

Survey analysis for the current utilization status of wheelchair table tennis athletic equipments

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Abstract : This article adopted the research subjects from those who participated in the 2008 Postal Insurance Cup for national bodily and mentally disabled athletes who represented this country. And these athletes participated to the points-accumulated contests for wheelchair teams of the first to fifth levels were of 45 men and 16 women athletes with a total of 61. Research methodologies like documentations, survey queries and mathematical statistics were used to conduct analyses in regards to issues like athletic populations for current Taiwan bodily and mentally disabled wheelchair table tennis players, and current equipment utilization status. And the following are the findings:

1. In the arena of wheelchair table tennis population development, male athletes accounted for 45 persons (74%): 28 persons (62%) of High levels TT4, TT5, 12 (27%) of middle level TT3, and 5 persons (11%) of low level TT1 and TT2. Female athletes accounted for 16 persons (29%): 10 persons (63%) of TT4 and TT5 levels, 5 persons (31%) of TT3 middle level and 1 person (1%) of low level TT1 and TT2.
2. In paddle grip, the male wheelchair athletes adopted right hand grip with 42 persons (93%), and those with left hand grip were 3 persons (7%). And the female athletes adopted right hand grip were 15 persons (91%) with one in left hand grip (9%). The male wheelchair athletes had 38 persons (84%) adopting handshake grip, 7 persons (19%) adopting pen-hold grip. Female wheelchair athletes had 16 persons (100%) adopting handshake grip.
3. In the area of pad rubber, 31 (69%) of the male athletes adopted pimples rubber pad, and 14(31%) of them adopted the smooth surface pad. For female wheelchair athletes, there were 12 persons (75%) adopting pimples pad and only 4 persons (25%) adopting smooth surface pad.
4. In the wheelchair control method and usage, 25 (56%) of the male athletes adopted the unlock mechanism with only 9 persons (20%) adopting the wheelchair locked approach, and 11 persons (24%) semi-locked. 6 persons (38%) of the female athletes adopted unlock mechanism, only 4 persons (24%) adopting locked mechanism and 6 persons (38%) with semi-locked.
5. In the wheelchair seat preparation and usage, 33 persons (73%) of the male athletes adopted parallel stance and only 12 (27%) adopted sideways. 8 persons (57%) of the female athletes adopted the parallel stance with only 6 (43%) adopting sideways.

Handshake grip has been the mainstream for Taiwan table tennis sport. Still, the pen-hold has the tactical characteristics in technique. The pad rubber can be pimples which has the characteristics of enabling the spin with varieties; it allows the player with either the attack or defense, slow or fast maneuvers. And this approach is adopted by most wheelchair players. For those middle and high levels wheelchair athletes, they tend to adopt unlock or semi-locked control of wheelchair, which can enhance the agility of wheelchair control.

Key Word : Wheelchair, Table tennis sport, bodily and mentally disabled

1 INTRODUCTION

The wheelchair control technique and the seating arrangement are just important as normal person's stance by the table as well as footwork. Each type of seating arrangement dictates the playing type and the mainstream tactics, therefore the coach must base upon the athlete's condition to provide wheelchair athlete with suitable seating and preparation so as to facilitate their readiness for both the technique and tactics.

In view of this, this report intends to illustrate the wheelchair for the wheelchair athletes, the pad, etc, in addition to issues like its current usage status so as to conduct analysis. It includes discussions for the importance of wheelchair maneuvering technique and seating arrangement, and comparison for the characteristics and limiting factors for each method. And

it proposes individual findings as well as things to look out for, with the expectation that it would be of assistance in promoting the research atmosphere conducive to the promotion of Taiwan wheelchair table tennis sports.

2 Research subject and methodology

2.1 Research methodology

This article adopted the research subjects from those who participated in the 2008 Postal Insurance Cup for national bodily and mentally disabled athletes who represented this country. And these athletes participated to the points-accumulated contests for wheelchair teams of the first and fifth levels were of 45 men and 16 women athletes with a total of 61. They were the subjects under study. Survey query was conducted on

all 61 athletes with 61 copies of survey sheets disseminated and the returned ratio reaching 100%, effectiveness ratio 100% as well. In addition, mathematical statistics approaches were employed to sort out and compile survey information.

