

The influence of compound physical exercises using a ball in the SAQ method on the concentration of lactic acid for female futsal players

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Abstract: The research significance was represented in preparing compound physical exercises supported by the ball in SAQ method, and knowing the influence of such exercises upon the concentration of lactic acid for female futsal players. The research aims at revealing the influence of compound physical exercises supported by the ball in SAQ method on (lactic acid concentration) for female futsal players. The researchers hypothesized that there are statistically significant differences among the results of pre and post tests for the two experimental and control groups in (lactic acid concentration) for the female futsal players. The research also hypothesized that there were statistically significant differences among the results of the post-tests of the two experimental and control groups in (lactic acid concentration) for the female futsal players. The researchers adopted the experimental method with two groups (experimental and control) for its suitability and the nature and research problem. The research community, represented by the Kirkuk female team for futsal for the academic year (2021_2022), was selected deliberately, and they were (16) players. As for the research sample, it was chosen randomly, which consisted of (10) players representing a percentage of (62.5%) from the research community. Therefore, they were divided into two groups, control and experimental, with (5) players for each group. The researchers have reached a set of conclusions, the most important ones are: The repetition of the compound physical exercises supported by the ball of a combined nature between physical and skill in the method of SAQ and similar to the conditions of competition and in the method of high-intensity interval training showed a positive effect in the research variable for futsal players. The effect was also shown by using the compound physical exercises using the ball in SAQ method in the training units of the female futsal players. Furthermore, similar studies were conducted on males and other age groups.

Keywords: SAQ, Lactic Acid, exercise, compound, futsal

Introduction

Futsal is one of the games that has gained a great deal of attention recently because of its popularity and large fan base. Scholars have tended to investigate it through various aspects in order to enhance the performance during matches for it is characterized by physical, skill, and strategic variables. The nature of the game exerts significant stresses on the players during competitions for several reasons: The futsal game requires a variety of skills and physical abilities, as well as narrow playing area and rules governing the play made it necessary to pay attention to rationing the workouts and performance techniques. SAQ method is one of the more recent techniques that has gained popularity. It is a training approach that aims to improve players' physical, skillful, and harmonic skills by adapting their nerve and muscular systems. This will give the female futsal player the ability to perform quick movements in multiple directions, perform various duties with a high level of fluidity, as well as perform exercises. According to SAQ method, it will enable the player to mix speed, agility and motor quickness in single exercise. This will place additional burdens on the players and will be reflected in the level of functional adaptations that will appear in various forms during the matches. (Al-Douri, 2021) cited from velmurgan & palanisamy (2012) that the exercises of such a

method result in integrated effects in many physical abilities within one training program.” (Al Douri, 2021, 22)

The performance of female futsal players throughout the match results in the accumulation of lactic acid. This acid would have an instrumental role in rationing training loads because of the adaptations it causes, especially if the training is according to the anaerobic energy system and with high stress. Training at a high intensity works to develop the player’s muscles to tolerate lactic acid, which means the development of player’s ability to withstand muscular performance resulting from the anaerobic energy system”) (Abu El-Ala, 2003, 313). Undoubtedly, the integration of performance during matches is associated with a high level of physical, skill and tactical aspects. Therefore, there must be a compatibility of the muscular responses with the neural responses necessary for the timing of complex sports skills. This necessitates the effective functioning of the neurological and muscular systems in a way that is consistent with the demands of competitive performance. As a result, the research is crucial for creating challenging physical workouts in SAQ method that are supported by a ball. In the concentration of lactic acid and knowing the effect of these exercises on the concentration of lactic acid for female futsal players in a scientific attempt to prove a training fact that those in charge of sports affairs can benefit from in general and specialists in the field of futsal in particular.

Methods and techniques

Participants

The research community, who were 16 players, was selected through the intentional method with the players of Kirkuk futsal team for the academic year (2021-2022). As for the research sample, it was chosen through the intentional method and it consisted of (10) female players, representing a percentage of (62.5%) of the research community. Thus, they were divided into two groups, experimental and control, with (5) players for each group, after excluding (6) players. Those excluded players were goalkeepers, injured and absent players.

Table (1): shows the research community and its sample, the excluded players and the percentage

Research community	Number	Percentage
Sample	10	%,62.5
Excluded players	3	18.75%
Excluded goalkeepers	3	18.75%
Total	16	100%

The tool of measurement

The Measurement of Lactic Acid (C₃H₆O₃)

The check strip is initially inserted into the strip slot after the two lithium batteries have been put into respective compartments inside the gadget. The gadget is controlled via this tape because it lacks buttons and instead relies on it. When placing this strip, a measurement should appear between (2.1-2.6 mmol/L). The measurement between these two numbers indicates that the device is sensitive to temperature and humidity and is ready to start measuring. In most cases, the device gives a measurement of 2.3 mmol/L. If a measurement of the device appears more than the specified range of the test strip or less, this would indicate that the device is incompatible with the temperature and humidity of the surrounding atmosphere. Accordingly, the device must be left for (20) minutes until the sensors at the front of the device can sense the surrounding atmosphere. Then the test strip is taken out and the calibration strip is inserted. This is found in every box of lactic acid measuring tape that has numbers between (F-0 to F-12) printed on the tape included.

