

**An Analytical study of effective tactical performance of  
serving & receiving of Table Tennis female players  
in the Olympic Games in London 2012**

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**Abstract:**

The study aims through analyzing the table tennis matches of women's singles in the Olympic Games in London 2012 to recognize: the effectiveness of tactical performance of serving in the single play of table tennis female players (kind of ball spin in serve, place of serve direction) through the effective levels of serve (direct point for the server, making the server in attack position, making the server in rally, making the server in defense position, failure of serve). The effective tactical performance of receiving in the single play of table tennis female players (kind of used skill in receiving, kind of ball spin in receiving, place of receiving direction) through the effective levels of receiving (direct point for the receiver, making the receiver in the attack position, making the receiver in the rally, making the receiver in the defense position, failure to receive)

according to each variable of the tactical performance variables of the receiving (kind of ball spin in receiving, place of directing receiving). The researcher used the descriptive method, the study sample included (15) matches starting from the (16) round to the final game of the women's singles competition in the Olympic games in London 2012. The most important results indicated that the back spin of the ball in receiving was the most effective ball spins. And that area no. (3) was the most effective areas when directing the serve to it. While the flick skill was the most used in the effective receiving and area no. (4) was the most effective in directing the serve to it when the ball spin kind was the side serve.

**Research problem:**

Olympic Games represent the highest technical level of table tennis worldwide, as it include the elite male &

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female players of table tennis all over the world. Competitions like this are considered an opportunity for researchers & trainers in the athletic field of table tennis to recognize the latest skill & planning level of male & female players especially the singles matches. Considering the importance of matches analysis in table tennis and the rare studies related to it, and in light of the researcher's expertise as a player and a trainer in the (A) premier league in addition to being an international judge of table tennis, and also through the reference survey of previous studied and researchers via the national net of information in scientific research & technology academy, he noticed that no other researcher – as far as he knows – has made a study or an effective analysis of the tactical performance of serving & receiving in the singles' play of the high level female players of table tennis, which arouse his attention to make this research in an attempt to recognize the latest tactical performance of female players in table tennis international matches. Hence, these data and statics play an

important role in directing the tactical training of Egyptian female players to raise their performance level in addition to the possibility of putting training aims for them in light of the actual demands of international table tennis female players.

### **Research Aims:**

This research aims through analyzing table tennis matches of women's singles in the Olympic Games in London 2012 to recognize the following:

- 1- The effectiveness of tactical performance of serving in the singles' play for table tennis female players (kind of ball spin in serving, place of serving direction) through levels of serving effectiveness (direct point for the server, making the server in attack position, making the server in rally position, making the server in defense position, failure to serve).
- 2- The effectiveness of tactical performance of receiving in the singles' play of table tennis female players (the

kind of skill used in receiving, the kind of ball spin in receiving, the place of directing the receiving) through levels of receiving effectiveness (direct point for the receiver, making the receiver in attack position, making the receiver in rally position, making the receiver in defense position, failure to receive) according to each of the tactical performance variables of serving (kind of ball spin in serving, place of directing the serve).

### **The Terms used in the research:**

#### **1- Tactical performance of serving: (procedural definition)**

Performing the serve according to some variables that influence its effectiveness which are (kind of ball spin in serving, place of directing the serve).

#### **2- Tactical performance of receiving: (procedural definition)**

Performing the receiving according to some variables that influence its effectiveness which are (kind of skill used in receiving, kind of ball spin in receiving, place of directing receiving).

#### **3- Effective tactical performance of serving: (procedural definition)**

The effect resulting from performing the serve which is represented in (scoring a direct point for the server, making the server in attack position, making the server in rally position, making the server in defense position, failure to serve).

#### **4- Effective tactical performance of receiving: (procedural definition)**

The effect resulting from returning the serve which is represented in (scoring a direct point for the receiver, making the receiver in attack position, making the receiver in rally position, making the receiver in defense position, failure to receive).

### **Research Procedures:**

#### **First: Research Method:**

The researcher used the descriptive method following the survey technique as it suits the nature of the researcher.

#### **Second: Research Sample:**

The researcher sample was selected deliberately and included (15) matches starting from the (16) round to the final match of the women's singles competition in the Olympic

Games in London 2012, which was held in the period from 27/7 – 12/8/2012 in London, England.

### **Third: Tools & Means of data gathering:**

The researcher used various means & tools to gather data and information related to the research which are:

#### **1- Scientific Observation:**

The researcher analyzed the matches (research sample) to get the data subject to observation.

#### **2- Reference Survey:**

The researcher reviewed the scientific references related to table tennis sport and the studies related to research subject (1, 2, 3, 4, 5, 6, 7, 8, 9) to use them in determining research variables {tactical performance variables of serving, tactical performance variables of receiving, effective levels of serving, effective levels of receiving, division of play areas on the table surface appendix (1)}.

### **3- Two data registration form (analysis):**

The researcher designed (2) forms to analyze the tactical performance effectiveness of serving and receiving appendix (2).

#### **4- Personal Interview:**

The researcher displayed the two data registration forms (analysis) which he designed on (3) experts in the field of table tennis sport.

#### **Fourth: Basic Study:**

The researcher analyzed the matches (research sample) in the period from Saturday 19/1/2013 to Tuesday 2/4/2013.

#### **Fifth: Statistical Treatments:**

- 1- Percentage.
- 2- Effectiveness equation (effectiveness degree) =

Total of (repetitions under effective level of serving or receiving x the opposing degree of level) Total of repetitions(7: 74)

## Display & Discussion of Results:

## 1- Display of results related to tactical performance variables of serving

### First: Display & Discussion of results related to tactical performance variables of serving:

**Table (1)**  
**Repetition, percentage, and effectiveness degree of ball spin kind of serving**

**N=15**

Effective levels of serving		Direct point for the server		Server in attack position		Server in rally position		Server in defense position		Failure to serve		Total	Percentage %	Effective degree
		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Tactical performance variables of serving		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Kind of ball spin	Top	0	0	0	0	0	0	0	0	0	0	0	0	0
	Back	0	0	239	%16.14	77	%5.20	86	%5.81	0	0	402	%27.15	2.38
	Side	81	%5.47	422	%28.49	334	%22.55	242	%16.34	0	0	1079	%72.85	2.32
	Without spin	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	81	%5.47	661	%44.63	411	%27.75	328	%22.15	0	0	1481	%100	

Table (1) shows that the ball back spin of serving has achieved the highest effective

degrees (2.38) degree and the total repetitions is (402) times and the percentage is (27.15%).