2.2 Operational definition for key words

2.2.1 Disabled table tennis

(1)One to five levels of wheelchair team : Those who have to play in wheelchair. (Lin, Kuang-Hua 1994; International Paralympic Committee, 1995)

2.2.2 Rubber surface for table tennis pad

(1)Pimpled surface (rubber) : Its rubber surface has pellet-like shape with ripples on the pellet surface. Ping pong ball spinning capability is less than that of rubber pad with flat surface.

(2) Flat surface (rubber) : The rubber surface is flat and even, which can produce highly spinning movement.

2.2.3 Controlling and maneuvering for the wheelchair

(1)Unlock style : The brakes for all the wheels of wheelchair are released with high agility in moving around.

(2)Locked style : The brakes for all wheels of the wheelchair are locked and fixated with less agility but more stabilized.

(3)Semi-locked style : The playing-hand side of the wheelchair with its wheel locked allows the other hand free to control the playing-side wheel.

2.2.4 The preparation for wheelchair seating

(1)Parallel : The body of the athlete and the frontal region of the wheelchair are parallel with the edge of the table (edge line).

(2) Sideways : The body of the athlete and the frontal of wheelchair are in an intersection angle with the edge of table (edge line), the sideways angle is approximately 20~45 degrees.

3 Findings and discussions

3.1 Findings

Table 1. The dexterity in paddle grips for the male and female wheelchair team from levels one to five

class	Male		Female	
	Right-handed	Left-handed	Right-handed	Left-handed
TT1	2			
TT2	3		1	
TT3	12		4	1
TT4	16	1	6	
TT5	9	2	4	
Total (%)	42(93%)	3(7%)	15(91%)	1(9%)

From the statistics result in Table 1, we learned that in the dexterity for paddle grip of male contenders in wheelchair sports, the ratios between right-handed and left-handed were 93:7, which were 42 right-handed persons and 3 left-handed. The female wheelchair athletes had the right-handed vs. left-handed ratio of 91:9 with 15 persons in right-handed and one in left-handed.

Table 2. The paddle grip inclinations for the male and female wheelchair team from levels one to five

	Male		Female	
	Handshake	Pen-hold	Handshake	Pen-hold
TT1	2			
TT2	3		1	
TT3	12		5	
TT4	12	5	6	
TT5	9	2	4	
Total (%)	38(84%)	7(16%)	16(100%)	0%

From the statistical findings in Table 2, we learned that in the paddle grip scenario, the ratio between handshake and pen-hold grip for male wheelchair sports athletes was 84:16 with 7 persons in pen-hold and 38 in handshake. For the female counterpart, the ratio between handshake and pen-hold was 100:0 with 16 persons in handshake and none in pen-hold.

Table 3. The paddle rubber use for male and female wheelchair teams of one to five levels

	Male		Female	
	Pimpled	Flat surfaced	Pimpled	Flat surfaced
TT1		2		
TT2	3		1	
TT3	9	3	2	3
TT4	12	5	5	1
TT5	7	4	4	
Total (%)	31(69%)	14(31%)	12(75%)	4(25%)

From findings in Table 3, we learned that in the paddle rubber usage, the pimpled and flat surfaced rubber for male athletes had ratio of 69:31 with 31 in pimpled and 14 in flat surfaced. For the female counterpart, the ratio was 75:25 with 12 in pimpled and 4 in flat surfaced.

Table 4. The wheelchair maneuvering style for male and female wheelchair teams of one to five levels

	Male			Female		
	unlocked	Locked	Semi- Locked	unlocked	Locked	Semi- Locked
TT1		2				
TT2		1	2		1	
TT3	7	2	3	3	1	1
TT4	10	2	5		2	4
TT5	8	2	1	3		1
Total (%)	25(56%)	9(20%)	11(24%)	6(38%)	4(24%)	6(38%)

From the findings of Table 4, we learned that in the wheelchair maneuvering, the ratio for wheelchair unlocked, locked and semi-locked athletes in this contest was 56:20:24 with 25 persons in unlocked, 9 persons in locked and 11 persons in semi-locked. For the female counterparts, the ratios were 38:24:38 with 6 in unlocked, 4 in locked and 6 in semi-locked

Table 5. The wheelchair seat preparation style for male and female wheelchair teams of one to five levels

	Male		Female	
	Parallel	Sideways	Parallel	Sideways
TT1	2			
TT2	3			1
TT3	9	3	4	1
TT4	12	5	3	3
TT5	7	4	1	1
Total (%)	33(73%)	12(27%)	8(57%)	6(43%)

From the findings in Table 5, we learned that in the wheelchair preparation, the athletes for this contest adopted the parallel and sideways style with the ratio of 73:27, entailing 33 persons in parallel and 12 persons in sideways. The female counterparts of the same categories had 57:43 ratios with 8 persons in parallel and 6 in sideways.

