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The Effect of Specific Fitness Training Program on Whirlwind Kick 720° Horse Rirse Riding Stance and Lotus Kick 540° Horse Riding Stance for Wushu Taolu Players

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Abstract
Background and Aim: These research objectives were to study the effects of specific fitness training programs on the whirlwind kick 720° horse riding stance and lotus kick 540° horse riding stance for Wushu Taolu players and to compare within-group on Wushu Taolu skills and specific fitness between pre-test, after week 4 and post-test.
Materials and Methods: The study was quasi-experimental research. The subjects were 20 Wushu Taolu athletes from the Shaanxi Province team with a simple random sampling method. They were examined pre-test, after week four, and a post-test on specific fitness (power and flexibility) and Wushu Taolu skills (whirlwind kick 720° horse riding stance and lotus kick 540° horse riding stance). Then proceed to training according to the specific fitness training program for an eight-week duration, three days a week (Monday, Wednesday, and Friday), one hour and a half per day. The data analysis with mean and standard deviation, mean compare within the group with One-way ANOVA repeated measurement, and Bonferroni post hoc, was done pairwise. The significance level was set at.05
Results: (1) The compare means of Wushu Taolu skills, whirlwind kick 720° horse riding stance and lotus kick 540° horse riding stance, all pairwise of pre-test with after week 4 and pre-test with post-test showed significant differences (*p<.05), however, all pairwise of after week 4 with post-test, there were no significant differences. (2) The compare means of specific fitness, standing long jump, vertical jump, sit and reach, and back extension, between pre-test after week 4, and pre-test with post-test, all pairwise showed significant differences (*p<.05); however, after week 4 with post-test, there were no significant differences.
Conclusion: Conclusion: The specific fitness training program can improve the Wushu Taolu skills, whirlwind kick 720° horse stance and lotus kick 540° horse stance performance.
Keywords: Specific Fitness Training Program; Kick Performance; Wushu Taolu Players

Introduction

Wushu athletes can perfectly demonstrate the difficult poses required. The five key components that enable Wushu athletes to perform at their best are as follows: Power is the most fundamental component of Wushu. It helps athletes move powerfully and quickly. Power comes from the muscles of the body, such as the leg muscles, core muscles, and arm muscles. Wushu athletes should train in exercises to build muscle and enhance power, such as weightlifting, cycling, and running. Flexibility helps athletes move freely and smoothly. It is important for performing various wushu skills, such as jumping, spinning kicks, twists, and flips. Wushu athletes should practice stretching regularly to keep their muscles flexible and able to move freely. Agility helps athletes move quickly and nimbly. It is important for performing various wushu skills, such as moving, dodging, and attacking. Wushu athletes should practice moving continuously to be able to move agilely. Precision helps athletes control their movements accurately. It is important for performing various wushu skills, such as attacking, preventing injuries, and maintaining balance. Wushu athletes should practice skills repeatedly to achieve precision, and spirit is one of the most important components. It helps athletes have a strong mind and the determination to win. It is important for performing various wushu skills, such as fighting, overcoming obstacles, and coping with pressure. Wushu athletes should train their minds to have a strong spirit. (Smith, 2006; Yang, J.-M., 2010).

Power and flexibility training are related to sports skills. Studies have shown that combining strength and flexibility exercises with regular skill training sessions could lead to significantly superior performance in badminton players (Beniwal & Dhauta, 2023). Core strength exercises and dynamic flexibility exercises have been identified as important factors in improving athletic performance, including skill performance in tennis (Mai, et al., 2019). In combat sports, flexibility development is important for maximizing performance and other physical capabilities. Additionally, flexibility training programs using techniques such as proprioceptive neuromuscular facilitation and the foam roller have been shown to improve muscle contraction efficiency and jumping ability in futsal players. Furthermore, a study on rhythmic gymnasts, artistic gymnasts, and dancers found that flexibility

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training before power training did not negatively interfere with power-related abilities such as vertical jump and sprint performance(Kasahara, et al., 2023).

Furthermore, both strengthen and improve the effectiveness of other training elements, such as technique and strategy. Power training boosts muscle strength and movement power, facilitating technique and strategy practice. Flexibility training reduces injury risk and enhances training efficiency. Examples of the relationship between strength and flexibility training and skill performance power training increase leg muscle strength, which is crucial for running, jumping, and kicking skills. Flexibility training enhances arm muscle elasticity, which is essential for throwing and hitting skills. Strength training strengthens core muscles, vital for twisting, flipping, and balancing skills (Beniwal & Dhauta, 2023). Power and flexibility training are vital for all athletes as they contribute to optimal physical fitness and superior skill performance. Power training enhances muscle strength and power, while flexibility training improves muscle and joint elasticity, both of which are necessary for successful skill execution. Moreover, these training types improve the effectiveness of other training elements. (American College of Sports Medicine, 2020; Behm & Granacher, 2009; and Bompa, 2000).

