Original Paper

Teaching of Backspin Serve in Table Tennis

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Abstract

Backspin serve is a common serve in table tennis matches, and it is also one of the difficult contents for students to master in college table tennis teaching. In order to make students master backspin serve more quickly, the author tries to practice the interest and practicability of serve in the teaching process. This paper expounds and analyzes the feedback information in the concrete implementation and practice in order to further improve the teaching content of physical education in colleges and universities and provide teaching reference for school teaching and sports training.

Keywords

table tennis, Backspin serves, Serve, Force, teaching

1. Introduction

Table tennis is widely developed in our country, researchers are not a few, for backspin serve, there are also many discussions. Throughout the world table tennis, the national players in the competition to short backspin serve, backspin serve for table tennis sports important can be imagined. There are many articles on backspin in Chinese journals, but the teaching and training of backspin serve still need to be discussed. In the long-term teaching process of table tennis, the author found that students always have too many difficulties in learning backspin serve. Like many amateurs of table tennis, it takes a lot of time to practice, but the ball always does not turn. In teaching practice, the author innovates boldly and explores a set of methods of underspin service force skills of table tennis, which has achieved good results in teaching. However, there is no end to progress. This article aims to introduce more table tennis professionals and amateurs to share the successful experience of table tennis backspin serve.

2. The Factors of Backspin Strength

Rotation is one of the characteristics of table tennis. The fundamental condition of table tennis rotation is whether the force line of table tennis passes through the center of gravity of the ball. If the line of force passes through the center of gravity, the ball only translates and does not rotate itself. If the line of

force deviates from the center of gravity, the ball not only translates but also rotates, that is, rotates. In mechanics, a moment (M) is necessary for any sphere to rotate. The torque is equal to the product of the force (F) acting on the sphere and its vertical distance (L) from the center of the sphere. I'll write it as M is equal to F dot L. It is clear from the formula that the larger F, the larger L, the larger the product M, and the more the ball rotates. If L is O, the ball will not rotate even if the force F is large. (See Figure 1) Therefore, from the perspective of mechanics, in order to make the table tennis produce strong rotation, not only should we try to increase the explosive force at the moment of touching the ball, but also should pay special attention to the skills of force ---- combine the force through the center of the ball with the force away from the center of the ball (Su, 1983).
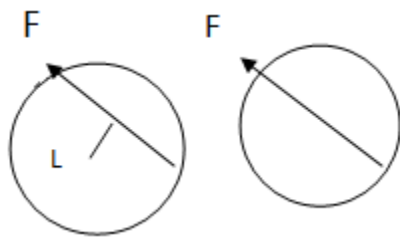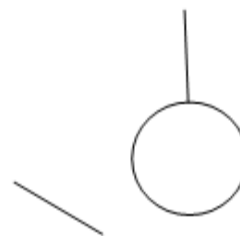
Figure 1   **Figure 2**

3. Backspin Serving Training (Taking Right Hand Grip as an Example)

In the teaching and training of table tennis, we found that whether it is serving, or playing, there are efforts to affect the phenomenon of the ball, that is to say, looks very strong, in fact, as a player is also full of sweat, but each beat on the ball, the speed of the ball is not fast, there is no rotation, this is why? First of all, the force is not coordinated. In the process of sending force, legs, waist, big arm, forearm are used force, but the order of force is not right, the instant speed power of patting the ball is not concentrated, that is to say, waist, legs and arms exert themselves, even against each other, the force becomes smaller, so the speed of the ball is not fast, although there is friction, the rotation of the ball is not strong. Second, force stiff. The whole body, was in a state of high tension, power is in the "internal friction", reasonable power fluid, hitting wrong time also won't have high quality service, even can not touch the ball, on the other hand, in order to meet the ball, so we have to reduce the swing arm speed, the speed of the ball will force is small, also is the key to the high quality ball. In order to deliver high quality and strong backspin ball, the hitting force process not only needs the muscle group to generate force in turn, but also needs the braking in turn, which is conducive to the transfer of momentum and the superposition of speed, so as to form the so-called whipping action (Liu, 2020).

3.1 Backspin Free Hand Movement Practice

The main purpose of this exercise is to let the trainee concentrate the whole body strength on the hands in a reasonable and coordinated way. This force is the force that we are going to apply to the ball, namely F mentioned above. The exercises are divided into the following steps:

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3.1.1 Feet open, right hand palm up, flat to the right, quickly left swing arm down cut;

3.1.2 stand at attention, then the right foot is independent, the two arms are stretched flat, the left knee is raised flat, and the abdomen is pulled in violently, the hands are quickly gathered in front of the abdomen, and the left foot stomps the ground vigorously;

3.1.3 With the right hand holding the racket, stand at attention with the left hand palm up and flat in front of the body. With the right hand holding the racket, raise the forehand up and flat to the right of the body. Lift the left knee to the thigh parallel to the ground, and bend the right knee slightly. At the same time, the left hand is slammed to the right shoulder (can not touch the shoulder). The right hand racket is chopped flat to the abdomen, and the left foot is stamped on the ground.