**Table (2)**  
**Repetition, percentage and effectiveness degree**  
**of serve directing place**

**N=15**

Effective levels of serving		Direct point for the server		Server in attack position		Server in rally position		Server in defense position		Failure to serve		Total	Percentage %	Effective degree
		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Tactical performance variables of serving		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Place of directing the serve	Outside table lines – in the net	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (1)	0	0	107	%7.22	131	%8.85	62	%4.19	0	0	300	%20.26	2.15
	Area no. (2)	0	0	381	%25.73	199	%13.44	127	%8.58	0	0	707	%47.74	2.36
	Area no. (3)	52	%3.51	86	%5.81	56	%3.78	27	%1.82	0	0	221	%14.92	2.74
	Area no. (4)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (5)	29	%1.96	59	%3.98	25	%1.69	58	%3.92	0	0	171	%11.54	2.35
	Area no. (6)	0	0	28	%1.89	0	0	54	%3.65	0	0	82	%5.54	1.68
	Area no. (7)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (8)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (9)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	81	%5.47	661	%44.63	411	%27.75	328	%22.15	0	0	1481	%100	

Table (2) shows that the most effective area in directing the serve to was area no.(3) , as the effectiveness degree is (2.74),

and total repetition is (221) times, the percentage is (14.92%).

## **2- Discussion of results related to tactical performance variables of serving:**

### **a) Kind of ball spin of serving:**

The researcher attributes the reason behind occupying the ball back spin in serving the first place regarding effectiveness to the severe back spin – that the ball gains as a result from the serve hit from the female player in its lower half by a quick powerful move from her racquet and wrist to the front and down – this works to make the ball pass directly over the net which lead to the decrease of its flying arc to fall in the 1st third (the top area) of the receiving player and the ball become the in the nearest possible place to the net then it slow down (reduces its speed) after its fall on the table and bounces very low to the table surface which disturb the player's timing and makes it difficult for her to attack the ball. Also, the severe back spin make the ball tend to bounce toward the net when it touches the racquet of the receiving player.

The researcher also see the reason that the ball back spin occupies the first place

concerning effectiveness to that the serving player deceives the receiving player when performing the serve of the ball back spin, as she changes the intensity of the back spin through diversification of the place where the ball touches the racquet surface. As when the ball touches the lower racquet (the lower third) gets a severe back spin. While if the ball touched the upper racquet (the upper third) gets a light back spin. This versification in the spin intensity disturbs the receiving player and affects the accuracy of her return of the ball, which allows the serving player to make a strong attack after the receiving player returns the ball to her.

**Dan Seemiller & Mark Holowchak (1997)** mentioned that the short serve of the back spin is difficult for the receiver to return it with attack hit. (8: 46)

Also **Sherif Fathy Ahmed (2001)** referred that the back spin ball bounces from the competitor's racquet to the bottom when his racquet angle is square or closed due to the back spin of the ball. (10: 20)

**Magdy Ahmed Shawky (2002)** added that the back spin

is used to keep the ball low and difficult to attack. (4: 49)

The researcher mentions that the reason that the ball back spin occupies the first place than the side spin is due to the application of the effective equation through which the effective degree is calculated for each back and side spin of the ball by returning to the number of times each one is used.

**b) Place of directing the serve:**

The researcher attributes the reason that the area no.(3) occupies the first place in effectiveness is that this area is located directly behind the net and beside the table sideline in the smallest space possible on the receiving player's left, and directing the serve to it is difficult to be answered , hence, it is possible to score a direct point from it or at least it hinder her to attack the serve hit easily because she will stretch her hand over the table to hit the ball with the racquet back. In addition, the skills that are performed from the player's left using the back racquet are difficult in performing and less powerful and dangerous compared to the skills which are performed

from the player's right considering that they are performed from body section and not outside it which does not give the player the full freedom to perform the back swing as her body hinders her performance. Consequently, the motor range of the hitting arm is decreased which gives the ball far less power and spin than when it is hit using the front racquet. This is what results of table (2) refer to that directing the serve to area no.(3) resulted in scoring (52) direct point from it in favor of the serving player, and put her in the attack position (86) times, in rally position (56) times and in defense position (27) times.

The researcher also adds that the reason that the area no.(3) occupies the first place in effectiveness is due to that this area is located directly behind the net in the table front area and beside the sideline on the left of the receiving player and directing serves of side spin to this area leads to ball deviation to the side outside the sideline once it touched the table of the receiving player which makes it difficult for her to pursue the ball hence scoring many point or making the ball



difficult for the competitor to return.

This agrees with what **Mohemd Saadeldin Elsaied (1992)** referred to that player's performance of the serve is not only to put the ball in play but also the serve is a tactical means that should be used well. The server can use the initiation factor by mastering the serve hits and well directing them to the competitor's playground in the suitable place in a way that can not be returned or easily returned in a way that enables the server after that to make an effective attack. (6: 110)

**Anderson Mikhail (2009)** confirms the previous opinion that the serve should not be performed only to put the ball in the play, but the ball should be served according to a certain plan such as selecting the kind of ball spin and the place of its fall in the competitor's playground. (11: 10)

**Second: Display & Discussion of results related to tactical performance variables of receiving:**

**1- Display of results related to tactical performance variables of receiving:**

**Table (3)**  
**Repetition, percentage and effectiveness degree of tactical**  
**performance variables of receiving according to**  
**kind of ball spin in the serve (back)**  
**N= 15**

