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Effect of using a (TENS) device to development some offensive basketball skills for the disabled on wheelchairs

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Abstract

One of the issues that experts in the field of sports training face, especially in training the game of basketball on wheelchairs, is that the training process takes place by relying on training the healthy part of the body of the handicapped, such as the torso and arms, without paying attention to the other parts of his body, and this is one of the scientific problems related to the applied side, which would Delaying the development of achievement for these players and herein lies the research problem. Where the research aims to use the (TENS) device on basketball players on wheelchairs and to identify the extent of the impact of this device on the development of some offensive skills in basketball for the disabled on wheelchairs. The researchers used the experimental approach, as it is one of the most widely used scientific research methods in the field of sports, and they concluded that the use of the (TENS) device has contributed to the development of their offensive skill capabilities for wheelchair basketball players, indicating that there are statistically significant discrepancies between the research results, with the experimental group benefiting. The researchers recommend the physical training and the development of the special technical aspects should be based on the use of electrical muscle stimulation and the development of special strength is necessary in the competition, in addition to controlling the nervous adaptation, which includes a high value of exercises and increasing the speed of movement during the game.

Keywords: Tens, development, offensive, basketball skills

1. Introduction

Basketball is one of the exciting and enjoyable activities for players and viewers because of its speed of performance, accuracy of skill and large number of goals, and it is the result of strenuous effort by players, coaches and researchers through cross-fertilization of ideas and mixing various special sciences in the field of sports, including physiological, biomechanical and anatomical, which is concerned with studying all that is Influential in reaching the best results by using devices in the field of sports and important auxiliary tools in teaching and training the performance of the skill and the development of special physical capabilities, and the electrical stimulation technique that works self-operated in the disabled when the body is in a state of rest.

Here lies the importance of research using the (TENS) device before the training prepared for the basketball player in wheelchairs and observing the strength of the effect of the device in terms of stimulating the motivational nerves of the muscle and increasing its strength and giving motivation to the injured muscle as it moves it in several ways in terms of the intensity of the signal, its duration and the number per second according The system that we take in the device, which works to stimulate and stimulate the motive force for it, which performs the effect of kinetic transfer from the legs to the trunk, then the arms with an external stimulus. As it sends comfortable pulses through the skin that stimulate the nerves in the area to be treated, where these signals act as a message that travels to the brain through the small nerves leading to the spinal cord and through the spinal cord and through different nerves to the brain, so the brain interprets them and then there is a reaction By the brain, many variables must be taken into account and what the athlete needs in terms of muscle strength training and muscle balance to achieve the correct technical performance that is reflected in the achievement, in light of the electrical stimulation.

1.2 Research problem

The researchers noticed the multiplicity of different methods and means of training in order to obtain the best results for the advancement and upgrading of the basketball game for the disabled, as it did not rise to the level of ambition, because this segment of players did not pay much attention to them and that the exercises used did not take into account the strength that the athlete needs. Required to properly achieve your technical performance, especially the handicapped category, which is reflected in the achievement the problem of the research lies in the fact that one of the problems facing specialists in the training process, especially in training the disabled in the game of basketball, is that the training process takes place by relying on training certain parts of the body of the handicapped, such as the torso and arms, without paying attention to other parts of his body, which may not be completely injured. It can play a role in the process of achievement and motor transfer. This is one of the most prominent scientific problems related to the applied side, which would delay the process of developing achievement for these disabled players.

1.3. Research objectives

1. Using a TENS device on wheelchair basketball players.
2. To identify the effect of the (TENS) device on developing some offensive skills in basketball for people with disabilities on wheelchairs.

1.4. Research hypothesis

1. The pre and post offensive skill assessments for the two groups show statistically significant variations.
2. There are statistically significant differences between the pre and post tests in the TENS test for the research sample in favor of the experimental group.

1.5. Research fields

The human field: Players applying to Al-Amarah Sports Club for wheelchair basketball for the 2019-2020 season.