Based on the foregoing, the researcher doubts that performance training specific to Wushu Taolu athletes can affect their ability to perform difficult poses. Therefore, we were interested in studying specific performance training, namely power and flexibility training, in Wushu athletes to improve kick performance for players.

Objectives

1. To study the effect of specific fitness training programs on Whirlwind Kick 720° Horse Riding Stance" and "Lotus Kick 540° Horse Stance skills for Wushu Taolu Player.

2. To mean compare of specific fitness and Whirlwind Kick 720° Horse Riding Stance" and "Lotus Kick 540° Horse Stance within the group with pre-test, after 4 weeks, and after the post-test.

Literature review [11 point]

Factors of High Performance in Wushu Taolu:

Wushu Taolu, characterized by its intricate routines and graceful movements, demands a diverse set of skills and attributes for athletes to excel. This paper explores key factors contributing to high performance in Wushu Taolu, drawing upon academic research and expert insights.

1) Foundational Physical Attributes: Strength and Power: Explosive power propels jumps, kicks, and throws, with research suggesting weightlifting, plyometrics, and dynamic training enhance these qualities (Wu, et al., 2018; Liu & Yu, 2020). Flexibility and Agility: A wide range of motion and quick changes in direction are crucial for complex movements and stances. Static and dynamic stretching, along with agility drills, improve these factors (Yang, H., et al., 2017; Wang & Chen, 2019). Cardiovascular Endurance: Sustained energy levels are needed for long routines and maintaining focus. Aerobic training methods like running and swimming are recommended (Chen & Li, 2016).

2) Technical Excellence: Mastery of Forms: Precise execution of standardized movements and sequences requires dedicated practice and muscle memory development (Smith, 2006; Yang, J.-M., 2010). Body Control and Coordination: Maintaining proper posture, balance, and coordinated movements throughout the routine is essential (Li & Zhang, 2015; Yang & Yue, 2012). Artistic Expression: Effective delivery of the form requires understanding its story and conveying emotions through facial expressions and movement aesthetics (Yang, H.,2010; Smith, 2006).

3) Tactical Acumen: Competition Rules and Scoring System: Understanding judging criteria and how to maximize scoring potential through technical difficulty, artistic presentation, and strategic transitions is crucial. Adaptability and Improvisation: The ability to adjust movements within the rules to optimize performance based on individual strengths and weaknesses is valuable.

4) Mental Attributes: Concentration and Focus: Maintaining unwavering attention to detail and execution throughout the routine is essential for success (Smith, 2006; Yang, 2010). Self-Discipline and Motivation: Consistent training, overcoming challenges, and striving for improvement require strong self-discipline and internal motivation (Li, & Zhang, 2015; Chen & Li, 2016). Mental Toughness: The ability to handle pressure, manage performance anxiety, and bounce back from setbacks is essential for high performance (Zhao & Wu, 2019).

Conclusion: High performance in Wushu Taolu demands a multi-faceted approach encompassing physical, technical, tactical, and mental attributes. Understanding and optimizing these elements through personalized training, proper nutrition, effective coaching, and psychological support empowers athletes to reach their full potential in this demanding

Strength, power, and flexibility training for wushu taolu

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Wushu Taolu, with its demanding routines and intricate movements, necessitates a unique blend of physical attributes. This paper delves into the efficacy of strength, power, and flexibility training in optimizing performance for Wushu Taolu athletes. Strength and Power: Wushu Taolu requires explosive power for jumps, kicks, throws, and stances (Wu, et al., 2018). Studies suggest weightlifting, plyometrics, and dynamic training significantly enhance leg and core muscle power, translating to improved jump height, kicking force, and overall explosiveness (Vecchio et al., 2019; Liu & Yu, 2020). Increased Muscle Mass: Strength training leads to increased muscle mass, contributing to greater force production and endurance during long routines (Chen & Li, 2016). However, excessive hypertrophy should be avoided to maintain agility and flexibility.