Effective levels of receiving		Direct point for the receiver		Receiver in attack position		Receiver in rally position		Receiver in defense position		Failure to receive		Total	Percentage %	Effective degree
		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Tactical performance variables of receiving	Kind of skill used in the receiving	Straight	0	0	0	0	0	0	0	0	0	0	0	0
		Top	0	0	0	0	0	0	0	0	0	0	0	0
	Loop hit	Side	27	%6.72	0	0	0	0	0	0	0	27	%6.72	4
	Counter Drive		0	0	0	0	0	0	0	0	0	0	0	0
	Flick hit		0	0	59	%14.68	0	0	0	0	0	59	%14.68	3
	Push		0	0	0	0	77	%19.15	239	%59.45	0	316	%78.60	1.24
	Total		27	%6.72	59	%14.68	77	%19.15	239	%59.45	0	402	%100	
ball spin in the	Top	0	0	59	%14.68	0	0	0	0	0	0	59	%14.68	3
	Back	0	0	0	0	77	%19.15	239	%59.45	0	0	316	%78.60	1.24
	Side	27	%6.72	0	0	0	0	0	0	0	0	27	%6.72	4
	Without spin	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	27	%6.72	59	%14.68	77	%19.15	239	%59.45	0	0	402	%100	
Place of directing the receiving	Outside table lines – in the net	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (2)	0	0	0	0	24	%5.97	44	%10.95	0	0	68	%16.92	1.35
	Area no. (3)	0	0	0	0	53	%13.18	0	0	0	0	53	%13.18	2
	Area no. (4)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (5)	0	0	28	%6.97	0	0	61	%15.17	0	0	89	%22.14	1.63
	Area no. (6)	0	0	0	0	0	0	79	%19.65	0	0	79	%19.65	1
	Area no. (7)	0	0	0	0	0	0	21	%5.22	0	0	21	%5.22	1
	Area no. (8)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (9)	27	%6.72	31	%7.71	0	0	34	%8.46	0	0	92	%22.89	2.55
	Total	27	%6.72	59	%14.68	77	%19.15	239	%59.45	0	0	402	%100	

Table (3) shows that the highest effectiveness degree was in favor of the side loop as follows: (4) degrees, total repetition (27) times and percentage (6.72%).

Table (3) results also indicate that the ball side spin in receiving has achieved the

highest effective degrees as (4) degrees, total repetition (27) and percentage (6.72%).

Table (3) also shows that the most effective area in directing the receiving to was the area no.(9) as (2.55) degrees, total repetitions (92) times, and percentage (22.89%).

**Table (4)**  
**Repetition, percentage and effectiveness degree of the tactical**  
**performance variables of receiving according to**  
**kind of ball spin in the serve (side)**

**N= 15**

Effective levels of receiving			Direct point for the receiver		Receiver in attack position		Receiver in rally position		Receiver in defense position		Failure to receive		Total	Percentage %	Effective degree
			Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Tactical performance variables of receiving															
Kind of skill used in the receiving	Loop hit	Straight	0	0	0	0	0	0	0	0	0	0	0	0	0
		Top	0	0	0	0	0	0	0	0	0	0	0	0	0
		Side	0	0	54	%5.00	0	0	0	0	0	0	54	%5.00	3
	Counter Drive	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Flick hit	32	%2.97	156	%14.46	0	0	0	0	0	0	188	%17.43	3.17	
	Push	0	0	0	0	334	%30.95	422	%39.11	81	%7.51	837	%77.57	1.30	
	Total	32	%2.97	210	%19.46	334	%30.95	422	%39.11	81	%7.51	1079	%100		
ball spin in the	Top	32	%2.97	156	%14.46	0	0	0	0	0	0	188	%17.43	3.17	
	Back	0	0	0	0	334	%30.95	422	%39.11	81	%7.51	837	%77.57	1.30	
	Side	0	0	54	%5.00	0	0	0	0	0	0	54	%5.00	3	
	Without spin	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	32	%2.97	210	%19.46	334	%30.95	422	%39.11	81	%7.51	1079	%100		
Place of directing the receiving	Outside table lines – in the net	0	0	0	0	0	0	0	0	81	%7.51	81	%7.51	0	
	Area no. (1)	0	0	0	0	139	%12.88	67	%6.21	0	0	206	%19.09	1.67	
	Area no. (2)	0	0	0	0	71	%6.58	63	%5.84	0	0	134	%12.42	1.53	
	Area no. (3)	0	0	0	0	67	%6.21	28	%2.59	0	0	95	%8.80	1.71	
	Area no. (4)	0	0	120	%11.12	0	0	38	%3.52	0	0	158	%14.64	2.52	
	Area no. (5)	32	%2.97	0	0	24	%2.22	69	%6.39	0	0	125	%11.59	1.69	
	Area no. (6)	0	0	0	0	0	0	91	%8.43	0	0	91	%8.43	1	
	Area no. (7)	0	0	90	%8.34	0	0	32	%2.97	0	0	122	%11.31	2.48	
	Area no. (8)	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Area no. (9)	0	0	0	0	33	%3.06	34	%3.15	0	0	67	%6.21	1.49	
Total	32	%2.97	210	%19.46	334	%30.95	422	%39.11	81	%7.51	1079	%100			

Table (4) shows that the highest effectiveness degree was in favor of the flick skill as follows: (3.17) degrees, total repetitions (188) times and percentage (17.43%).

Table (4) results also indicate that the ball top spin in the receiving has achieved the highest effectiveness degrees

as follows: (3.17) degree, total repetitions (188) times and percentage (17.43%).

Table (4) also shows that the most effective area in directing the receiving to was the area no.(4) as follows: (2.52) degree, total repetitions (158) times and percentage (14.64%).

