

Original Research Article

A study on the practical application effect of taekwondo leg techniques among college students

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Abstract: The popularization of taekwondo in colleges has promoted the development of the non-professional college student taekwondo group, yet this group is plagued by such problems as single application of leg techniques, low scoring rate and poor technical adaptability in actual combat with electronic protective gear. Taking non-professional college student taekwondo athletes as the research object, this paper adopts methods of literature review, practical observation and experimental comparison to analyze the current situation and influencing factors of leg technique application under the electronic protective gear environment, and puts forward optimization strategies and innovative techniques. The research shows that the accuracy requirement of electronic protective gear has made push kicks and their improved techniques replace traditional roundhouse kicks as the core scoring methods, and college student athletes' practical performance of leg techniques is restricted by weak foundation, poor physical fitness, lack of tactical thinking and other issues. The targeted innovative combined leg techniques have been proven to effectively improve the practical scoring rate and technical application efficiency, providing a reference for the optimization of taekwondo teaching and training in colleges and universities.

Keywords: college students; taekwondo; leg techniques; practical application; electronic protective gear

1. Introduction

Colleges and universities have become an important position for the development of amateur taekwondo, with non-professional college student athletes as the core force for the popularization and cultural dissemination of the sport. With the country's emphasis on college students' physical fitness, taekwondo, as a multi-functional sport, has attracted much attention. However, compared with popular sports, it presents a state of "seemingly popular but actually unpopular" in colleges and universities. Most students lack professional understanding of leg techniques, and the fragmentation of after-school training also leads to a weak technical foundation.

At the same time, taekwondo competitions have completed the innovation from traditional protective gear to electronic protective gear. Electronic protective gear has changed the scoring logic with its high sensitivity and accurate judgment, focusing more on the accuracy of strike points and movement standardization rather than the strength and loudness emphasized by traditional protective gear. At present, college student athletes still mainly use roundhouse kicks and side kicks in actual combat, but lack mastery of improved techniques such as push kicks that are adapted to electronic protective gear, and complex leg techniques are rarely applied. Phenomena such as "hitting the gear but not scoring" and "random kicking relying on luck" are common, resulting in low flexibility and scoring rate of leg technique application. Existing researches mostly focus on professional athletes, and there is a lack of research on electronic protective gear adaptive techniques for non-professional groups in colleges and universities. This study aims to fill this gap and provide support for improving college students' practical ability of leg techniques.

2. Research objects and methods

The research takes non-professional college student taekwondo athletes from 114 colleges and universities across the country who participate in various taekwondo competitions as the research objects, with a focus on athletes participating in the National College Student Taekwondo Championship and competition samples of the previous women's 57KG class and men's 60KG class as the research core.

A variety of methods are comprehensively adopted in the research: The relevant theories of taekwondo leg techniques and competition rules for electronic protective gear are sorted out through the literature review method; high-level college student competitions are observed through the practical observation method, videos are recorded and athletes' leg technique application, scoring and error situations are analyzed; the scoring differences of leg techniques in traditional and electronic protective gear competitions are compared through the statistical method; 20 non-professional male college athletes are selected and divided into an experimental group and a control group for a 3-month experiment. The experimental group adopts leg technique improvement and combination technology training, while the control group follows the traditional mode to verify the effectiveness of innovative technologies; expert interviews are conducted with provincial coaches, college physical education teachers and competition referees to improve the research conclusions and strategies.

3. Current situation of practical application and core problems

3.1. Current situation of application

College student athletes show a significant characteristic of single leg technique application, relying heavily on three traditional leg techniques: Roundhouse kicks, side kicks and downward strikes in actual combat, among which the utilization rate of roundhouse kicks reaches 65%. However, the mastery rate of improved push kick techniques is only 15.7%, the proficient application rate of line-changing leg techniques is merely 3.2%, and the application rate of complex leg techniques such as double flying kicks and spinning back kicks is less than 5%. Under the electronic protective gear environment, the scoring rate of traditional roundhouse kicks drops sharply, and push kicks have replaced them as the core mid-position scoring leg techniques. Moreover, the offensive focus of competitions is gradually shifting from mid-position to high-position. Athletes with prominent high-position techniques and advantages in height and flexibility are more likely to win. Some athletes who lost in traditional protective gear competitions also turn the tide due to their advantages in high-position techniques. In addition, 80% of athletes lack the awareness of leg technique combination and connection, with the problem of "retreating immediately after kicking" and no subsequent offensive or defensive counterattack movements. Repeated strikes with a single leg technique are easy to be predicted by opponents, resulting in low scoring rate and easy exposure of flaws.

3.2. Core problems

First, the understanding of basic leg techniques is superficial and movements are non-standard. Fragmented after-school training lacks systematic and professional guidance, and athletes have insufficient understanding of the force application principles and strike point judgment of leg techniques, only being able to complete superficial movements. Phenomena such as "hitting the gear but not scoring" often occur in actual combat with electronic protective gear. Second, the adaptability to the scoring mechanism of electronic protective gear is insufficient, still taking strength training for traditional protective gear as the orientation and ignoring the requirements of movement range and force application standardization, with poor mastery of adaptive techniques such as push kicks. Third, the physical fitness support is inadequate, with obvious shortcomings in coordination, flexibility, core stability and endurance. 45% of athletes cannot complete leg technique line-changing combinations, 60% have their high-position leg technique application restricted due to poor flexibility, and unstable center of gravity is also easy to lead to movement errors. Fourth, the tactical thinking is weak. College teaching mostly focuses on the consolidation of single leg techniques and lacks combination and tactical training, so athletes cannot adjust the leg technique route according to the opponent's defense, resulting in rigid play. Fifth, the physical energy distribution is unreasonable. Blind force application in the early stage of the competition leads to physical exhaustion in the middle and later stages, with a sharp drop in the speed and strength of leg techniques, movement deformation and even random kicking.