Time field: from 11-6-2019 to 29-8-2019.

Spatial field: The inner hall of the club in which the team is training.

1.6. Define terms

Device (TENS): It is a device that stimulates the nerves through the skin and is considered harmless. It is a drug-free method for treatment and its use is small electrical signals that pass through the skin. It is considered one of the important treatment methods used in physiotherapy clinics. This device gives electric flashes through electrodes linked to wires that are connected to the skin to reduce pain and move the muscles through electrical impulses, and its sizes vary, but there are small types of it that are portable and operate with a small battery.

Variables	Control group		Experimental group		Calculated (v) value	Sig type
	Mean	Std. Deviation	Mean	Std. Deviation		
Shooting from behind the free throw line (10) throws	3.45	0.46	3.94	0.49	1.06	Non sig
Correction of the peaceful movement after the performance of the plump	4.01	0.90	4.65	0.95	1.10	Non sig
A test measuring the accuracy of scoring from stability with the hands until exhaustion of effort	5.12	0.13	5.76	1.24	1.15	Non sig

2. Research methodology and field procedures

2.1. Research Methodology: The method is the method followed by the researcher in his study of the problem to discover the truth, and that "the research problem is the one that imposes the method that can be used" (Hassan Ahmed and Susan Ali, 1999, p. 47), and the researchers used the experimental method, as it is one of the scientific research methods most used in the mathematical field, and the choice of method depends on the nature of The problem to be solved.

2.2. Community and sample research

It is meant by "the model that conducts the researcher as a whole and the focus of his work" (Majeed, Raysan Khraibet, 1987, pg. 41) [2] and that "the objectives of the research and the procedures used by the researcher determine the nature of the sample that he will choose, which represents the study community" (4), so the researchers chose their sample in a deliberate manner represented by the Maysan club team for basketball players On wheelchairs, the number of the sample on which the tests were applied reached (15) players, as this number constitutes (88.23%) of the original community of the research, which is (17) players, and (3) players who were subjected to the exploratory experiment were excluded. Following that, they were randomly split into two groups, experimental and control, with six players in each group. In order to ensure the homogeneity of the research sample members, the torsion coefficient was used among the research sample members in the variables of height, weight, chronological age, and training age, as shown in Table (1). As it turns out that the value of the torsion coefficient is confined between (-0.98 and +0.6), and this means that the research sample individuals have a normal distribution, as the torsion coefficient is confined between (+1), (Fouad Al-Lahibi Al-Sayed, 1978, p. 455-456) [3].

Table 1: Shows the homogeneity of the research sample with the torsion coefficient in the variables of height, weight, chronological age, and training age

Variables	Unit	Mean	Median	Std. Deviation	Skew Ness
Lenght	Cm	163.2	161	2.99	0.76-
Mass	Kg	64.5	66	3.1	0.81-
Age	Year	22.1	23	0.82	0.410-
Training age	Year	2.54	3	0.68	0.5+

In order to find equivalence between the two groups of the research sample, the law (T) was used for asymmetric samples, and accordingly, the researchers conducted the equivalence process in the pre-tests for some basketball skills, as it was found from the results (T) that there were no significant differences between the two groups of the research sample, when the values of (T) calculated less than the tabular (T) values of (2.57) under the level of significance (0.05) and with a degree of freedom (5), which indicates the equality of the research sample in the level of skillful performance of some offensive skills in basketball, and Table (2) shows that.

It shows the statistical parameters of the experimental and control groups in the pre-tests for the purpose of equivalence.

Note: The tabular value of (t) is at 5 degrees of freedom and the probability of error is $0.05 = (2.10)$.

2.3. Tools and devices used and means of collecting information

2.3.1 Means of collecting information:

The researchers used many scientific means to obtain the required data and facts through:

1- Studies and Research 2- International Information Network 3- Registration Form 4- Observation and Experimentation 5- Sources and References.