**Table (5)**  
**Repetitions, percentage and effectiveness degree of tactical**  
**performance variables of receiving according to**  
**place of directing the serve (area no. 1)**

**N= 15**

Effective levels of receiving		Direct point for the receiver		Receiver in attack position		Receiver in rally position		Receiver in defense position		Failure to receive		Total	Percentage %	Effective degree
		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Tactical performance variables of receiving	Kind of skill used in the receiving	Loop hit	Straight	0	0	0	0	0	0	0	0	0	0	0
			Top	0	0	0	0	0	0	0	0	0	0	0
			Side	0	0	0	0	0	0	0	0	0	0	0
			Counter Drive	0	0	0	0	0	0	0	0	0	0	0
			Flick hit	0	0	62	%20.66	0	0	0	0	62	%20.66	3
			Push	0	0	0	0	131	%43.67	107	%35.67	0	0	238 %79.34 1.55
			Total	0	0	62	%20.66	131	%43.67	107	%35.67	0	0	300 %100
			Top	0	0	62	%20.66	0	0	0	0	62	%20.66	3
			Back	0	0	0	0	131	%43.67	107	%35.67	0	0	238 %79.34 1.55
			Side	0	0	0	0	0	0	0	0	0	0	0
			Without spin	0	0	0	0	0	0	0	0	0	0	0
			Total	0	0	62	%20.66	131	%43.67	107	%35.67	0	0	300 %100
			Outside table lines – in the net	0	0	0	0	0	0	0	0	0	0	0
			Area no. (1)	0	0	0	0	50	%16.67	0	0	50	%16.67	2
			Area no. (2)	0	0	0	0	41	%13.67	30	%10.00	0	0	71 %23.67 1.58
			Area no. (3)	0	0	0	0	40	%13.33	0	0	40	%13.33	2
			Area no. (4)	0	0	49	%16.33	0	0	12	%4.00	0	0	61 %20.33 2.61
			Area no. (5)	0	0	13	%4.33	0	0	38	%12.67	0	0	51 %17.00 1.51
			Area no. (6)	0	0	0	0	0	0	0	0	0	0	0
			Area no. (7)	0	0	0	0	0	0	27	%9.00	0	0	27 %9.00 1
			Area no. (8)	0	0	0	0	0	0	0	0	0	0	0
			Area no. (9)	0	0	0	0	0	0	0	0	0	0	0
			Total	0	0	62	%20.66	131	%43.67	107	%35.67	0	0	300 %100

Table (5) shows that the highest effectiveness degree was in favor of the flick skill as follows: (3) degrees, total repetitions (62) times and percentage (20.66%).

Table (5) results also indicate that the ball top spin in the

receiving has achieved the highest effectiveness degrees as follows: (3) degrees, total repetitions (62) times and percentage (20.66 %).

Table (5) also shows that the most effective area in directing the receiving to was the area

no.(4) as follows: (2.61) times and percentage (20.33%).  
degree, total repetitions (61)

**Table (6)**  
**Repetitions, percentage and effectiveness degree of tactical**  
**performance variables of receiving according to**  
**place of directing the serve (area no. 2)**

**N= 15**

Effective levels of receiving			Direct point for the receiver		Receiver in attack position		Receiver in rally position		Receiver in defense position		Failure to receive		Total	Percentage %	Effective degree
			Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Kind of skill used in the receiving	Loop hit	Straight	0	0	0	0	0	0	0	0	0	0	0	0	0
		Top	0	0	0	0	0	0	0	0	0	0	0	0	0
		Side	0	0	0	0	0	0	0	0	0	0	0	0	0
	Counter Drive		0	0	0	0	0	0	0	0	0	0	0	0	0
	Flick hit		32	%4.53	95	%13.43	0	0	0	0	0	0	127	%17.96	3.25
	Push		0	0	0	0	199	%28.15	381	%53.89	0	0	580	%82.04	1.34
	Total		32	%4.53	95	%13.43	199	%28.15	381	%53.89	0	0	707	%100	
	Total		32	%4.53	95	%13.43	0	0	0	0	0	0	127	%17.96	3.25
Kind of ball spin in the receiving	Top		0	0	0	0	199	%28.15	381	%53.89	0	0	580	%82.04	1.34
	Back		0	0	0	0	0	0	0	0	0	0	0	0	0
	Side		0	0	0	0	0	0	0	0	0	0	0	0	0
	Without spin		0	0	0	0	0	0	0	0	0	0	0	0	0
	Total		32	%4.53	95	%13.43	199	%28.15	381	%53.89	0	0	707	%100	
Place of directing the receiving	Outside table lines – in the net		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (1)		0	0	0	0	55	%7.78	67	%9.48	0	0	122	%17.26	1.45
	Area no. (2)		0	0	0	0	32	%4.53	69	%9.76	0	0	101	%14.29	1.32
	Area no. (3)		0	0	0	0	55	%7.78	10	%1.41	0	0	65	%9.19	1.85
	Area no. (4)		0	0	71	%10.04	0	0	6	%0.85	0	0	77	%10.89	2.84
	Area no. (5)		32	%4.53	15	%2.12	24	%3.39	78	%11.03	0	0	149	%21.07	2.01
	Area no. (6)		0	0	0	0	0	0	143	%20.23	0	0	143	%20.23	1
	Area no. (7)		0	0	9	%1.27	0	0	8	%1.13	0	0	17	%2.40	2.06
	Area no. (8)		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (9)		0	0	0	0	33	%4.67	0	0	0	0	33	%4.67	2
	Total		32	%4.53	95	%13.43	199	%28.15	381	%53.89	0	0	707	%100	

Table (6) shows that the highest effectiveness degree was in favor of the flick skill as follows: (3.25) degrees, total repetitions (127) times and percentage (17.96%).

Table (6) results also indicate that the ball top spin in the receiving has achieved the highest effectiveness degrees

as follows: (3.25) degree, total repetitions (127) times and percentage (17.96%).

Table (6) also shows that the most effective area in directing the receiving to was the area no.(4) as follows: (2.84) degree, total repetitions (77) times and percentage (10.89%).

