoor training as a foundational preparatory regimen for players transitioning from indoor to

outdoor field hockey. By honing dribbling skills in the controlled indoor setting, players can develop a stronger technical foundation that can then be applied and further refined in the more dynamic and challenging outdoor field hockey context. This approach can optimize player development and better position athletes for success as they progress in the sport. The findings underscore the need for hockey training programs to thoughtfully integrate both indoor and outdoor training modalities to comprehensively address the technical, tactical, and physical demands of the game..

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