

# Sense kinesthetic training and electrical stimulation and their effect in neuro-muscular adaptation and the accuracy of stabbing youth with a fencing sword

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## Abstract

Dynamic sensory training and electrical stimulation have an important role to play in fencing because it is a sport based on the sudden change of the body's position in the performance of its skill and the speed of change from the attack to the defense, which requires the preparation of exercises related to the spatial and temporal field and change of angles, strength, compatibility and consistency between the central and decentralized contractions required to perform and implement the skills with the accuracy required for fencing sword players in the skill of stabbing. Using electrical stimulation to improve muscle electrical activity to influence improved neuromuscular adjustment and accuracy of stabbing with a sword fencing weapon, the research was carried out on a sample of young fencing sword players, research variables for neuromuscular adjustment and electrical activity of working muscles were measured, and the experimental group underwent motor sensor training and electrical stimulation of 24 training units over an 8-week period of 3 training units per week, and the results of the research resulted in improved speed compatibility between the man and the arm of the bowl. The efficiency of the propulsion, the compatibility of the corners of the body parts, the motor compatibility and the accuracy of the stab for the experimental group.

**Keywords:** Kinetic sense, propulsion efficiency, angle compatibility, neuromuscular adjustment.

and mechanical conditions and good achievement.

Most studies on the study of the causes of movement have indicated the importance of linking these (forces) internally with corresponding external resistances to the impact on athletic performance, and have tried to emphasize the external description of the movement after the internal processes associated with performance have been understood. This means a careful study that includes the internal interaction of muscles, ligaments and tendons as internal forces, and the accompanying neurological adaptation. Training the abilities of the sense of mobility and performance analysis and

## Introduction

The significant development in sports achievements in most countries of the world for various games demonstrates progress in the good connection between different sciences for the purpose of saving at the time and strengthening the technical foundations of sports skill according to the physical requirements and the need to enhance the importance of each ability in achieving the final achievement by treating the physical abilities and mechanical conditions and even physical measurements to predict their results and determine the requirements of this game to suit these capabilities

preparation of special training for the purpose of improving and developing it in proportion to the special performance of the duels.

The neuromuscular compatibility supports control of the free arm movement of duels during the stand-up and the ensuing Motor consistency at the stretch of the shoulder with the bend of the elbow up and the work of a circle by hand, forearm and antibody with the head with no hand contact with the head and this arm is in a state of relaxation, and these references did not measure the effect of improved neuromuscular compatibility and the possibility of its effect on the traditional situation during attack or return to standby (Sciascia, Cromwell and Uhl, 2017).

The researcher wonders that through the above, did improving motor sensory perceptions by preparing special exercises and using electrical stimulation develops the amount of neuromuscular compatibility, electrical activity of the muscles and the technical performance of the duels when challenging the sword and why not use it by many players?

By looking at previous studies and the information network, the researcher noted that most of the studies dealing with fencing as far as they know did not address the effect of motor sensory exercises and the use of electrical stimulation of muscles working to improve the neuromuscular compatibility required to achieve the effectiveness of skill performance and accuracy in the sword of fencing. (94: 86) Some variables have addressed biomechanics without applying special exercises, which prompted the researcher to conduct this study in an attempt to clarify the effects of motor sensory exercises and electrical stimulation in these conditions on the effectiveness of the accuracy of the performance of skill and neuromuscular compatibility during the stabbing of

identifying defects or characteristics of the technique used by the athlete plays a key role in the training of the coach or player in upgrading the capabilities of neuromuscular compatibility and electrical activity commensurate with the nature of the movements and skills of the players sword fencing, in order to improve neuromuscular compatibility and with the help of electrical stimulation the accuracy of the stab and increase electrical activity in the muscle groups working when the player himself performs the technique.

Therefore, the researcher believes that the training of motor sense and electrical stimulation has an important and effective role in the sport of fencing because it is a sport based on the sudden change of the position of the body in the performance of its skill and the speed of change from the attack to the defense, which requires the effect of preparing exercises related to the spatial and temporal field and change of angles and strength and compatibility and consistency between the central and decentralized contractions required to perform and implement the precision skills required for the players sword duel in the skill of stabbing.

The stabbing movement is the backbone of the fencing sword game, it is one of the basic movements that leads to stability and movement, and this movement is carried out by extending the armed arm with the front man (commander) forward and one time towards the opponent's goal, with the rear man and the free arm extended simultaneously as well and in the opposite direction to the arm Armed, for the purpose of reaching the goal, this movement should be available with accuracy with speed in the akala and this requires a neuromuscular compatibility based on the upgrading of the capabilities of the sense of the field of movement, its time and strength, which requires the

requires a neuromuscular compatibility based on high efficiency in the motor system in all its parts (muscular, nervous, joint and muscle strength....) so it is important to use special exercises for the muscular work associated with technical performance and duty, namely motor sensory exercises and electrical neurostimulation to achieve this purpose (Athab and Hassan, 2010).