3.1.4 Throw the ball upward with the left hand, and then lead the racket to the right. Pay attention to stretching the right arm and changing the force inertia with the distance.

3.2 Ball Sense Practice

3.2.1 Put the ball on the lower left part of the racket, throw it up and throw it continuously. It is required to use the same part of the racket to throw the ball repeatedly, and carefully experience the feeling of the hand when the ball touches the racket and the feeling when the ball is thrown at different heights.

3.2.2 Put the ball on the lower left part of the racket, and stop the ball with the lower left part of the racket after throwing it up (the ball stops on the racket)

3.2.3 Gently throw up the ball with your left hand, and flatten your forehand with your right hand to the right of your body. Lift your left knee to the thigh parallel to the ground, and bend your right knee slightly. With the right hand racket in front of the abdomen, the bottom of the ball is cut flat, while the left foot is stamped on the ground.

3.2.4 Gently throw the ball up with your left hand. When the ball falls, rub the bottom of the ball with the lower left part of the racket. With the deepening of practice, the leading racket should be gradually increased, while the waist and forearm should be turned and wrist should be turned, so that the swing speed of the bat at the moment of hitting the ball will be faster and faster, and the force acting on the ball will be more and more powerful, and the ball will be more and more rotated (Jiang, 2020). Special attention should be paid to the timing of wrist power, to touch the ball at the moment of power to have a good effect, this is the so-called touch of the serve, but also to practice.

3.3 Batting Practice

The hitting point includes the contact point on the racquet, the distance of the ball from the end line of the table and the height of the ball from the table. In order to be able to hit the ball accurately when serving, we have designed the following exercises. Hang the table tennis ball in the air with a thin line, adjust the distance and height of the ball from the table (as shown in Figure 2), specifically, the distance from the end line of the ball from the table is 10-15 cm, 14-18 cm from the table height. The player finds a proper standing position, uses the suspended ball as the ball dropped from the left hand while serving, and hits the ball in the middle and lower part with the left front end of the racket (if the ball is

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regarded as the clock surface, the hit spot is about 5 to 6 o'clock). When doing this exercise, it is still to use a small force first, slow motion to find a good hitting point, experience the feeling of hitting the ball instantly hard friction, and then fast, until you can proficiently and accurately hit the ball without looking at the ball. In this exercise, in order to better let the students experience the effect of the racket on the ball, according to the principle of force interaction, can be suspended in the ping-pong ball into a small amount of sand, or change the ping-pong ball into a tennis ball, so that the students can obviously feel the static friction force between the ball and the racket. After completing this session, you can do the following actual serving exercises.

3.4 Landing Exercises

In table tennis practice, setting multiple landing points is a common method, which conforms to the main characteristics of transformation practice (Gu & Huang, 2017).

3.4.1 Practice of long ball landing Point control

Before serving, stand on the left half of the table, with your right foot slightly in front or flat, your body slightly tilted to the left, and your left palm holding the ball in front of your left. Throw the ball around the waist, when the ball falls below the height of the net hit the bottom hard, so that the ball landed within 10 cm of the table. Remove the net at the beginning of the practice, focus on the landing point, gradually increase the strength, skilled and then install the net, continue to practice, adjust the racket shape so that the ball can just brush the net.

3.4.2 The standing position is the same as above, and the practice method is the same as above, except that the landing point is controlled at one third of the place close to the net, and the hitting point is slightly higher than when serving the long ball.

3.5 Ball over the Net Curve Practice

Even if the ball serves well, it is easy to be attacked if it bounces too high (Schmidt & Lee, n.d.). Therefore, only the spin is not high quality service, high quality strong backspin must be low and turn, how to control the arc height, is also an essential part of training. When hitting the ball, the more downward force, the ball will bounce higher curve, vice versa; Too little downward force, the ball can't go over the net. Only through repeated practice, not only adjusting the shape of the racket, can we find the right power to send the ball over the net. To do this, a thin line about half a hemisphere high is drawn over the net during practice so that all balls pass between the net and the line. After practice, the arc is completely controllable.

4. Experimental Research

4.1 Research Objects and Methods

The object of this study is the freshman ping-pong students of Yangtze University (386 students in 10 classes). After one year of teaching, 100 students were randomly selected from the experimental class (5) and the control class (5), and each student was given 20 backspin balls.

4.2 Result Analysis

4.2.1 Practice status

The author conducted a questionnaire survey among 182 students from 5 experimental classes (180 copies of the questionnaire were recovered). According to the survey (Table 1), students often practice free hand movement exercise, ball sense exercise and hitting point exercise after class, while the practice of landing point exercise, ball over the net curve exercise and multi-ball exercise can only be practiced in class due to the limitation of the table. Obviously, the serve test in Table 3 would have been better if the latter had been practiced more.