Flexibility and agility refer to a wide range of motion that is crucial for executing complex stances, kicks, and throws seamlessly. Research suggests that static and dynamic stretching, along with yoga and tai chi practices, effectively improve flexibility in the hamstrings, hip flexors, and calves, facilitating deeper stances and wider kicking ranges (Yang, H., et al., 2017; Wang & Chen, 2019). Quick changes in direction, referred to as agility drills, enhance the ability to change direction quickly and efficiently, which is essential for executing fast turns and transitions within the routine (Li & Zhang, 2015).

Integrated Training Approach: Recent research indicates that combining strength, power, and flexibility training tailored to specific Wushu Taolu movements produces optimal results (Chen & Li, 2016); Yang et al., 2017). This integrated approach: Improves movement efficiency: Enhanced strength and power coupled with better flexibility allows for more efficient execution of complex movements, conserving energy for longer routines. Reduces injury risk: Balanced training addresses muscular imbalances and improves joint mobility, potentially reducing the risk of overuse injuries common in Wushu Taolu (Zhao & Wu, 2019). Enhances artistic expression: Strength and flexibility training can contribute to better posture, balance, and control, enabling athletes to express the artistry and aesthetics of the forms more effectively (Yang, H., 2010).

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Conceptual Framework

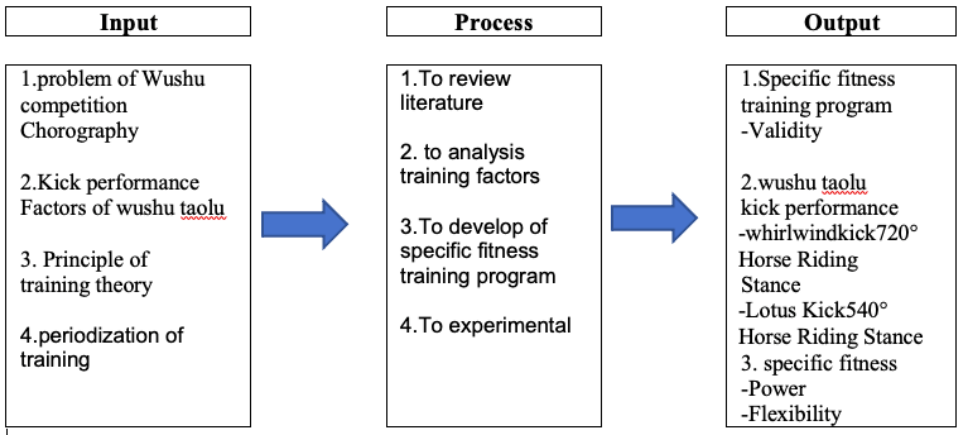

Figure 1 Conceptual Framework

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Methodology

Population and Sample

Population: In this study, the population was 28 Wushu Taolu teams in Shaanxi Province, that participate in the regional level of the country's competitions.

Sample: The subjects were 20 Wushu Taolu athletes from the Shaanxi Province team with simple random sampling from 28 teams in Shaanxi Province. The athletes were 20 men and women, ages 10–20, during the 2022 training season.

The inclusion criteria are as follows:

1. Be a wushu athlete age range of 10-20 years and train in the Shaanxi Province team during the 2022 training season.
2. Be a person who trains regularly by practicing at least three days a week before participating in the program for six months.
3. Those who do not have any injuries that hinder training must get the approval of the doctor.
4. Those who have passed the training readiness assessment according to the PAR-Q+ 2022 assessment form, The Physical Activity Readiness Questionnaire for Everyone.
5. Be the person who signed consent to participate in the training

The exclusion criteria were as follows:

1. Less time to participate in experiments 80% of the eight-week training period
2. Participants did not complete the test by the date and time specified by the researcher.
3. Have a medical condition or injury that prevents them from continuing the training.
4. Request to leave the research project

This research was approved by the human research board of Bangkok University, Certificate No.195/2566 /issue date 15 October 2022 /expiry date.16 October 2023.

Research Design:

This study was Quasi-experimental research that one group repeated measurement design, which

Exp Group	O_1	T	O_2	T	O_3

O1 = pre-test, before training with a power test, flexibility test, and Wushu Taolu skills test.

O2 = post-test, after 4-week training with a power test, flexibility test, and Wushu Taolu skills test.

O3 = post-test, after 8-week training with a power test, flexibility test, and Wushu Taolu skills test.

T = specific fitness training program

Note: power tests were a vertical jump test and a standing long jump test; flexibility tests were a sit and reach test and a back extension test; and wushu skills were a whirlwind kick 720° horse riding stance skill test and a lotus kick 540° horse riding stance skill test.