3.2 Discussions

3.2.1 Discussions for paddle grip dexterity

From the findings in Table 1, we learned that there was extreme difference in ratio for the left-handed and right-handed approach (Male 93:7; Female 94:6). And this phenomenon attracted our attention entailing an urgent need to cultivate a group of players in left-handed approach. Since there are plenty of globally high quality players playing with left hand; therefore if we do not cultivate a definite amount of players in left-handed approach, then we expect that Taiwan players would have a difficult time to adapt themselves to the reality needs in global contests.

3.2.2 Discussion for paddle grip

From the statistical findings in Table 2, there was a dead-set ratio (84:16) for pen-hold grip in Taiwan wheelchair athletes, and this can be attributed as something good. Multiple styles of paddle grip can facilitate the formation of tactics and can also reach the demanded tactical characteristics. Nonetheless, the female counterparts of wheelchair athletes were trained with pen-hold tactics through handshake grip. Since the female is bounded by physiological characteristics, their instantaneously bursting energy was conspicuously less than that for the male counterpart. Thus, the female pen-hold grip for the wheelchair tactics was not encouraged nor recommended.

For the wheelchair athletes who tend to adopt handshake grip, the techniques like backhand push, cut, serve and flick are quite common. If the athlete adopts the twiddle-gripped and still be adroit like those handshake grip player using the pen-hold backhand push, cut, serve and flick, then, the performances would be amazing. From the characteristics of the overall pen-hold backhand, for the incoming ball of the backhand direction, it would be convenient to counteract with pen-hold backhand for the athlete.

Recently, experts in this field pointed out that, any technique of backhand pen-hold grip can be converted into techniques for backhand backside. This illustration

indicates that the potential for backhand backside is not limited to a few items that we have commanded, and there are more new techniques to be developed and unearthed. (Lee Chia, Dan Tau, 2006)

3.2.3 Paddle rubber discussion

From the findings in Table 3, we learned that the ratio for adopting pimples paddle surface was pretty high in Taiwan male and female wheelchair athletes (i.e. Male 69 : 31; female 75:25). Within this, it includes long pimple, mid and long pimple, short pimple to complement pen-hold flat-in approach. And this tactics utilizes the characteristics for the slow speed of pimples as well as the anti-spin, which would effectively buffer the wheelchair team characteristics of high speed for the ball due to the seating closer to the table. In addition, with mix of flat-in tactics, it can allow the tactics of timely spin with arcs, thus, the tactics would be unpredictable.

(1) Flat-in

Nowadays, domestic usage of flat-in foam rubber for the athletes is quite predominant. Flat-in foam rubber's characteristics is that the rubber has greater glutinous capability which facilitates the serve, counter the serve, spin and arcs which produce the spin. Since the surface of the rubber is both flat and even, therefore, in the counter-serve, the form changes for both the foam and rubber would be relatively small. Hence, the hand feeling would be stable and easy to control the paddle.

(2) The short pimple of the foam rubber is OUT

The main characteristics for foam rubber with the short pimple out are : Since there is less rubber surface viscosity, the ball would spend less time on the surface of the paddle. The rebound would be faster, the counter-drive would be faster with lower arc produced. The serve with cut would also be faster which can be beneficial to the control for fast, low and short serve. During the serve, the foam rubber viscosity would be less than that for flat-in. Nonetheless, in serve, the wheelchair athletes can adjust to the angle entailing with good cut and spin, and serve-strength concentration with stronger spin serve. According to the functions of flat-in foam rubber paddle, under the premise of desired serve speed and landing spot in accommodating the spin variations resulted from the speed and agility of the wrist movement as well as the variations of the paddle, and this is exactly the characteristics for the flat-in foam rubber paddle.