**Table (7)**  
**Repetitions, percentage and effectiveness degree of tactical**  
**performance variables of receiving according to**  
**place of directing the serve (area no. 3)**  
**N= 15**

Tactical performance variables of receiving		Effective levels of receiving		Direct point for the receiver		Receiver in attack position		Receiver in rally position		Receiver in defense position		Failure to receive		Total	Percentage %	Effective degree
		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %					
Kind of skill used in the receiving	Loop hit	Straight	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Top	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Side	27	%12.22	0	0	0	0	0	0	0	0	0	27	%12.22	4
	Counter Drive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Flick hit	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Push	0	0	0	0	56	%25.34	86	%38.91	52	%23.53	194	%87.78	1.02	
		Total	27	%12.22	0	0	56	%25.34	86	%38.91	52	%23.53	221	%100		
ball spin in the	Top	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Back	0	0	0	0	56	%25.34	86	%38.91	52	%23.53	194	%87.78	1.02		
	Side	27	%12.22	0	0	0	0	0	0	0	0	27	%12.22	4		
	Without spin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	27	%12.22	0	0	56	%25.34	86	%38.91	52	%23.53	221	%100			
Place of directing the receiving	Outside table lines – in the net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Area no. (1)	0	0	0	0	34	%15.38	0	0	0	0	34	%15.38	2		
	Area no. (2)	0	0	0	0	22	%9.96	8	%3.62	0	0	30	%13.58	1.73		
	Area no. (3)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Area no. (4)	0	0	0	0	0	0	20	%9.05	0	0	20	%9.05	1		
	Area no. (5)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Area no. (6)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Area no. (7)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Area no. (8)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Area no. (9)	27	%12.22	0	0	0	0	58	%26.24	0	0	85	%38.46	1.95		
	Total	27	%12.22	0	0	56	%25.34	86	%38.91	52	%23.53	221	%100			

Table (7) shows that the highest effectiveness degree was in favor of the side loop skill as follows: (4) degrees, total repetitions (27) times and percentage (12.22%).

Table (7) results also indicate that the ball side spin in the receiving has achieved the highest effectiveness degrees

as follows: (4) degree, total repetitions (27) times and percentage (12.22%).

Table (7) also shows that the most effective area in directing the receiving to was the area no.(1) as follows: (2) degree, total repetitions (34) times and percentage (15.38%).

**Table (8)**  
**Repetitions, percentage and effectiveness degree of tactical**  
**performance variables of receiving according to**  
**place of directing the serve (area no. 5)**  
**N= 15**

Effective levels of receiving		Direct point for the receiver		Receiver in attack position		Receiver in rally position		Receiver in defense position		Failure to receive		Total	Percentage %	Effective degree
		Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Kind of skill used in the receiving	Loop hit	Straight	0	0	0	0	0	0	0	0	0	0	0	0
		Top	0	0	0	0	0	0	0	0	0	0	0	0
		Side	0	0	0	0	0	0	0	0	0	0	0	0
	Counter Drive	0	0	0	0	0	0	0	0	0	0	0	0	0
	Flick hit	0	0	58	%33.92	0	0	0	0	0	0	58	%33.92	3
	Push	0	0	0	0	25	%14.62	59	%34.50	29	%16.96	113	%66.08	0.96
	Total	0	0	58	%33.92	25	%14.62	59	%34.50	29	%16.96	171	%100	
	Top	0	0	58	%33.92	0	0	0	0	0	0	58	%33.92	3
	Back	0	0	0	0	25	%14.62	59	%34.50	29	%16.96	113	%66.08	0.96
	Side	0	0	0	0	0	0	0	0	0	0	0	0	0
ball spin in the	Without spin	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	58	%33.92	25	%14.62	59	%34.50	29	%16.96	171	%100	
	Outside table lines – in the net	0	0	0	0	0	0	0	0	29	%16.96	29	%16.96	0
	Area no. (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (2)	0	0	0	0	0	0	0	0	0	0	0	0	0
Place of directing the receiving	Area no. (3)	0	0	0	0	25	%14.62	18	%10.53	0	0	43	%25.15	1.58
	Area no. (4)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (5)	0	0	0	0	0	0	14	%8.19	0	0	14	%8.19	1
	Area no. (6)	0	0	0	0	0	0	15	%8.77	0	0	15	%8.77	1
	Area no. (7)	0	0	35	%20.47	0	0	12	%7.01	0	0	47	%27.48	2.94
	Area no. (8)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (9)	0	0	23	%13.45	0	0	0	0	0	0	23	%13.45	3
	Total	0	0	58	%33.92	25	%14.62	59	%34.50	29	%16.96	171	%100	

Table (8) shows that the highest effectiveness degree was in favor of the flick skill as follows: (3) degrees, total repetitions (58) times and percentage (33.92%).

Table (8) results also indicate that the ball top spin in the receiving has achieved the highest effectiveness degrees as follows: (3) degree, total repetitions (58) times and percentage (33.92%).

Table (8) also shows that the most effective area in directing the receiving to was the area no.(9) as follows: (3) degree, total repetitions (23) times and percentage (13.45%).

**Table (9)**  
**Repetitions, percentage and effectiveness degree of tactical**  
**performance variables of receiving according to**  
**place of directing the serve (area no. 6)**  
**N= 15**