2.3.2 Tools and devices used in the research:

1- Measuring tape 2- Stopwatch 3- Whistle 4- Sony electronic weight scale 5- HP PAVILION laptop computer. Korean origin. With specifications: (RAM 4G – 3000 CORI PINTUM IV). 6- TENS device. 7- Special electrodes used with the device number 4. 8-Basketballs number (10). 9-Shaving machines (20). 10- 1 Casio camera, 240 frames per second, and a webcam, 60 frames per second.

2.3.3 The devices used in the research

11- TENS device

Objective of the test: Stimulates the electrical activity of the target muscles.

The tools used: a TENS device to stimulate the electrical activity of the targeted muscles, electrodes specific to the type of device used, medical alcohol, and a special razor to install the device that transmits the TENS signal.

Method of performance: After reviewing the sources and consulting the experts, the working muscles that are intended to increase the electrical activity of them were identified, which are the muscles of the torso and the right and left thighs. During the program of the special device (TENS), after that, the hair is removed from the area whose electrical activity is to be measured, and the place is cleaned with medical alcohol to ensure that skin secretions are removed from the surface to reduce the skin's resistance to the special signals and obtain a very good TENS signal. After that, the clamp was installed on the muscle, as mentioned previously, taking into account the fixation of the double clamp on the top and middle of the muscle parallel to the direction of the muscle fibers, and fixing all the connecting wires on the medical clamp to determine the movement of the wires near the clamps, as this device will work to receive the electrical

muscle by means of the wires connecting it to the clamps after that the device will send the TENS signal in the form of a signal.

2.4 Tests used in the research

First: Shooting test from behind the free throw line (10 throws): (Shaaban Ibrahim Muhammad Ibrahim, 1984, p. 178) [4].

The purpose of the test: measuring the shooting accuracy of the free throw.

The necessary tools: - basketball court, basketball goal, basketball number (2) legal performance description: -

- With the ball behind the center of the free throw line, the player assumes the shooting position.
- Each performer completes two sets, each set of five consecutive throws.
- The player is free to shoot the ball however he sees fit.
- The player leaves the place of shooting after the end of the first set, allowing another player to perform the first set and so on alternately for both players and for the rest of the players.

Test instructions

1. The player took the correct position (shooting with the ball behind the middle of the free throw).
2. Each player has the right to perform (10) throws in two groups, and each group has (5) consecutive throws
3. Each player has only one attempt.
4. Announcing the number recorded by the player to give him the ball and noting the correctness of the performance.

Test administration

- **Registered:** He calls the names first and records the results of the throws second
- **Referee:** Stands near the player, not giving him the ball, and observing the correctness of the performance

Score calculation

- For each successful throw (a ball that makes it into the basket), the player receives one point.
- When the ball misses the hoop (a missed throw), the player receives no points.
- - A player's score is equal to the sum of his (10) throws' points.
- The maximum score for the test is (10) marks.

