Effects of Specific Exercises on Motor Response Speed for Saber Fencers

Dr. Salman Hussain Hajji Mohammad

Associate Professor – Faculty of Basic Education – Department of Physical Education and Sport – General Organization for Applied Education and Training.
salman-hajji@hotmail.com

Abstract: The current research aims to identify the effects of specific exercises for arms and legs on improving motor response speed due to its importance in saber fencers. The researcher used the experimental approach (two-group design) with pre- and post-measurements. Research community included all fencers of Al-Quadesia Sports Club (n=76). The researcher recruited (30) fencers for the main application and divided them into two equivalent groups (experimental = control = 15). Another (16) fencers were recruited for the pilot study. Results indicated that: (1) Specific exercises had positive effects on improving motor response speed of the armed arm. (2) Specific exercises had positive effects on improving motor response speed of the armed arm with advance. (3) Specific exercises had positive effects on improving motor response speed of the lunge.
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Key words: Motor Response – Saber – Fencing – Specific Exercises**.**

1. Introduction:

Fencing is a sport characterized by high speed due to continuous change of playing situations in attack and defense, that require the fencer to respond quickly to the competitive situation. Each fencer has a specific style and, in most cases, this style changes according to opponent's reactions. Therefore, the fencer should respond quickly to these reactions to confuse the opponent and open a gap for a touch.

Fencing matches are characterized by continuous movement and quick blitz performance. Therefore, the fencer should perform attack and defense skills more quickly than the opponent in time to win (Salah El-Din, E. 2000: 18).

Modern trends appeared in sports training, including specific training. This type of training is highly specific in improving technical and physical performance, qualitatively and quantitatively in addition to improving accurate timing of performance according to simultaneous use of muscle groups inside the technical/physical performance of the specific sports activity (Hussam El-Din, T. et al 1993: 11).

Technical performance is better improved if training is more specific to the sports activity as it includes working muscles to improve the muscles at the same way it is used in competition with the same speed and the same energy sources (Al-Nemr, A. & Al-Khateeb, N. 2000: 295).

In designing training programs, coaches should include specific exercises similar to motor performance demands of the game using the same muscular groups at the general direction of the game itself on the physical, technical and tactical aspects. In addition, training process should concentrate on specific requirements of performance physiologically, technically and tactically. The coach should plan training concentrating on improving performance-related energy systems in the specific activity in addition to using specific exercises to improve basic skills of the game and working muscles in different performances (Abu Zaid E. 2000: 162-163).

Specific exercises completely match competitive movement patterns in force, time and path curves. It is directed to major working muscle groups. Simulation exercises are considered specific as it is used for improving technique that includes various movement patterns like those including basic technical stages. The more skills are included in the activity, the more specific exercises exist for that activity (Abd Al-Maksoud, E. 1997: 162-163).

Reaction speed should gain more attention when specializing in sports activities that require spontaneous response to an act pre-conditioned by a specific clue or situation (Alaa El-Din, G. & Al-Sabbagh, N. 2007: 224-225).

Specific exercises are considered highly specialized as it takes the characteristics of sports technique. These exercises are similar to technical performance considering force and muscular work.

The researcher thinks that the nature of fencing performance requires the fencer to be always alert to respond to his/her opponent's movements that sometimes are unpredictable. Therefore, the fencer should perform movements quickly and accurately without being predicted by the opponent. The coach should consider that and work on improving reaction speed of the fencer to deal with the competitive situation successfully.

Performance speed in fencing depends on game situations as the nature of performance is characterized by speed in various attack patterns and renewing attack while this speed decreases in other situations like preparation for attack or careful thinking and planning (Haggag, H. & Al-Tanbouli, R. 1999: 20).

Competitive fencing requires the fencer to be quick, accurate with fast reactions and endurance. Therefore, training should improve general motor abilities just like fencing techniques (Harmenberg 2008: 12).

Like all other sports, fencing requires a complete set of physical qualities including speed, quick reaction, speed strength, muscular strength, agility, endurance, accuracy and coordination (Morris et al 2007: 187).

Fencing requires quick motor response to a stimulus in the least time possible at the same moment when this stimulus appears or immediately after its appearance. Delayed perception of this stimulus increases response time. This is called reaction speed. Increasing speed exercises that involve the nervous system leads to facilitating neural signal transmission and this improves reaction time (Abdin, G. 1984: 16).

Fencing requires speed with a suitable degree that conforms with performance that is characterized by attack, defense, faints and quick blade work in accompaniment of body movements. Regular training is required to improve speed due to its significant effects on game results. A clear proof of that is the case of two equal opponents in all technical aspects. The faster fencer will win the touch before his/her opponent. Speed here means motor response speed that combines reaction speed and motor speed (Gebril, F. et al 2000: 24) (Abd Al-Aziz, I. 2003: 38) (Salem, M. & Salem, T. 1995: 41-42).