Research instrument

In this study, the research instrument followed this.

1. The specific fitness training program was developed under the training of theory and a review of literature. Power and flexibility were specific fitness training and mixed wushu total skills training, divided into 4 training phases with 8 weeks of training duration, 3 days per week, 1.30 per time, and advisor peer-approved. The content validity of the training program was conducted by 3 experts (trainer and sports scientist), who implemented comments and suggestions to improve and analyze the content validity (Index of Item-Objective Congruence: IOC) equals .87.
2. Whirlwind kick 720° horse riding stance skill test (validity=.87, R=.80)
3. Lotus kick 540° horse riding stance skill test (validity=.80, R=.80)
4. Vertical Jump test
5. Standing Long Jump test
6. Sit and reach test
7. Back Extension test

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Results

To answer the objective of studying the effect of a specific fitness training program on Whirlwind Kick 720° Horse Riding Stance" and "Lotus Kick 540° Horse Stance skills for Wushu Taolu players. The results found that.

Table 1 Mean and standard deviation of Wushu Taolu skills, pre-test, after week 4, and post-test

Variables	Pre-test	After week 4	Post-test
	Mean ±S.D.	Mean ±S.D.	Mean ±S.D.
Whirlwind kick 720° horse riding stance	3.05±1.28	5.25±1.47	7.80±0.87
Lotus kick 540° horse riding stance	3.20±1.40	6.05±1.11	7.90±0.83

The table showed that the mean and standard deviation of the whirlwind kick 720° (score) and lotus kick 540° (score), as pre-test (3.05+1.28 and 3.20+1.40), after week 4 (5.25±1.47 and 6.05+1.11) and post-test (7.80±0.87 and 7.90+0.83) respectively.

Table 2 The compare mean within the experiment group on Wushu Taolu skills test, whirlwind kick 720° horse riding stance and lotus kick 540° horse riding stance between pre-test, after week 4 and post-test by One way ANOVA repeated measurement

variables	Source of variant	Type III Sum of Squares	df	MS	F	p
whirlwind kick 720° horse riding stance	Time	226.03	2	113.02	90.79	.01*
	Error	47.30	38	1.25		
	total	273.33	40	114.27		
Lotus kick 540° horse riding stance	Time	224.23	2	112.12	98.85	.01*
	Error	43.10	38	1.13		
	total	267.33	40	113.25		

*P< .05

The table showed that comparing the whirlwind kick 720° horse riding stance and lotus kick 540° horse riding stance between the pre-test, after week 4, and post-test, there was at least one pair with significant differences (p<.05)

Table 3 The Bonferroni pairwise comparison of Wushu Taolu skills test, whirlwind kick 720° horse riding stance, and lotus kick 540° horse riding stance between pre-test, after 4 weeks, and post-test

Variables	**Test**	**Pre-test**	**After week 4**	**post-test**
Whirlwind kick 720° horse riding stance	Pre-test	xxx	2.20*	4.75*
	After week 4		xxx	2.55
	post-test			xxx
Lotus kick 540° horse riding stance	Pre-test	xxx	2.85*	4.70*
	After week 4		xxx	1.85
	post-test			xxx

*P< .05

The table showed that the whirlwind kick 720° horse riding stance and lotus Kick 540° horse riding stance with pre-test and after week 4 and pre-test with post-test had a significant difference (*p<.05), but between after week 4 and post-test there was no significance difference.

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Table 4 Mean and standard deviation of specific fitness, pre-test, after training 4, and post-test.

Variables	Pre-test	After week 4	post-test
	Mean±S.D.	Mean±S.D.	Mean±S.D.
Standing long jump(cm)	185.70±50.00	206.75±51.60	208.39±51.49
Vertical jump(cm)	272.33±30.90	282.07±31.52	284.12±27.86
Sit and reach (cm)	22.13±2.18	23.94±2.40	26.06±2.06
Back Extension(cm)	14.63±2.36	17.4±2.13	20.83±3.09

The table showed that the mean and standard deviation of the pre-test, after week 4, and after the post-test are as follows: standing long jump (185.70±50.00 cm, 206.75±51.60 cm and 208.39±51.49 cm), vertical jump (272.33±30.90 cm, 282.07±31.52 cm and 284.12±27.86), sit and reach (22.13±2.18 cm, 23.94±2.40 cm, and 26.06±2.06 cm) and back extension (14.63±2.36 cm, 17.4±2.13 cm and 20.83±3.09 cm) respectively.