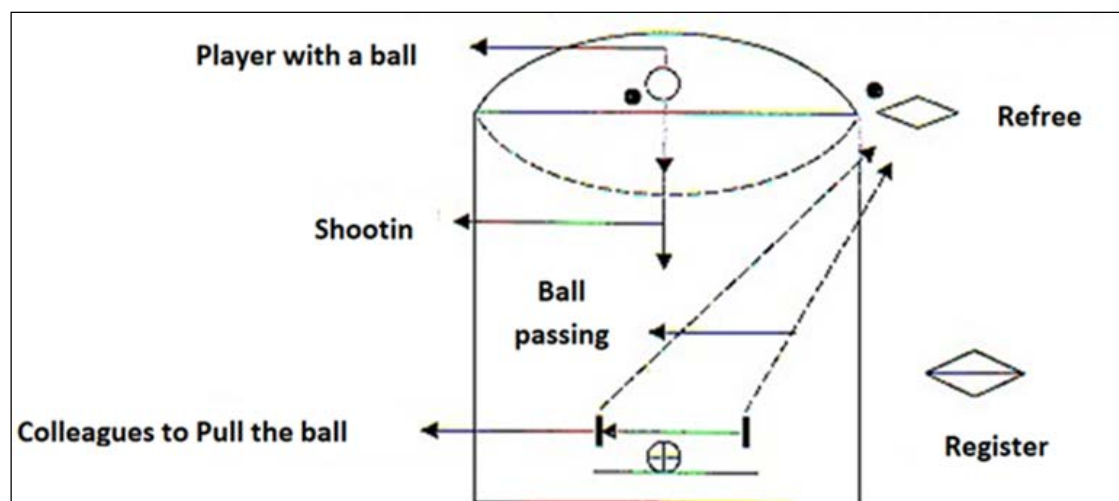


Fig 1: Shooting test from the peaceful movement after performing the tapping (Fayez Bashir Hammoudat & Muayid Abdullah Jassim, 1987, p. 234):

Objective of the test: The test aims to assess the level of accuracy of shooting after performing the dribbling skill.

Equipment and tools used: basketball, basketball goal

How to perform the test: The player performs the tapping from the middle of the basketball court towards the goal to perform the peaceful shooting from above. Registration: Each successful shooting attempt counts one point.

The highest points obtained by the tester are (10) points for each type of shooting.

Second: A test measuring the accuracy of scoring from stability with the hands until the exhaustion of the effort (performance endurance). (Muhammad, Saif Ali, 2014, p.60) [4].

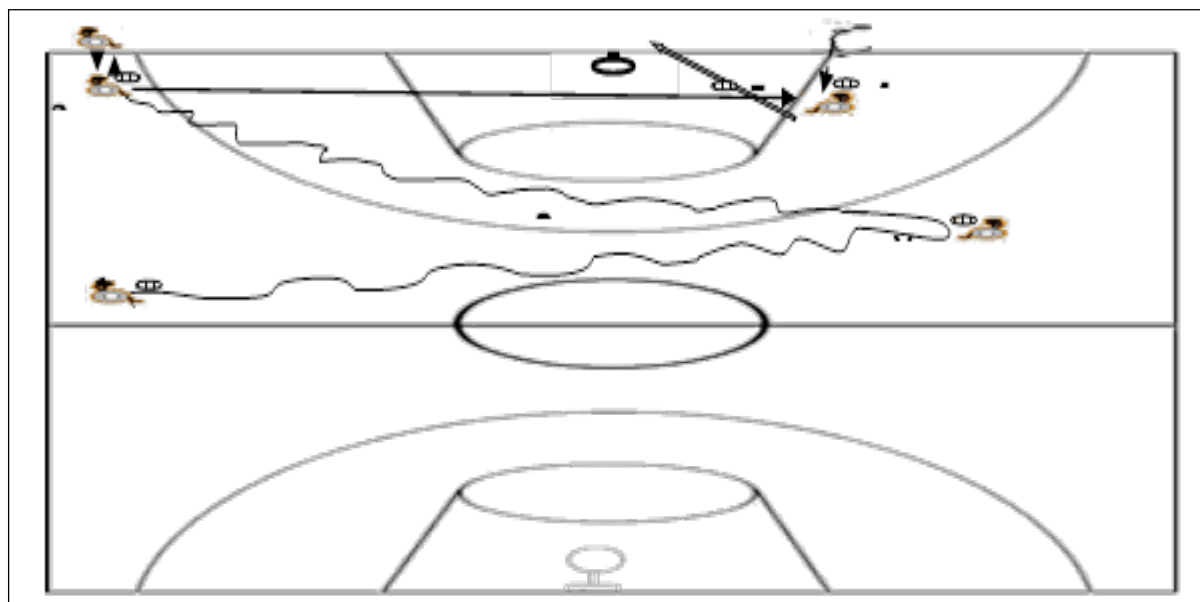
- **The name of the test:** The sword of the compound test for the performance of scoring from the stability of the hands.
- **The purpose of the test:** Measuring the accuracy of scoring from holding hands until exhaustion of effort (performance endurance).
- **Age and gender level:** Wheelchair-bound basketball players (applicants).
- **Tools used:** Basketball court, 10 basketballs,

wheelchairs, measuring tape, stopwatch, whistles, indicators.