Fencing requires speed as the fast fencer has superior performance. Speed here means motor response speed that combines reaction speed and motor speed. Regular training is required to improve speed due to its significant effects on game results. This clearly shows the importance of speed for technical performance in fencing as it is considered a basic and major element for fencers. (Abd Al-Aziz, I. 1999: 38).

According to experts' opinions in sport in general, and especially in fencing, motor response speed and accuracy play a major role in fencing. Considering the researcher's work in the field of fencing, he noticed a major decrease in the performance level of foot work and arm movements during attack and defense, especially for beginners. These movement are basic skills in fencing. This led the researcher to try to identify the effects of specific exercises for arms and legs on motor response speed due to its importance in fencing.

Aim:

The current research aims to identify the effects of specific exercises for arms and legs on improving motor response speed due to its importance in saber fencers.

Hypotheses:

1. There are statistically significant differences between the pre- and post-measurements of the control group on motor response speed in favor of post-measurements.
2. There are statistically significant differences between the pre- and post-measurements of the experimental group on motor response speed in favor of post-measurements.
3. There are statistically significant differences between the post-measurements of the control and experimental groups on motor response speed in favor of the experimental group.

2. Methods:

Approach:

The researcher used the experimental approach (two-group design) with pre- and post-measurements.

Participants:

Research community included all fencers of Al-Quadesia Sports Club (n=76). The researcher recruited (30) fencers for the main application and divided them into two equivalent groups (experimental = control = 15). Another (16) fencers were recruited for the pilot study.

Table (1): Categorizing Participants (n=40)

Main Sample				**Pilot Study**		**Community**	
Experimental		**Control**					
Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
15	19.7%	15	19.7%	8	10.5%	76	100%

The researcher homogenized participants for growth factors (age – height – weight) and training experience.

Table (2) indicated that squewness values were between (±3). This proves participants' homogeneity.

Table (2): Participants' homogeneity on growth factors and training experience (n1 = n2 = 15).

S	Variable	Measurement	Mean	SD	Median	Squewness
1	Age	Year	20.036	.4287	20.00	.574
2	Height	Cm	1.781	7.920	1.790	.124
3	Weight	Kg	66.33	3.467	67.00	-.179-
4	Training experience	Year	3.006	.0449	3.00	2.76

Table (3) indicated that squewness values were between (±3). This proves participants' homogeneity.

Table (3): Participants' homogeneity on motor response speed (n1 = n2 = 15).

♀	Variable	Mean	SD	Median	Squewness
1	Response speed for armed arm extension	.4343	.06683	.4200	.720
2	Response speed for armed arm extension and advance	.4713	.06039	.4750	.144
3	Response speed for lunge	.5410	.05904	.5100	1.039

Table (4) clearly showed no statistically significant differences between the two groups on all measured variables and this proves homogeneity of participants.

Table (4): Difference significance between the experimental and control groups on growth factors, training experience and motor response speed (n1 = n2 = 15)

Variable	Measurement	Mean	SD	Mean	SD	(t)	P
Age	Year	20.03	.5246	20.04	.324	0.042	0.967
Height	Cm	175.87	8.157	180.40	7.238	1.610	0.119
Weight	Kg	66.26	3.594	66.40	3.459	0.103	0.918
Training experience	Year	3.01	.0516	3.00	.0378	0.807	0.426
Response speed for armed arm extension	Sec	.44	.0613	.428	.0735	0.512	0.612
Response speed for armed arm extension and advance	Sec	.473	.0468	.469	.0731	0.178	0.860
Response speed for lunge	Sec	.548	.0588	.534	.0604	0.643	0.526

Pilot Study:

The researcher recruited (16) fencers from the same research community and outside the main sample to participate in the pilot study. The study aimed to verify the suitability of tests used in this research and validate tools and equipment in addition to training assistants on measurement protocol and identifying duration of measurement.

Furthermore, the study aimed to prove the reliability and validity of the following tests:

- Motor response speed with extension of the armed arm (sec)
- Motor response speed with extension of the armed arm and advance (sec)
- Motor response speed with lunge (sec)

The study was performed from 15-12-2018 to 17-12-2018.

Tests validity:

To calculate validity, the researcher used distinct validity procedure. The researcher used two equivalent groups (distinct = non-distinct = 8).

Table (5): Validity of Tests (n1 = n2 = 8)

S	Variable	Measurement	Distinct (n=8)		Non-distinct (n=8)		Means Difference	(t)	P
			Mean	SD	Mean	SD			
1	Response speed for armed arm extension	Sec	0.33	0.04	0.423	0.09	0.093	2.56	0.022
2	Response speed for armed arm extension and advance	Sec	0.35	0.04	0.445	0.088	0.087	2.52	0.024
3	Response speed for lunge	Sec	0.46	0.05	0.55	0.074	0.085	2.53	0.020

Table (5) indicated statistically significant differences between the distinct and non-distinct groups on $P \leq 0.05$. this proves tests validity.