Table 1

Freehand movement exercises	the sense of ball	contact point	point of fall	Ball over the net	Many balls training
often	often	often	classroom	Classroom	classroom

Table 2

self-assessment	strength feeling		The migration effect		Increase interest in practice	
remarkable	158	87.8%	146	81.1%	161	89.5%
effective	14	7.7%	22	12.2%	13	7.2%
unconspicuous	8	4.5%	12	6.7%	6	3.3%

Table 3

	experimental class						contrast class					
point of fall	Class 1	Class 2	Class 3	Class 4	Class 5	sum	Class 1	Class 2	Class 3	Class 4	Class 5	sum
Aarea	19	14	20	16	19	88	6	6	5	5	4	26
ABarea	28	26	27	24	24	126	10	12	9	8	9	48
BCarea	148	143	142	147	146	726	47	44	48	39	58	236
CDarea	125	128	135	140	104	632	102	97	99	97	73	468
Darea	43	45	41	35	42	206	155	157	144	146	154	756
failure	43	41	48	46	44	222	96	98	87	85	100	466

4.2.2 Interest

According to the survey, eight out of 182 middle school students did not make their own ping-pong ball, while the rest made one of their own, hung it on their bed or by their desk, and some filled sand. Students said that the ball hanging there, after class back to the dormitory, leisure with play, sometimes with the palm, sometimes with a pen, with books with chopsticks throw ball friction ball have played,

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really interesting. In fact, what students do at this time is more of a ball sense exercise and interest cultivation. It can be seen from table 2 that 95.5% of the students concentrate their energy, thinking that they have done too much kicking, turning waist and collecting forearms, and now they know how to concentrate their energy to a certain point. 93.3% of students believe that through the practice of the above methods to serve, not only can put the power on the hand, also can to concentrate strength to other places, such as fingers, elbow, now know how to do other sports power, such as playing basketball shooting that don't want to, what some jumpers can now, as I want to practice power appeared migration. 96.7% of the students think that they have the desire to try table tennis after playing freehand movements and hanging balls, so they play table tennis more than before, and some of them say that they would like to play table tennis whenever they are free. This shows that the students' interest in playing table tennis has been obviously strengthened.

4.2.3 Practicability

In order to verify the effect of this service training method, we carried out experiments. Among the 10 classes of table tennis in Yangtze University, 5 classes are selected as experimental classes and 5 classes as control classes. At the end of one year of teaching, 100 students from each of the experimental class (5) and control class (5) will be randomly selected, and each student will serve 20 backspin balls. The laboratory floor is made of cement. Draw four lines on the cement floor: A (assuming A line) on the vertical projection of the net, one in the middle route of the table (parallel to the net) on the vertical projection (assuming the B line), the third parallel lines on the back line projection (assuming the C line), leave the C line 0.6 meters (assuming the D) to draw A line, in order to study the convenient, we call these lines delimited area area A, AB, BC, CD area and D area. As can be seen from the previous analysis, the rotation of the ball in each area decreases successively, that is, the ball with strong backspin will jump back to zone A, and the ball with weak backspin or no spin will roll down to zone D. After the start of the serving experiment, the ball stops in which area is executed by the rotation of the ball. The ball that does not fall to the table jumps back to the net and is included in the A area.

Statistics of the balls in each area were obtained in Table 3. T test was conducted on the batting data of the experimental class and the control class in the table. The results showed that: in terms of the landing point data of zone A, the students in the experimental class were significantly higher than the control class ($P < 0.01$) and three times as many; From the sphere of AB area, the experimental class was also significantly higher than the control class ($P < 0.01$); The rotation of the ball in BC was lower than that in AB, and the experimental class was still significantly higher than the control class ($P < 0.01$); In area D, there was less ball backspin and no ball backspin, and the number of students in experimental class was significantly lower than that in control class ($P < 0.01$); In addition, service errors in the experimental class were significantly less than those in the control class ($P < 0.01$). It can be seen from the areas of several landing points that after the serving training of the students in the experimental class, most students' serving landed in the BC area with relatively high rotation, and some students'

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serving landed in the A and AB area. But from the control class, most of the students hit the ball in the D zone with little backspin and no spin, which shows that the training effect is very obvious, the students can significantly improve the service level, so that the probability of students to serve backspin greatly increased.

5. Discussion

5.1 According to the investigation and analysis of the students to learn a year later, table tennis beginners should do more practice with his hands, and in the form of the method with best diversity and interesting, especially the hard way, is the weak link of ordinary college students' sports activities, to strengthen the training and cultivation, can serve to use force in the ball, learning to strong to pull the ball, etc. is easy to generate power, If the coordination can be transferred effectively, it will help students to form lifelong sports consciousness.

5.2 Although the test result was better than that in comparative classes, but D area 10.3% and 11.1% of the errors that still need more practice time, 15 times each semester, 60 class hours a year, and learning about other content, students practice serving time actually few, suggested the school open teaching field, increase the teaching hours, providing many balls training place, Let students have more time to study and practice.

5.3 The reform of physical education is an eternal theme in college physical education. The reform will put forward new requirements for the equipment of school physical education venues and equipment. At the same time, only innovation can continuously improve the teaching system and improve the quality of teaching, which is also the responsibility and obligation of every teacher.

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