### Research objectives

1. Recognition of neuromuscular abilities, motor sensory abilities and the electrical activity of the muscles of fencing sword players.
2. Preparing motor sensory exercises and electrical stimulation.
3. Identify the effect of exercises on neural compatibility and the accuracy of the appeal or not for the two research groups.

### Hypothesis

1. There are statistically significant differences between tribal and remote tests in neuromuscular compatibility and indicators of muscle electrical activity. For my search group.
2. There are statistically significant differences between tribal and remote tests of the accuracy of the appeal of the two research groups.
3. There are statistically significant differences between the remote tests of search variables between the two search groups.

### The methodology and note puppies

The researcher used the experimental method to suit the nature of the research, designed the two quantitating, and the research sample was selected from a player who is a fencing weapon and they represent a deliberate sample of under (20) years

the players sword fencing and its association with adaptation Muscle function and training design for muscle strength to achieve high efficiency in technique followed in accordance with scientific conditions. The movement of the challenge to the sport of sword fencing can be considered the product of the transformation of energy during the progress the lower end (the two men) and the required momentary strength, ability and high speed (through the upper end and torso) at the moment of appeal and with the required care and accuracy.

Recent studies indicate that there are two forms of functional adjustments that support traditional strength training and lead to specific skill status, the first of which is that strength training may either lead to the strengthening of muscle constriction in the same protein threads that make up the muscle. The second is that training may lead to the development of neurotransmitters causing muscle contraction or the development of the constriction-based muscle group (Alsayigh, Athab and Firas, 2017).

The current study focused on the mechanisms of neuromuscular adjustment that produce motor sensory capacity training and electrical stimulation. As neuromotor cells form the last ring in the spinal cord and are directly related to muscle fibers that perform mutual muscle contractions appropriate to achieve the motor goal.

The researcher believes that this training method needs the scientific experience of the applied field to prove its effectiveness through the results of this study, in order to be available to coaches and players to raise the level of Iraqi fencing players for this event to achieve an Asian, international or Olympic medal as long as we dream of achieving it. These special exercises have not been applied to the players of this event, which

for the year 2021, and in order to avoid factors affecting the results of the experiment, the researchers found the homogeneity of the research sample by the difference factor, as shown in table (1).

**Table 1.** Homogeneity of the search sample

S	Variable	Unit of measurement	Mean	Standard deviation	Broker	Convolution
1	age	month	193.93	7.37	192	0.78
2	weight	Kg	63.10	7	7.67	0.62
3	High	poison	170.9	2.89	170	0.93

working muscles were identified as follows (Cojocariu and Abalasei, 2014):

**Neuromuscular compatibility measurements with mechanical allowance:**

- Measuring the relative speed compatibility between the armed arm and the leading man at the moment of the stabbing.) The difference between the two speeds).
- Measure the efficiency of momentary thrust between arm and torso with instant momentary payment of the two men at the moment of launch. (The sum of the momentary force of the torso and arm is divided by the momentary strength of the two men.)
- Differences in the absolute angles of the body sections at the moment of payment (main section) which are differences in higher and lower angle values so that the result is between (0-10 degrees) (express and hip:) for the following parts: ankle angle (angle of thrust) (angel

of age from the players of the Center for The Care of Sports Talent Athletics under the Ministry of Youth and was the research community (10) Players representing the total research community of players of the Specialized School for The Care of Sports Talent of the Ministry of Youth,

The sample was then divided into two groups in a random manner (pumpkin) of each group (5) players.

The researcher used foreign and Arab sources and the International Information Network, observation and experimentation, and personal interview with experts and specialists in fencing, tests and measurements, as means of collecting information. They also used a 22-legal fencing weapon and three Japanese-made casiosat a speed of 120 images/s, and kinovea 0.8.7 kinovea 0.7 to analyze movements and identify neuromuscular indicators with biomechanical allowances. J-Kea, beurer digital TENS/EMS, EMG and accessories (attached notes), and added weights in the form of belts or a different-weights (200g to 5kg)

The researchers conducted a reconnaissance experiment on January 17, 2021 on players from the research sample to identify the obstacles and difficulties that may arise when conducting the main experiment tests with the aim of overcoming them and training the auxiliary team. The most important tests of neuromuscular compatibility and special sensory abilities and the measurement of indicators of electrical activity of some

and follow-up camera for electrical analysis of the muscle.