Tests Reliability:

To calculate reliability, the researcher used test/retest procedure with time interval of (48) hours between test and retest.

Table (6): Reliability of tests using test/retest procedure (n=8).

S	Variable	Measurement	Test		Retest		R	P
			Mean	SD	Mean	SD		
1	Response speed for armed arm extension	Sec	0.423	0.09	0.425	0.09	0.996*	0.00
2	Response speed for armed arm extension and advance	Sec	0.445	0.088	0.443	0.082	0.99*	0.00
3	Response speed for lunge	Sec	0.55	0.074	0.546	0.072	0.991*	0.00

Table (6) indicates statistically significant correlations between test and retest on $P \leq 0.05$. this proves reliability of test.

3. Results:

Table (7) showed statistically significant differences between the pre- and post-measurements on the tested variables (Response speed for armed arm extension - Response speed for armed arm extension and advance - Response speed for lunge) on $P \leq 0.05$ in favor of the post-measurements of the control group.

Table (7): Difference Significance between the pre- and post-measurements of the control group on tested variable (n = 15)

S	Variable	Measurement	Pre-		Post-		(t)	P
			Mean	SD	Mean	SD		
1	Response speed for armed arm extension	Sec	0.44	0.061	0.40	0.06	19.07	0.00
2	Response speed for armed arm extension and advance	Sec	0.47	0.046	0.42	0.04	13.20	0.00
3	Response speed for lunge	Sec	0.54	0.058	0.50	0.05	10.95	0.00

Table (8) showed statistically significant differences between the pre- and post-measurements on the tested variables (Response speed for armed arm extension - Response speed for armed arm extension and advance - Response speed for lunge) on $P \leq 0.05$ in favor of the post-measurements of the experimental group.

Table (8): Difference Significance between the pre- and post-measurements of the experimental group on tested variable (n = 15)

S	Variable	Measurement	Pre-		Post-		(t)	P
			Mean	SD	Mean	SD		
1	Response speed for armed arm extension	Sec	0.42	0.073	0.35	0.05	8.12	0.00
2	Response speed for armed arm extension and advance	Sec	0.46	0.073	0.38	0.05	12.23	0.00
3	Response speed for lunge	Sec	0.534	0.060	0.47	0.037	7.86	0.00

Table (9) showed statistically significant differences between the post-measurements of the control and experimental groups on the tested variables (Response speed for armed arm extension - Response speed for armed arm extension and advance - Response speed for lunge) on $P \leq 0.05$ in favor of the post-measurements of the experimental group.

Table (9): Difference Significance between the post-measurements of the control and experimental group on tested variable (n1 = n2 = 15)

S	Variable	Measurement	Control		Experimental		(t)	P
			Mean	SD	Mean	SD		
1	Response speed for armed arm extension	Sec	0.40	0.06	0.35	0.05	2.097	0.045
2	Response speed for armed arm extension and advance	Sec	0.42	0.04	0.38	0.05	2.258	0.032
3	Response speed for lunge	Sec	0.50	0.05	0.47	0.03	2.083	0.047

Table (10) indicated that improvement percentages between pre- and post-measurements of the control group ranged from (10.6%) (Response speed for armed arm extension) to (7.4%) (Response speed for lunge).

Table (10): Improvement percentages between pre- and post-measurements of the control group (n = 15)

S	Variable	Measurement	Pre-	Post-	Improvement (%)
1	Response speed for armed arm extension	Sec	0.44	0.40	9.09 %
2	Response speed for armed arm extension	Sec	0.47	0.42	10.6%
3	Response speed for armed arm extension and advance	Sec	0.54	0.50	7.4 %

Table (11) indicated that improvement percentages between pre- and post-measurements of the experimental group ranged from (17.4%) (Response speed for armed arm extension) to (11.99%) (Response speed for lunge).

Table (11): Improvement percentages between pre- and post-measurements of the experimental group (n = 15)

S	Variable	Measurement	Pre-	Post-	Improvement (%)
1	Response speed for armed arm extension	Sec	0.42	0.35	16.7%
2	Response speed for armed arm extension	Sec	0.46	0.38	17.4 %
3	Response speed for armed arm extension and advance	Sec	0.534	0.47	11.99 %

Table (12) indicated that improvement percentages between post-measurements of the control and experimental group ranged from (7.61%) (Response speed for armed arm extension) to (4.6%) (Response speed for lunge) in favor of the experimental group.