Effective levels of receiving			Direct point for the receiver		Receiver in attack position		Receiver in rally position		Receiver in defense position		Failure to receive		Total	Percentage %	Effective degree
			Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %	Repetition	Percentage %			
Kind of skill used in the receiving	Loop hit	Straight	0	0	0	0	0	0	0	0	0	0	0	0	0
		Top	0	0	0	0	0	0	0	0	0	0	0	0	0
		Side	0	0	54	%65.58	0	0	0	0	0	0	54	%65.58	3
	Counter Drive		0	0	0	0	0	0	0	0	0	0	0	0	0
	Flick hit		0	0	0	0	0	0	0	0	0	0	0	0	0
	Push		0	0	0	0	0	0	28	%34.15	0	0	28	%34.15	1
	Total		0	0	54	%65.58	0	0	28	%34.15	0	0	82	%100	
Kind of ball spin in the receiving	Top		0	0	0	0	0	0	0	0	0	0	0	0	0
	Back		0	0	0	0	0	0	28	%34.15	0	0	28	%34.15	1
	Side		0	0	54	%65.58	0	0	0	0	0	0	54	%65.58	3
	Without spin		0	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	54	%65.58	0	0	28	%34.15	0	0	82	%100	
Place of directing the receiving	Outside table lines – in the net		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (1)		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (2)		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (3)		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (4)		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (5)		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (6)		0	0	0	0	0	0	12	%14.63	0	0	12	%14.63	1
	Area no. (7)		0	0	46	%56.10	0	0	6	%7.32	0	0	52	%63.42	2.77
	Area no. (8)		0	0	0	0	0	0	0	0	0	0	0	0	0
	Area no. (9)		0	0	8	%9.75	0	0	10	%12.20	0	0	18	%21.95	1.89
	Total		0	0	54	%65.58	0	0	28	%34.15	0	0	82	%100	

Table (9) shows that the highest effectiveness degree was in favor of the side loop skill as follows: (3) degrees, total repetitions (54) times and percentage (65.85%).

Table (9) results also indicate that the ball side spin in the receiving has achieved the highest effectiveness degrees as follows: (3) degree,

total repetitions (54) times and percentage (65.85%).

Table (9) also shows that the most effective area in directing the receiving to was the area no.(7) as follows: (2.77) degrees, total repetitions (52) times and percentage (63.42%).



**2- Results' Discussion of tactical performance variables of receiving:**

a) Results' Discussion of tactical performance of receiving (kind of the skill used in receiving):

Results of tables (3-9) show that related to the kind of skill used in receiving as following:

- The side loop skill occupies the first place concerning effectiveness in the tables (3, 7, 9) by values as follows: (4, 4, 3) degree respectively.

- The flick skill occupies the first place concerning effectiveness in the tables (4, 5, 6, 8) by values as follows: (3.17, 3, 3.25, 3) degrees respectively.

The researcher attributes the reason that the side loop skill occupies the first place concerning the effectiveness in receiving the serve according to {kind of ball spin in the serve (back), place of directing the serve (area no.3,6) to that this skill is a speed hit meaning that it gives the ball high speed and of intense side spin and has a powerful effect because the intense side spin resulted from this hit in the ball makes it deviate greatly to the left outside the table sideline in a deceiving way and in a low flying arc when bouncing from its surface, which make it difficult for the server to defense against it or make a

counter attack. As she must deal with not only the speed and power of the ball but also with the intense side spin whereas all the side loop hits that are performed during all the matches (research sample) which are (81) hits were performed using the back of the racquet which make them move in a very deviated arc towards the left when it bounces from the table surface.

**Tarek Hamouda Amin (1997)** confirms this opinion that the side loop hit is remarked by its low flying arc and its speed and intense side spin which accelerate the ball path speed and its power, and when it touches the server playground it bounces greatly to the right or the left side and with flying arc less high which increases the difficulty of returning it. (3: 28)

**Thomans Larry (2005)** indicated that high levels players use this hit in most of the matches automatically. (12: 22)

The researcher also attributes the reason that the side loop hit occupies the first place concerning effectiveness in receiving the serve according to the previous tactical performance variables of serving to that performing this hit takes a very short time which allows the receiving player to surprise the serving player with an attack so that she cannot organize her

defense hence, score many points. That is why this skill occupies the first place among attack skills because it has a positive and effective influence on matches' results. It is also considered among the final skills that if it is mastered it can score a direct point.

This agrees with what **Larry Hodges (2008)** referred to that players of high levels use this loop hit with its different kinds in most of the matches automatically as it has an essential effect in scoring points and consequently winning the match. (13: 49)

**Anderson Mikhail (2009)** also mentions that the side loop hit is considered of the most important skills in attack play and in scoring points. (11: 37)

The researcher clarifies the reason that the lick skill occupies the first place concerning effectiveness in receiving the serve according to {kind of ball spin in the serve (side) – place of directing the serve (area no.1,2,5)} is due to that it is an attack skill which can be performed in attacking any kind of ball spins in the short serve, it works to take the attack initiative from the serving player with one hit. Also, the receiving player tries

to diversify the fall place of its flick ball in serving player playground so that the ball will be away from the reach of its racquet which positively affects in finishing the point in her favor or at least to prepare to perform a strong attack hit when the serving player returns her flick hit.

**Jan – Ove Waldner (2005)** indicates that the flick hit is one of the attack hits that is used to hit back the short serve hits and can be played to the side of the table or to its middle or to any of its corners and the choice depends on the strength and weakness points of the competitor. It is also used to prepare for other hits that can be loop or smash. (14: 87)

The researcher also attributes the reason that the flick hit occupies the first place concerning the effectiveness of receiving the serve according to previous tactical performance variables of the serve to that this skill is deceiving and is marked by its excessive speed which does not allow the serving player to know what the receiving player intends to do or to know the ball direction because its

performance takes a very short time.

In this regard, **Zoltan Berczik (2002)** mentions that the player can deceive his competitor by using the flick hit through changing the angle between the wrist and the forearm in the last moment and accordingly the ball direction changes. (15: 51)

#### **b) Results' Discussion of receiving tactical performance (kind of ball spin in receiving):**

Results of tables (3-9) concerning the kind of ball spin in receiving show the following:

- The side spin of the ball occupies the first place concerning effectiveness in the tables (3, 7, 9) with values (4, 4, 3) degrees respectively.
- The top spin of the ball occupies the first place concerning effectiveness in the tables (4, 5, 6, 8) with values (3.17, 3, 3.25, 3) degrees respectively.

The researcher attributes the reason that the side spin occupies the first place concerning effectiveness in receiving the serve according to {kind of ball spin in the serve (back) – place of

directing the serve (area no.3,6)} to that the side spin is a difficult spin which makes the ball change its direction when it touches the table surface of the serving player to right or to the left which makes it difficult for her to expect the place where the ball falls regarding the lack of clarity of its path during flying in the air which confuses her play technique and changes her timing in hitting the ball then she finds it difficult to return the ball correctly and consequently loses the point.