Performance method

The player sits on the wheelchair on the middle line on the left side, at a distance of one meter from the side line. When he hears the start signal, he performs the patting process at a distance of (7.90 m) to the designated figure, who is two meters away from the side line on the right side, and performs the turn and then completes the process Al-Tabtaba for a distance of (11.90 m) to the second person, after that, he performs the chest handling five times, delivering and receiving, then cutting to the right at the specified point, a distance of (8.60 m), which is in the middle of the distance between the distance from the middle of the three-point line to the end of the field, and a meter and a half away from the inside, where he receives the balls from Trainer and direct scoring on the ring of stability with two hands.

1. Registration: counts the number of successful attempts.
2. If the ball enters directly, three degrees are given.
3. If the ball hits the square and enters, two marks are given.
4. If the ball hits the ring and enters, one point is given.
5. If the ball does not enter, zero is given.



2.5. Exploratory experience:

The exploratory experiment was conducted for the purpose of verifying the functioning of the TENS device on 11/6/2019 at 5:00 pm in Al-Amarah Sports Club on (3) players from the same research. The aim of this experiment was as follows.

- Recognizing the total time of placing electrodes on the muscles and their locations.
- The sample's understanding of the tests employed and their consistency in performance.
- How to deal with issues that might arise at work.
- Teaching the support team how to conduct and comprehend the research experiment's measurements, particularly the sequential steps required to set up the TENS device's operation and record data in the forms designed specifically for this purpose.

2.6. Pre-tests

The researchers did the pre-tests for the sample members before the testing started on 21/6/2019, and the researchers

then conducted the prepared tests on the players, who numbered 6 players from the sample, after finishing the exploratory experiment and overcoming all challenges.

2.7. The scientific basis for the tests: That all the tests used in the research are standardized tests, and were conducted in the Iraqi environment in previous studies in the game of basketball, and despite that, the validity of all tests and their suitability for the research sample has been verified by finding honesty, stability and objectivity, as follows.

2.7.1. The validity of the tests: In order for the researchers to make sure of the validity of the tests, they were presented to a group of specialists and experts (*), and the logical validity of the specialists was obtained, so that the tests that obtain the percentage of agreement on them are (75%) or more, as (Bloom) mentions, "The researcher must obtain Approval of (75%) of the opinions of the arbitrators. (Benjamin Bloom, 1983p. 126) [7].

Table 3: Shows the percentage of agreement of specialists about the tests used and the TENS device (10 experts)

N	Device name and tests	Agree	Disagree	Percentage
1	The nervous system (TENS):	8	2	80%
2	Shooting from behind the line for free throws (10 shots)	10	0	100%
3	Correction of the peaceful movement after the performance of the plump	10	0	100%
4	A test measuring the accuracy of scoring from stability with the hands until exhaustion of effort	9	1	90%

2.7.2. Test reliability

The stability of the test means the degree of coherence and accuracy with which the measurement method used can measure the phenomenon under measurement. The researchers used the test-retest method, and the researchers conducted between the two tests the simple correlation coefficient (Pearson). It turned out that the calculated correlation coefficient value reached (0.93) and thus the tests are of high reliability. (Farahat, Laila Sayed, 2002, p. 64) [8].

2.7.3. Objectivity

"Objectivity is the non-disagreement of those assessing the judgment on something or a specific topic" (Al-Bahi, Mustafa Hussein, 1999, pg. 64). Despite the tests used, they are used as a stopwatch and a measuring tape, and they are easy and clear. The researchers verified them by taking the percentage

of agreement of the aforementioned experts, which confirmed their objectivity the exams.