Table (12): Improvement percentages between post-measurements of the control and experimental group (n1 = n2 = 15)

S	Variable	Control	Experimental	Difference in improvement percentages
1	Response speed for armed arm extension	9.09 %	16.7%	7.61 %
2	Response speed for armed arm extension	10.6%	17.4 %	6.8 %
3	Response speed for armed arm extension and advance	7.4 %	11.99 %	4.6 %

4. Discussion:

Table (7) showed statistically significant differences between the pre- and post-measurements on the tested variables (Response speed for armed arm extension - Response speed for armed arm extension and advance - Response speed for lunge) on $P \leq 0.05$ in favor of the post-measurements of the control group. The researcher thinks that this improvement is due to the regular training program followed by the control group. This is consistent with Salah El-Din, E. (2000) in that fencing requires motor response speed so the the fencer can keep up with his opponent in the least time possible to open a gap and win a touch. Therefore, motor response speed should be improved.

Al-Khakani, B. (2007) indicated that modern fencing depends motor response speed to achieve winning through touching the opponent along the suitable range of motion. The less the time required for approach, the more the fencer can achieve a touch.

Table (8) showed statistically significant differences between the pre- and post-measurements on the tested variables (Response speed for armed arm extension - Response speed for armed arm extension and advance - Response speed for lunge) on $P \leq 0.05$ in favor of the post-measurements of the experimental group. The researcher thinks that this improvement is due to the use of specific exercises as they are similar to the motor path and duration of basic fencing skills. This is consistent with Al-Nemr, A. & Al-Khateeb, N.

(1996) and Hussam El-Din, T. et al (1993) in that specific exercises improve technical performance and the ability to perform technical basic skills effectively.

Bower, M. (1990) and Abd Al-Rahman, O. (1994) indicated that the fencer should master various basic skills and perform them automatically without thinking in them so that he/she can focus on initiating, changing and modifying tactics in time to achieve the touch.

Table (9) showed statistically significant differences between the post-measurements of the control and experimental groups on the tested variables (Response speed for armed arm extension - Response speed for armed arm extension and advance - Response speed for lunge) on $P \leq 0.05$ in favor of the post-measurements of the experimental group. The researcher thinks that this improvement is due to the use of specific exercises as he considered the time frame of performance so that the motor performance is initiated accurately in time with correct technical performance. Abd Al-Maksoud, E. (1997) indicated that specific exercises under different conditions represent a major tool for improving physical and technical performance levels due to close similarities between motor coordination of the exercise and the motor path of the skill used in competition.

Kristy Brouland (2008) indicated the importance of specific training performed in a similar timeframe to real performance.

Table (10) indicated that improvement percentages between pre- and post-measurements of the control group ranged from (10.6%) (Response speed for armed arm extension) to (7.4%) (Response speed for lunge). The researcher thinks that this improvement is due to the use of specific exercises as during arm movements, the motor path is somehow limited compared with extension of the armed arm and lunge. With more major muscular groups involved in movement, motor response speed is affected positively. Haggag, H. & Al-Tanbouli, T. (1999) indicated that motor technical performance in most fencing skills depends on attacking the opponent suddenly. This attack requires muscular strength that bursts in a very short time. Therefore, fencing skills and movements are characterized by speed and strength. This means that the resultant of speed and strength lead to correct and effective motor performance.

Table (11) indicated that improvement percentages between pre- and post-measurements of the experimental group ranged from (17.4%) (Response speed for armed arm extension) to (11.99%) (Response speed for lunge). The researcher thinks that this improvement is due to the use of specific exercises that progressed from easy to difficult according to participants' abilities and led to improving motor response speed. Mahmoud, M. (1993) indicated that specific exercises similar to performance play a major role in teaching and improving technical performance. To increase its effectiveness, these exercises should be performed according to the motor path of the skill to be trained. Working muscle groups should be involved progressively from easy to difficult.

Table (12) indicated that improvement percentages between post-measurements of the control and experimental group ranged from (7.61%) (Response speed for armed arm extension) to (4.6%) (Response speed for lunge) in favor of the experimental group. The researcher thinks that this improvement is due to the use of specific exercises as these exercises had a significantly higher effect compared to regular exercises used by the control group. This is consistent with Salah Asran (1992) and Fawzy, N. (1996) who indicated that specific motor abilities improved with specific exercises performed according to the nature of the motor skills and along the same motor path.

Conclusions:

According to this research aims, hypotheses, methods and results, the researcher concluded the following:

1. Specific exercises had positive effects on improving motor response speed of the armed arm.
2. Specific exercises had positive effects on improving motor response speed of the armed arm with advance.
3. Specific exercises had positive effects on improving motor response speed of the lunge.

Recommendations:

According to these conclusions, the researcher recommends the following:

1. It is important to use specific exercises in general.
2. Specific exercises should be used for improving motor response speed of saber fencers.
3. Performing similar studies on foil and epee fencers.

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