4. Main influencing factors of practical application

4.1. Equipment factors

Electronic protective gear is the core hardware influencing factor, and its high sensitivity and accuracy

put forward new requirements for leg techniques: It is necessary to accurately hit the effective scoring area with a moderate movement range to avoid the deviation of strike points and unstable center of gravity, and the force application focuses on coherence and standardization rather than pure strength. Traditional roundhouse kicks have low adaptability to electronic protective gear due to their large movement range and easy deviation of strike points, while improved leg techniques such as push kicks and swing kicks are more in line with the scoring logic of electronic protective gear because of their small movements and flexible conversion.

4.2. Training factors

The lack of practicality in college taekwondo teaching and training is the core subjective factor. The teaching content focuses on the teaching of basic movements, ignoring the teaching of electronic protective gear adaptive techniques, leg technique combinations and line changes; the training method is mainly single repetitive practice, lacking practical scenario simulation; some colleges and universities lack professional taekwondo coaches, and most teachers are general physical education teachers who cannot provide accurate technical and tactical guidance; at the same time, training resources are limited, and the lack of equipment such as electronic protective gear simulators restricts the development of practical training.

5. Optimization strategies and innovative leg techniques

5.1. Optimization strategies

First, optimize the teaching content to align with the practical needs of electronic protective gear competitions, take push kicks as the core mid-position leg technique for key training, increase the teaching of adaptive techniques, leg technique combinations and high-position leg techniques, and strengthen flexibility training. Second, carry out practical scenario training, use electronic protective gear simulators to familiarize with scoring rules, organize group confrontation to simulate competition scenarios, formulate personalized tactics, and cultivate on-the-spot adaptability. Third, strengthen physical fitness training, carry out coordination, flexibility, core strength, explosive power and endurance training against shortcomings, and cultivate the awareness of scientific physical energy distribution. Fourth, strengthen professional coach guidance, introduce professional coaches or train existing teachers, finely correct movement standards, and let athletes find and improve problems through video replay. Fifth, enrich competition exchanges, organize intra-school competitions and inter-school friendly matches, encourage participation in various college student competitions, and accumulate experience through competitions instead of simple training; integrate psychological training to alleviate practical tension and improve psychological quality.

5.2. Innovative leg techniques

Combined with college students' technical foundation, physical fitness and the needs of electronic protective gear, three types of easy-to-master and high-scoring combined leg techniques are designed: The combination of front thrust kick + push kick + downward strike, which uses front thrust kick to control distance, switches to inward swing kick if the distance is not controlled, and quickly switches to downward strike to hit the head after controlling the distance, with good distance control effect and smooth connection; the combination of side kick + outward swing kick, which uses side kick to control the opponent's route, and if the strike is ineffective, flips and changes the line to outward swing kick with the knee as the axis to hit the high-position area, easily creating offensive gaps; the push kick with spinning inward swing, which integrates the characteristics of roundhouse kick and push kick. After controlling the distance with push kick, the knee is buckled inward and the lower leg is turned outward, hitting the middle and high positions by virtue of the inertia of body rotation, with small movement range and accurate strike points, having both offensive and defensive counterattack advantages, and achieving remarkable practical effects in high-level college student competitions.

6. Practical effect verification and research conclusions

6.1. Practical effect verification

The 3-month experimental comparison shows that the experimental group adopting innovative leg

techniques has a 22.4% and 23.4% increase in leg speed and effective strike force respectively compared with the control group, a 48.2% increase in leg technique scoring rate, and an 8.9% and 55.8% decrease in physical energy consumption and error rate respectively. It is proved that the innovative leg techniques are adapted to college students' technical and physical characteristics, conform to the scoring mechanism of electronic protective gear, effectively improve the strike accuracy and movement smoothness, reduce blind kicking, and ensure the stable technical state throughout the actual combat.

6.2. Research conclusions

Non-professional college student taekwondo athletes have problems such as single leg techniques, low scoring rate and lack of combination and connection ability in actual combat. The core reasons are insufficient adaptability to electronic protective gear, weak basic leg techniques, physical fitness shortcomings, lack of practicality in teaching and training, and weak tactical thinking. The popularization of electronic protective gear has made push kicks and their improved techniques the core scoring methods, and high-position techniques the key to winning, while the shortcomings in teaching, physical and psychological aspects further restrict the application effect of leg techniques.

The research samples are concentrated on athletes in provincial and above competitions with insufficient regional coverage and a short experimental cycle. In the future, the sample scope can be expanded to include athletes from colleges and universities in different regions and at different levels to carry out long-term follow-up research; the research on technical differences between male and female athletes can be deepened to design personalized training schemes; the combination of intelligent technologies such as motion capture and AI analysis with taekwondo training can be explored to improve the accuracy of teaching and training, providing more comprehensive support for the development of taekwondo in colleges and universities.

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