Table 5 The mean comparison within the experiment group on specific fitness test between pre-test, after week 4, and post-test by One way of ANOVA repeated measurement

Variables	Source of variant	Type III Sum of Squares	df	MS	F	p
standing long jump	Week	5156.71	2	2578.36	451.04	.01*
	Error	217.23	38	5.72		
	total	5373.94	40	2584.08		
vertical jump	Week	1588.60	2	794.30	67.82	.01*
	Error	445.08	38	11.71		
	total	2033.68	40	806.01		
sit and reach	Week	154.43	2	2.42	77.22	.01*
	Error	13.00	38	0.34		
	total	167.43	40	2.76		
back extension	Week	385.81	2	192.90	85.95	.01*
	Error	85.29	38	385.81		
	total	471.10	40	578.71		

*P< .05

The table showed that there were significant differences between the pre-test, after week 4, and post-test for at least one pairwise of all the variables.

Table 6 The Bonferroni post hoc pairwise of specific fitness test between pre-test, after week 4, and post-test

Variables	Test	Pre-test	After week 4	Post-test
standing long jump	Pre-test	xxx	12.24*	22.69*
	After week 4		xxx	2.05
	Post-test			xxx
vertical jump	Pre-test	xxx	-9.45*	11.79*
	After week 4		xxx	2.05
	Post-test			xxx
sit and reach	Pre-test	xxx	1.80*	3.93*
	After week 4		xxx	2.13
	Post-test			xxx
back extension	Pre-test	xxx	2.78*	6.20*
	After week 4		xxx	3.43
	Post-test			xxx

*P< .05

The table showed that for all pairwise pre-tests after week 4 and pre-tests with post-test, there was a significant difference (p<.05); however, for all pairwise after week 4 with post-test, there was no significant difference.

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Discussion

The result found that the compare means of whirlwind kick 720° and lotus kick 540° were as follows pre-test after week 4 and post-test were significant differences (*p< .05).

This is because it is the result of a systematically created training program that follows the theory of sports training principles (Bompa, 2000).and consequently the results of the power and flexibility after training week 8 improve the pre-test (standing long jump, vertical jump, sit and reach and back extension), that effects on whirlwind kick 720° and lotus kick 540° skills performance. Specific fitness, power, and flexibility can improve skills performance for wushu toalu. In the high jump, kick, and turn around, athletes must have more power strength muscle, and flexibility. There are also studies on how power and flexibility training can improve jump and kick performance for wushu players (Sukamti et al, 2022; Kyröläinen, et al, 2005 Gong-Jib, Choi. ,2013). In a study on junior wushu players, it was found that male players had higher scores in terms of speed, and power, while female players had higher scores in terms of flexibility (Franchini & Herrera-Valenzuela, 2021). Soltani Shirazi, M., & Sadeghi, H. (2020) reported that the core stability training program improves the neuromuscular system function by strengthening the muscles of the core area. This in turn prevents the dislocation of the center of gravity outside the base of support and decreases its oscillation (displacement), therefore, as a result of the persistent effect of the program, balance ability and direct kicking power improve.

Reports on strength training for wushu indicate that a rigorous strength training program can enhance the kicking ability of wushu athletes. A recent study conducted by Monteiro et al. (2019) revealed that incorporating a specific high-intensity intermittent training (HIIT) regimen into the regular training routine of amateur wushu sanda athletes resulted in notable improvements in countermovement jump, horizontal jump, and kick speed test. Furthermore, a study analyzing the biomechanical characteristics of various jumping front kicks and concluded that the flexural leg swing technique offers advantages in real combat scenarios (Feito Y, et al, 2018). In addition, explored the strength of knee extensors and flexors in elite male kickboxers and discovered that the dominant limb displayed greater muscular strength at lower angular velocities. Wang, et al. (2024) studied the functional training interventions on muscle strength, jumping, and functional movement screen of wushu athletes has been verified.

Conclusion

The specific fitness training program, power, and flexibility can improve Wushu Taolu skills, whirlwind kick 720° horse stance, and lotus kick 540° horse stance performance. The results after training are better than before training, which was significant.

Recommendation

Recommendations from this study

1. There should be a training program that allows the kicking skill to have a full range of movement. Movement function
2. Be careful when adjusting the intensity of power training and jumping kicks.

Recommendations for the next study

1. Plyometric training should be added to help perfect and realistic kicking skills.
2. Should focus on flexibility training using passive training.
3. Functional training should be applied to correlate with the desired sports skills.

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