Tribal tests were conducted on (20

January 2021) and then the special exercises were carried out and implemented, and then the special exercises were applied taking into account the following considerations that the exercises should provide different motor experiences for the player, and the performance of movements should be limited to body weight only at the outset, and after the player acquires more motor skill added to it some resistance (such as a weight-laden jacket, medical balls, throwing balls,...) To teach the body how to control dynamic movements, movements are performed on several levels and not limited to one level (e.g. stabbing and returning at a linear level as attack movements, as well as the player must repeat the exercise and work on both sides of the body equally. (Note the supplement 3) The exercises lasted eight weeks from (23/1 to 18 March 2021) carried out 24 units, up to (3) training units per week. The training included the development of special physical aspects related to the performance of the stabbing movement and the use of the stimulation device, which can contribute to the development of the level of neuromuscular efficiency and accuracy in the sample members (ATHAB, 1818).

- Discussion of the results

**Table 2.** Statistical Results of Differences between tribal and Remote Test Results of the Two Groups

ology)(angle of thigh)(corner of the torso).

- Test control of body movements and change of direction: assess the player's compatibility of movement in general by conducting a sting test and changing direction in a stadium not less than 15 m × 15 m and transporting the player on lines in the form of the letter Showman the supplement and give two attempts for each laboratory.
- Challenge accuracy test: To measure the accuracy of the shot with the movement of the duel appeal specifically represents the legal objective of the shish weapon with the presence of an electric duel device, and only successful attempts are recorded which are determined by matching the instructions (be by the arbitrator requesting to appeal a particular number) with the place where the touch was obtained as well as the light of the lamp in the electrical system.
- - EMG electroactivity measurement test (2 pickup) of the muscle with three brachial heads and the straight femoral muscle in the stabbing phase of some working muscles, to determine the index (top) electric measured by microvolt

Tests	group	Peri. Test		Post. Test		Differ. mean	standard error	Value (t)	Rate of mistakes	Moral
		mean	Stand. dev.	mean	Stand. dev.					
Relative speed of the arm and the man	Expr.	6.03	0.701	3.31	0.477	2.72	0.277	9.808	0.000	Moral
	Contr.	6.98	0.348	5.63	0.901	1.35	0.381	3.542	0.03	Moral
Payment efficiency	Expr.	0.35	0.10	0.68	0.11	0.33	0.0758	4.351	0.001	Moral
	Contr.	0.39	0.25	0.41	0.18	0.02	0.010	1.851	0.214	non-moral

Angle compatibility	Expr.	19.25	3.67	9.58	1.25	9.67	2.921	3.31	0.003	Moral
	Contr.	21.35	4.12	20.65	3.60	0.67	0.690	0.97	0.412	non-moral
Motor compatibility	Expr.	13.80	2.35	10.65	1.58	3.15	0.698	4.51	0.004	Moral
	Contr.	14.20	3.01	13.75	3.25	0.45	0.274	1.64	0.062	non-moral
Top index of the humerus muscle	Expr.	753.57	95.1	1102.1	103.81	369.23	61.672	5.987	0.000	Moral
	Contr.	634.01	134.3	642.84	41.45	8.83	8.55	1.032	0.115	non-moral
Top index of femoral muscle	Expr.	731.85	81.61	1102.1	103.81	370.25	95.257	3.885	0.010	Moral
	Contr.	678.70	130.4	680.44	186.99	1.74	1.768	0.984	0.358	non-moral
Accuracy of the shot	Expr.	5.75	0.957	8.25	1.258	2.5	0.668	3.74	0.001	Moral
	Contr.	5.25	3.095	6.5	3.109	1.25	0.581	2.15	0.357	non-moral

\* At the freedom score (4) and the probability of error (0.05)

**Table 3.** Statistical Results of Differences between Remote Test Results between the Two Research Groups

Test	experimental		control		Differ. mean	The difference line	Value(t)	Rate of mistakes	Moral
	mean	Stand.dev.	mean	Stand.dev.					
Relative speed of the arm and the man	3.31	0.477	5.63	0.901	2.32	0.630	3.68	0.001	Moral
Payment efficiency	0.68	0.11	0.41	0.18	0.27	0.087	3.12	0.003	Moral
Angle compatibility	9.58	1.25	20.65	3.60	11.07	2.605	4.25	0.000	Moral
Motor compatibility	10.65	1.58	13.75	3.25	3.1	0.653	4.75	0.000	Moral
Top index of the humerus muscle	1122.8	154.49	642.84	41.45	479.96	77.089	6.226	0.000	Moral
Top index of femoral muscle	1102.1	103.81	680.44	186.99	421.66	81.26	5.189	0.001	Moral
Accuracy of the shot	8.25	1.258	6.5	3.109	1.75	0.507	3.45	0.002	Moral

as a result of the speed of movement "The development of muscle strength is the basis for skilled performance because it contributes to improving compatibility and agility" (Athab, 2019).