2.8. Post-tests: After completing the curriculum, the researchers conducted the post-tests on Wednesday corresponding to (29/8/2019) in the Al-Imarah Sports Club Hall. The researchers were keen to provide the same procedures and conditions that were surrounding the pre-tests.

2.9. Statistical Methods

The researchers used the statistical bag system (SPSS) to obtain the results of the research.

3. Presentation, analysis and discussion of the results

3.1. Presenting, analyzing and discussing the results of the tests for the control and experimental groups

Table 4: Statistical parameters and (T) value of the offensive skills variables of the control group in the pre and post test

Variables	Pre-test		Post-test		Calculated (v) value	Sig Level
	Mean	Std. Deviation	Mean	Std. Deviation		
Shooting from behind the free throw line (10) throws	3.45	0.46	5.21	1.12	3.25	0.01
Correction of the peaceful movement after the performance of the dribbling	4.01	0.90	5.86	0.96	3.14	0.02
A test measuring the accuracy of scoring from stability with the hands until exhaustion of effort	5.12	0.13	6.97	1.34	3.07	0.00

Note: The tabular value of (t) is at 5 degrees of freedom and the probability of error is 0.05 = (2.10).

Table 5: Statistical parameters and (T) value of offensive skills variables using the TENS device and for the experimental group in the pre and post test

Variables	Pre-test		Post-test		Calculated (v) value	Sig Level
	Mean	Std. Deviation	Mean	Std. Deviation		
Shooting from behind the free throw line (10) throws	3.94	0.49	8.21	1.12	7.83	0.00
Correction of the peaceful movement after the performance of the dribbling	4.65	0.98	8.86	1.66	4.88	0.02
A test measuring the accuracy of scoring from stability with the hands until exhaustion of effort	5.76	1.24	13.07	1.34	4.02	0.01

Note: The tabular value of (t) is at 5 degrees of freedom and the probability of error is 0.05 = (2.10).

Table 6: Statistical features and (T) value of offensive skills variables for the control and experimental research groups for the post-tests

Variables	Control group		Experimental group		Calculated (v) value	Sig type
	Mean	Std. Deviation	Mean	Std. Deviation		
Shooting from behind the free throw line (10) throws	5.21	1.12	8.21	1.12	3.79	0.00
Correction of the peaceful movement after the performance of the dribbling	5.86	0.96	8.86	1.66	3.31	0.00
A test measuring the accuracy of scoring from stability with the hands until exhaustion of effort	6.97	1.34	13.07	1.34	6.44	0.00

Note: The tabular value of (t) at a degree of freedom of 5 and an error probability of 0.05 = (2.77)

4. Discussion

The researchers attribute the reason for the discrepancy and difference in the results of the research to the effect of using the TENS device in an organized electrical stimulation manner before the physical effort. It has helped to recruit the largest number of motor units of the stimulating muscle and thus contributed to the effect of motor transfer from the thigh to the trunk to the extremities, and this matter does not happen

when using various exercises, including plyometric exercises and strength training. This is what the researchers inferred through the results of the tests. The use of the TENS device contributed to the production of the greatest force for the basketball player on wheelchairs, although there are always units that do not work during the production of force (maximum force, explosive force, force characterized by speed). This is indicated by the results of the electrical

activity test of the muscle in knowing the increase in the number of motor units recruited to work during the muscle contraction of the experimental group in developing offensive skills and the ability of the players to perform the tests, and this is a logical result of the superiority of the experimental group that used the TENS device (electrical stimulation). The researchers agree with what was indicated by Martin, *et al.* (1993) ^[10] that when performing a voluntary contraction, type I (slow) fibers will fire first, as for the electrical stimulation, the fibers of the second type will work first, as the electrical stimulation depends on the current that is placed externally on the nerve endings of the large motor neuron, which needs a low threshold of excitation to activate it more quickly, as well as the distance between the nerve axon and the electrode be short. (Martin L, Cometti G, Pousson M, Morlon B., 1993; 67: 457–461) ^[10].