**Michel Gadal (2002)** confirms the previous opinion that the side spin of the ball makes it change its direction when falling on the competitor's table to the right or to the left, which confuses the timing of the competitor and makes it hard for her to return it. If the competitor did not take into consideration this side spin, then his ball will bounce outside the sideline of the table. (16: 17)

The researcher also attributes the reason that the top spin of the ball occupies the first place concerning effectiveness in receiving the serve according to {kind of ball

spin in the serve (side) – place of directing the serve (areas no.1,2,5)} to that the top spin makes the ball flying arc low and makes it hit the table quickly so that its bounce from the table surface is quick which confuses the serving player timing and makes it difficult for her to return the ball or lose it for her inability to keep time harmony with it, also the top spin makes the ball tend to rise when it touches the serving player's racquet.

The researcher attributes the reason that the side spin of the ball in receiving was the most effective according to some tactical performance variables of the serve, while the top spin of the ball was the most effective in the rest of tactical performance variables of the serve to that the kind of ball spin used in the serve is considered a reply to the tactical performance of the serving player during her performance of the serve skill concerning (the kind of spin through which the serve is performed – the place of directing the serve) and because they are high level players and have an integrated technical staff who analyze the

competing players during the championship to recognize their power & weakness points, accordingly, the player is tactically directed to use the weakness points of the competing player and avoid her strength points among of which her performance level of different ball spins.

### **c) Results' discussion of tactical performance of the receiving (place of directing the receiving):**

Results of tables (3-9) concerning the place of directing the receiving show the following:

- Area no. (4) occupies the first place concerning effectiveness in the tables (4, 5, 6) with values (2.52, 2.61, 2.84) degrees respectively.
- Area no. (9) occupies the first place concerning effectiveness in the tables (3, 8) with values (2.55, 3) degrees respectively.
- Area no.(1) occupies the first place concerning effectiveness in table (7) with value (2) degrees.
- Area no.(7) occupies the first place concerning effectiveness in table (9) with values (2.77) degrees.

The researcher attributes the reason that area no.(4) where the serve was directed to occupies the first place concerning effectiveness according to {kind of ball spin in the serve (side) – place of directing the serve (areas no.1, 2)} to that this area is located in the middle area of the table in the right side of the serving player. The receiving player directs her attack hits to this area in a cross way and also her side spin hits to make the ball get outside the sideline of the serving player's table, thus, the ball becomes away from her racquet because the serving player when performing the serve stands in the left corner of the table aligned to the sideline. Also, the receiving player directs her defense hits to this area so that to be short, of intense back spin, quick and aligned to the right sideline of the serving player's table, thus the ball in its bounce from the table surface does not cross the right sideline and the table final line which affects the serving player's reply or at least hinder her from attacking it because it is short, so that she is forced to

return the ball using the push hit too which gives the receiving player the opportunity to initiate the attack.

The researcher attributes the reason that area no.(9) where the serve is directed to occupies the first place concerning effectiveness according to {kind of ball spin in the serve (back) – place of directing the serve (areas no.5)} to that the serving player when performing the serve stands in the left corner of the table aligned to the sideline and close to it so that she can attack the short balls which are played by the receiving player behind the net, but the receiving player in this situation surprises the serving player by returning her serving hit to area no.(9) close to the cross point of table's backline and sideline towards her body which leads to her confusion and does not allow her the sufficient space to return the hit, therefore, she loses the point or return an easy ball for the serving players which helps her to attack it easily.

**Mohamed Ahmed Abdel Allah (2007)** mentions that the serve answer using long push can be used to surprise the server and the ball is directed to the back hit corner along with giving the ball an intense back spin in order to make it difficult for the server to attack the ball. (5: 279)

The researcher attributes the reason that area no.(1) where the serve is directed to occupies the first place concerning effectiveness according to {place of directing the serve (areas no.3)} to that this area is located in the table front area directly behind the net and beside the table's sideline in the smallest space possible on the right of the serving player and the farthest place from the reach of her racquet, as she stands in the left corner from the table aligned to the sideline of performing the serve, which makes the space between the ball fall in this area and the place where the serving player stands wide which urges her to move her legs quickly to the right and stretches her hand

and body over the table to return the ball to the receiving player which gives the server the opportunity to initiate the attack. The researcher also attributes the reason that some players resort to serve the ball to this area as a kind of their tactical technique in order to draw the server inside the table close to the net to find it difficult after that to follow the next hit of the receiver which is often long at the table's corners.

**David Hewitt (2004)** mentions that the serve answer using the short push to the right or left or middle of the table which is located directly behind the net is one of the methods of effectively returning the side or back spin short serve of the ball because this method hinders the server from performing her attack loop hits. (17: 93)

The researcher also explains the reason that area no.(7) where the serve is directed to occupies the first place concerning effectiveness according to {place of directing the serve (area no.6)} that this area is located in the

table's back area in the right side of the server; the server directs her hits to this area in a cross way and also her side spin hits to make the ball get out of the sideline of the table or its final line, therefore, the ball becomes away from the server's racquet because when performing her serve she stands in the left corner of the table aligned to the sideline. This also sometimes confuses the move of her legs which affects the accuracy of her ball return because the good table tennis player depends greatly on the move of her legs to reach the ball quickly and to hit it strongly.

**Jan – Ove Waldner (2005)** refers that putting the ball away from the competing player's arm makes him use his opposing foot in a wrong way. (14: 16)

### **Conclusions:**

#### **1- Results of tactical performance variables of the serve:**

- Back spin of the ball in the serve is the most effective ball spins concerning its effectiveness degree (2.38) degrees.

- Area no.(3) is the most effective areas concerning the effectiveness of directing the serve to, as its effective degree was (2.74).