(3) Long pimples and semi-long pimples paddle

The characteristics for both the long and semi-long pimples paddle are : The pimple is thin, long and soft, and it tends to react in sideways when impacted with the ball. When the pimple resumes its original shape and it would produce a counteract force which would result with counter-spin of the ball. Thus, using the long pimple paddle would create a different feeling than others. And using the long pimples paddle, it tends to be using less tactics of attack serve and flip; instead, it would be primarily using the techniques of cut, spin and block.

Therefore, wheelchair athletes should base on the counter-serve characteristics of long pimples and semi-long pimpled paddle to correctly select the paddle's rubber with appropriate pimples so as to match the tactics and techniques. This way, it would create psychological panic at the opponent with induced mistakes and finally the effect of surprise to win the game. (Cao, Ben, 2004)

3.2.4 Discussions for wheelchair maneuvering style

From the findings of Table 4, we learned that the wheelchair athletes of both male and female can adopt the unlock, locked and semi-lock, with the ratios (Male 56:20:24; Female 38:24:38), which showed that most were in unlock, next followed by semi-lock and the least of them in locked.

(1) Unlock style

This method is suitable to those with good waist strength like male team of TT4 and TT5 levels, female team of TT5 level. Those with less waist strength should not adopt this method. The characteristics and effects are: This is a kind of seating maneuvering with high techniques in the wheelchair table tennis sport, with the characteristics primarily focusing on the maneuverability of the wheelchair in both the front and back direction. As for the complementing serve tactics, it possesses conspicuous advantages which allow wider area for forehand attack, easy to control the attack timing and greater capability to lunge forward to save the wide-angled serve with faster position-shifting.

(2) Locked style

For the male team of TT1,2,3 levels and female team with less waist strength as well as those who with less hand maneuverability, this is the preferred seating. Its characteristics and effects are: This is the commonly seen seating arrangements in table tennis sport for medium skill level or the beginners. And it is known with adoption by most users with characteristics like the stabilized gravity center of wheelchair, powerful serve and counter-serve, better ball control and high safety reasons.

(3) Semi-locked style

It is suitable to male team of TT4, TT5 and female team of TT5 with better waist strength as well as tactics of fast attack. Characteristics and effects: It is one of the seating arrangements suitable to attack mode athletes. Its characteristics lies primarily at more stabilized gravity center of the wheelchair, better agility, conducive to forehand and backhand attack. Since the backhand side of the wheelchair is movable, enabling with wider area for attack and easy to control the striking points in space as well as larger strength in striking the ball. It also provides fast position shifting for dive-saving larger angle serve, and it is easy to handle the center attack (close to body) which is conducive to a variety of serve tactics.

3.2.5 Discussions for the preparation of wheelchair seating

As for this subject, the seating is the position on seat based on the tactics characteristics for the bodily and mentally disabled athlete. The proper seating can allow

the familiarized tactics a chance to work to compensate the technique disadvantage in addition to more comprehensive coverage.

From the statistics findings in Table 5, this signifies that most the male and female athletes seating on wheelchair in preparation style adopts the parallel style (Male 73:27; Female 57:43). This could be resulted from the athletes tend to be using backhand as well as attack-prone tactics. Therefore, the parallel preparation would be easier to initiate with explosive attack when adopting backhand approach. Nonetheless, relatively speaking, it would impede the forehand technique development. In reality, this is less than desired for the overall tactics. For beginners, the backhand in long pimpled paddle can adopt this seating preparation method, nevertheless, for those wheelchair athletes with attack in high speed mode, this is not recommended.

4. Conclusions

Handshake grip has been the mainstream for Taiwan table tennis sport. Still, the pen-hold has the tactical characteristics in technique. The pad rubber can be pimpled which has the characteristics of enabling the spin with varieties; it allows the player with either the attack or defense, slow or fast maneuvers. And this approach is adopted by most wheelchair players. For those middle and high levels wheelchair athletes, they tend to adopt unlock or semi-locked control of wheelchair, which can enhance the agility of wheelchair control.

The lack of balanced development in disability levels and classifications has been well noted in Taiwan wheelchair table tennis athletes, entailed with deficiency of low level and severely disabled population. The sporting life span for the wheelchair athlete is normally longer than those who can stand up straight, in addition to the training effectiveness rendering them with high effectiveness in a very short time span. In the future, with the competition goal tending to be less difficult in attending the international tournament, these would be the focused items in promoting table tennis sport for bodily and mentally disabled wheelchair players in Taiwan.

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