The researchers agree with what Lexell (1983) indicated that the large motor units are often located on the surface of the muscle, and the distance between the motor units and the electrode is small, and the use demand can be changed by changing the muscle or by increasing the strength of the frequencies. (Lexell J, Henriksson-Larsen K, Sjöström M., 1983; p. 115–122) ^[11].

The researchers also agree with what was indicated by Muhammad Hassan Allawi and Abu El-Ela Ahmed Abdel-Fattah (2000) that electrical stimulation is distinguished by its ability to recruit all muscle fibers to contract at once, and this does not happen during voluntary contraction, as there always remains a part of the muscle fibers that has not contracted yet, and this part is called (power reserve).

The researchers also see that the use of the TENS device has clearly contributed to the development of the ability of basketball players on wheelchairs in the development of electrical activity of the muscles of the thighs and trunk and the maximum strength of the experimental group.

The researchers agree with what was indicated by Dania Riad Hamed (Al-Najm, Dania Riyad Hamed, 2004, p. 67) ^[12], the effect of the use of electrical stimulation on improving the electrical activity of working muscles, as well as the use of plyometric exercises.

The researchers also attribute the reason for this difference and discrepancy in the results of the research to the effect of using the (electrical stimulation) method that has helped to develop the muscular ability of the offensive motor skills, especially in the shooting test and performance endurance, as well as the development of speed through the results achieved in the skill test of shooting speed, as a result To stimulate the muscle groups that contributed significantly to the motor transfer process from (thigh to torso to hands).

The researcher agrees with what Essam Mohamed Amin and Adel Mohamed indicated that the positive effect of electrical stimulation plays an important role in raising the level of performance because it raises the rates of internal functions through stimulation of the muscle group, by the effect of the electrical stimulation device used directly in the muscles to be stimulated, thus increasing blood supply. To the position of the alert with each muscle contraction. (Essam Mohamed Amin Helmy and Adel Mohamed Zain El Din, 1987, p. 727) ^[13].

The researchers believe that these results have achieved the research hypotheses.

The researchers also believe that the use of the TENS device increases the enhancement of muscle contractions and improves voluntary control, that is, this type of training can facilitate the mechanisms of muscle contraction that the

disabled basketball player needs during the stages of offensive skill performance.

Also, the category of advanced wheelchair players was characterized by the development of functional electrical indicators (peak electrical activity) of working muscles during performance in posttests (muscle movement adaptation) and efficiency of neuromuscular functions on one hand, and on the other hand, the advantage of using these exercises is their ability to recruit a large percentage of the muscle fibers to contract, and this is what does not happen in the case of voluntary contraction, as there always remains a spare part of the muscle fibers that did not contract, in addition to the obstruction resulting from the muscle groups corresponding to the working muscles.

The researchers also claim that using the TENS device had a beneficial impact on enhancing the strength of the muscles in the trunk and arms, as well as an improvement in the compatibility of the trunk's and arms' movements during the speed of rotation on wheelchairs. This improvement was attributed to the working muscles' harmonious contractions as a result of the process of efficient exchange between stretching and muscle contraction. It aids in accelerating the motor performance of the performed workouts in the muscles, and that these exercises with the use of the device contributed to the development of the ability of the muscles in contraction and relaxation movements that depend on the performance of the movements of the basketball player, and this indicates the development of these muscles within the motor ranges of performance.

5. Conclusions and recommendations

5.1. Conclusions

1. The usage of TENS equipment has helped wheelchair basketball players improve their offensive abilities.
2. There are statistically significant differences between the results of the research and in favor of the experimental group.

5.2. Recommendations

1. The physical training and the development of the special technical aspects should be based on the use of muscular stimulation.
2. The development of special strength is essential in competition as well as neuroadaptive control which includes a high value of exercise and increased movement speed during match play.
3. Conducting studies of other basketball activities using the TENS device and monitoring the electrical activity values of working muscles.

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Appendix No. 1

T.E.N.S device, electrical muscle stimulation technology