#### **2- Results of tactical performance variables of the receiving according to:**

##### **a) Kind of ball spin in the serve (back):**

- The side loop hit is the most used skills in the effective receiving as its degree was (4).
- The side spin ball in the receiving was the most effective ball spin kinds as it achieved the highest effective degrees; its value was (4) degrees.
- Area no.(9) is the most effective areas concerning the effectiveness of directing the receiving to, as its effective degree was (2.55).

##### **b) Kind of ball spin in the serve (side):**

- The flick hit was the most used skill in the effective receiving as its degree was (3.17).
- The top spin ball in the receiving was the most effective ball spin kinds as it achieved the highest effective

degrees; its value was (3.17) degrees.

- Area no.(4) is the most effective areas concerning the effectiveness of directing the receiving to, as its effective degree was (2.52).

**c) Place of directing the serve (area no. 1):**

- The flick hit was the most used skill in the effective receiving as its degree was (3).
- The top spin ball in the receiving was the most effective ball spin kinds as it achieved the highest effective degrees; its value was (3) degrees.
- Area no.(4) is the most effective areas concerning the effectiveness of directing the receiving to, as its effective degree was (2.61).

**d) Place of directing the serve (area no. 2):**

- The flick hit was the most used skill in the effective receiving as its degree was (3.25).
- The top spin ball in the receiving was the most effective ball spin kinds as it achieved the highest effective degrees; its value was (3.25) degrees.

- Area no.(4) is the most effective areas concerning the effectiveness of directing the receiving to, as its effective degree was (2.84).

**e) Place of directing the serve (area no. 3):**

- The side loop hit was the most used skill in the effective receiving as its degree was (4).
- The side spin ball in the receiving was the most effective ball spin kinds as it achieved the highest effective degrees; its value was (4) degrees.
- Area no.(1) is the most effective areas concerning the effectiveness of directing the receiving to, as its effective degree was (2).

**f) Place of directing the serve (area no. 5):**

- The flick hit was the most used skill in the effective receiving as its degree was (3).
- The top spin ball in the receiving was the most effective ball spin kinds as it achieved the highest effective degrees; its value was (3) degrees.
- Area no.(9) is the most effective areas concerning the effectiveness of directing the



receiving to, as its effective degree was (3).

**g) Place of directing the serve (area no. 6):**

- The side loop hit was the most used skill in the effective receiving as its degree was (3).
- The side spin ball in the receiving was the most effective ball spin kinds as it achieved the highest effective degrees; its value was (3) degrees.
- Area no.(7) is the most effective areas concerning the effectiveness of directing the receiving to, as its effective degree was (2.77).

**Recommendations:**

- 1- To pay attention and concentrate in the training programs of the Egyptian female players on performing the serve and the receiving using both side of the racquet the forehand and the backhand by different spins to the different areas of the table surface as a tactical duty.
- 2- To make use of this research results in putting the tactical phrases of the serve and the receiving of the training programs of the Egyptian female players.

3- To use the two forms designed by the researcher in correcting the tactical performance of the serve and the receiving in the singles' matches of table tennis for women stages and for different age stages.

4- To make a similar study in the men's & women's couples (pairs) to recognize the effective tactical performance of the serve and the receiving in this competition.

5- To make an experimental study – in light of the results of this research – to suggest a program that aims to improve the tactical performance of the serve and the receiving of women's singles in table tennis.

**References:**

- 1- **Elen Wadei Farag, Salwa Ezzeldin Fekry (2002):** the reference in table tennis, an education and training, Elmaraef establishment, Alexandria.
- 2- **Peter Simpson (1990):** successful table tennis, translated by Mohamed Abdel Hameed Eldory, Baghdad, Iraq.

- 3- **Tarek Hmody Amin (1997):** ball & racquet games, Aldar Alarabia for press & distribution, Cairo.
- 4- **Magdy Ahmed Shawky (2002):** table tennis, theoretical bases, practical applications, the Arabic center for press, Zagazig.
- 5- **Mohamed Ahmed Abdelallah (2007):** the scientific bases in table tennis and measurement methods, Ayat center for press & publication, Zagazig.
- 6- **Mohamed Saad eldin Elsaied (1997):** athletic curriculums series, table tennis curriculum, press department of information & documentation center, leaders preparing sector, supreme council for youth and sport, Giza.
- 7- **Yasser Kamal Mahmoud (1997):** effectiveness of the tactical aspect to deter the serve in the most common situations of tennis players, a Ph. D. thesis, Physical Education Faculty for males, Alexandria University.
- 8- **Dan Seemiller & Mark Holowchak (1997):** Winning Table Tennis, Skills, Drills And Strategies, Human Kinetics Publishers, United States Of America.
- 9- **Donald Porker & David Hewitt (2003):** Play The Game Table Tennis, British Library Cataloguing, Bland ford, London.
- 10- **Sherif Fathy Ahmed (2001):** a program to improve the loop hit performance using the backward of the racquet in table tennis sport in light of the kinematic characteristics, a Ph. D. thesis, Physical Education Faculty, Tanta University.
- 11- **Anderson Mikhail (2009):** ITTF High Performance, 6 – 13 June, Cairo, Egypt.
- 12- **Larry Thomans (2005):** Newgy Rob Pong Coaching: 10 Quick Tips to Better Table Tennis, Human Kinetics Publishers, Inc, United States Of America.
- 13- **Larry Hodges (2008):** Table Tennis: Steps To Success, 2nd ed., Human Kinetics Publishers, Inc, United States Of America.
- 14- **Jan – Ove Waldner (2005):** J – O Waldner, When The Felling Decides, Human

Kinetics Publishers, Inc,  
United States Of America.

15- **Zoltan Berczik (2002):**  
The Second Competition  
Period, Butterfly World  
Report: Jan. No. 97, Kimihiko  
Tomasu Publisher, Tokyo,  
Japan.

16- **Michel Gadai (2002):**  
Train To Win, Learn And  
Teach Top Level Table Tennis,  
Ottawa, Ontario.

17- **David Hewitt (2004):**  
How To Coach Table Tennis,  
The National Coaching  
Foundation, William Collins &  
Sons Ltd, London.