We also note that there has been an improvement in the efficiency of momentary payment, which represents the good ratio between the momentary forces of the two men during the performance of the appeal and the momentary forces of the arm and torso during the main section, which helped to develop accuracy while controlling the determination of the target area and the appropriate speed of performance quickly.

The researchers attribute the differences in the experimental group to the development of the strength of the muscles of the arms and the sense of place strength and angle required in accordance with the performance time, especially the At the freedom score (8) and the probability of error (0.05)

compatibility of movement (forearm, wrist and fingers) because the more strong the muscles of the player's arms the greater his ability to perform motor and increase the amount of control of the movement required according to its purpose, and this helped to develop the motor speed of the armed arm relative to the speed of movement of the man

impact, and the performance time is great if the goal is accuracy, "when the purpose of the movement is to obtain accuracy is essential, the performance must be slow to reduce errors"(Borysiuk, Nowicki, *et al.*, 2020).

Therefore, accuracy must be developed, the technique must be adjusted first, and speed must be developed through continuous exercise and training. Khaled Attia points out that when developing kinetic accuracy, we should use 40 percent heavier as ID. The weight of the legal weapon to develop the accuracy of the correction by the movement of the appeal because the weight of the weapon or decrease by (20%) He did not give moral results in this (Borysiuk, Nowicki 2AB, *et al.*, 2020).

The exercises used by the researcher that have created neuro-adjustment in the values of electrical activity in the top variable in the distance tests between the experimental group and the officer and for the benefit of the experimental group this is the result of training fiber build- and producing large values of strength and increasing the effectiveness of the willful muscles (Dowling, 2001). As the number of recruited units increases, the production of the force generated increases, including neurological adaptations to train resistances: increased electrical activity of the muscle (EMG), increased duration of motor unit activity, and increased viability of momentary motor units in the case of explosive force, Improving the compatibility of ant muscular groups (muscles working to move the joint in the opposite direction), improving compatibility within the motor unit (Borysiuk, Nowicki, *et al.*, 2020), improving the recruitment of high-threshold motor units, some motor units are difficult to stimulate compared to other units, it is difficult to activate high-threshold motor units,

We note here that the compatibility of the main corners of the body parts working with performance went with the least differences between them in order to achieve the optimal position to apply the force and speed required according to the requirements of skill and this was the result of the exposure of this group to the training of the ability of mobility and electrical stimulation associated with skill performance. (Frank Wahab:2019: 189)

It should be noted that the degree of motor compatibility of the test depended mainly on muscle strength, including rapid strength, which has to do with sensory perceptions of the amounts of strength and the sense of the place and time of the performance of the movements of the legs and arms and the consistency between them, as barrow and MC stressed that "muscle strength is one of the dynamic factors of motor performance and it is the cause of progress in it." The development of another dynamic characteristic at the same time" (Kinesthetic:2004:159).

The results showed that there is no moral difference between the tribal and remote tests in the accuracy of the shot by stabbing movement, and the researcher attributes that the reason that the development of accuracy through the training of the distinctive force at speed takes a long time, so did not show the increase morally because of the insufficient training time specified for the training method in the development of accuracy where he asserts, (Scheetz)"accuracy training develops speed by a certain percentage but speed training does not develop accuracy"(Athab and Alsayigh, 2021). Accuracy is an important foundation for learning and mastering sports motor skills in general and basic skills for fencing in particular. When doing something very quickly, the output of the work is with little accuracy and less

4. The results of the electrical activity indicators were positive for the research sample after applying the kinesthetic and electrical stimulation exercises.
5. A development appeared in the shooting accuracy index as a result of deciding the sensory-kinetic perceptions and the physical abilities of the research sample.

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as the strongest and most capable, and there are two types of neuro-adjustment improving the recruitment of high-threshold motor units and increasing their duration(Fong, 2014).

From the advanced results, the researchers confirm the link between the strength of speed and its development, skill performance and offensive skills in fencing, there is a close correlation between the motor skills and physical characteristics acquired by the player in the training process(Harmenberget *al.*, 1991).

The results of this study showed and emphasized the importance of training the abilities of mobility and electrical stimulation and its association with offensive skills and skill performance in fencing and agreed with the opinion(Hayward and Kerley, 2009)and that muscle strength is the first factor to succeed in the development of I also agreed with(Mays, 2011)that any training curriculum should include the element of muscle strength and also agree with (Mysterud and Rolandsen, 2019), who stressedthe importance of using weight exercises with the characteristic strength of speed in training young people(Nakata *et al.*, 2010).

## Conclusions

1. It appeared that there is an importance in the effect of training of sensory-motor abilities in improving the skill performance of the research sample.
2. Improving the strength characterized by speed has a clear effect on the electrical activity of the working muscles.
3. The sensory-motor training and electrical stimulation improved the compatibility of the performance angles at the moment of the challenge to the parts of the body contributing to the performance.



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