The number on the inserted strip must correspond to the number displayed on the back of the lactic acid test strip packaging. In order to ensure the accuracy of the results, the tape number listed must

correspond to the tape number of the lactic acid measurement. Then the inserted strip is taken out and the third strip for measuring lactic acid (Test Strip) is inserted. The process of inserting the third strip must be preceded by placing the drill in the drill device, then sterilizing one of the fingers with sterile alcohol and wiping it well (drying it), then pressing the drill device on one of the fingertips and then pressing the side button of the drill device. This process will lead to the exit of the piercing and its penetration (puncture) of the skin, which will lead to the exit of a drop of blood placed directly on the third strip (Test Strip). This tape is located in the front slot of the device for the three tapes. A drop of blood will be placed at the end of this strip, where it will be visible, and it will need to flow from the beginning of the strip to the beginning of the region shown by a (+) sign. After the blood reaches this area, a descending measurement of the seconds will appear on the screen of the device from (59) seconds down to (1 sec) after which the measurement of the concentration of lactic acid will appear (Bishop, 52-530 2001,5) Note: A (5) minutes interval was given after completing a short performance endurance test for each player. The figure below shows an Equ Sport device to measure lactic acid.



Figure (1): Illustrate the EcoSport device for measuring lactic acid

Methods and Procedures

- SAQ method was used to prepare and design compound physical activities supported by a ball. After reviewing the scientific sources and references in the field of training science, training physiology and futsal, and in cooperation with the two supervisors, the researcher designed (18) exercises. These exercises were presented to the experienced and specialized persons according to the questionnaire form to determine what suits the research. Furthermore, (9) exercises were identified by experts and specialists.
- The pre-tests for the research variable and for the two groups (control and experimental groups) were carried out on Wednesday 2/2/2022 in the indoor games hall of the Sports Activity Department / Kirkuk.
- After completing the pre-tests for the two research groups, the researchers performed the compound physical exercises supported by the ball in SAQ method on the experimental group. The researcher took into consideration a set of points in terms of starting all training units with a general warm-up, followed by a special warm-up, using the high intensity interval training method to implement the compound physical exercises supported by the ball in SAQ method, and then implementing the compound physical exercises supported by the ball by (3) training units per week. This indicates the implementation of (24) training units during (8) weeks and in two medium courses. As for the intervals, they were given between repetitions and totals, depending on the training method adopted (high intensity interval training method) by conducting exploratory experiments carried out by the researcher and based on the pulse index. The pulse index was approximately (120-130) p/min, while the average rest time between groups was (180) seconds. The average rest time between one exercise and another was (180) seconds. The time for performing the exercises was from (10-17) seconds. The intensity used was (80-90%). The ripple of the ball-supported compound exercise load was controlled by volume change only. Also, all the exercises were carried out at the beginning of the

experimental main part and were applied from the beginning of the training unit. The total performance time for the intermediate session was (381,38) minutes, and the second intermediate session was (413,36) minutes. The ripple of the movement of the load when performing the exercises was dependent on the increase in the total training volume for each small session (1:3).

- After completing the performance of the compound physical exercises supported by the ball in SAQ method on the experimental group, the researchers conducted the post-tests for the two research groups (control and experimental) on Friday 1/4/2022 in the indoor games hall of the Sports Activity Department / Kirkuk. The researchers were keen to provide the same conditions and requirements in which the pre-tests of the sample were carried out.

Statistical means

The statistical package for social sciences (SPSS) version () was adopted for processing data to extract (arithmetic mean, standard deviation, t-test for related samples, and simple correlation (Pearson).

Results

Table (2): shows the arithmetic means, standard deviations, calculated (t) values and (sig) values for the concentration of lactic acid for the experimental and control group in the pre and posttests.

No	Statistic al parameters Skills	Measur ing unit	Calcula ted T- value	Post-test		Pre-test		Level of probab ility sig	Statisti cal significance
				Standar d deviation	arithme tic mean	Standar d deviation	arithme tic mean		
1	Experim ental	ml/lit	-9.43-	1.09	13.80	1.14	7.40	.001	Sig.
2	Controll ing	Lit /ml	-6.00-	.54	8.60	.44	6.20	.004	Sig.

*Significant if (sig) ≤ (0.05).

Table (3): shows the means, standard deviations, calculated (t) values and (sig) values for the lactic acid concentration for the control and experimental groups in the post tests.

No	Statistic al parameters Skills	Measur ing unit	Calcula ted T- value	Experimental Group		Controlling Group		Level of probab ility sig	Statisti cal significance
				Standar d deviation	arithme tic mean	Standar d deviation	arithme tic mean		
1	Lactic acid concentr ation	/ml Lit	10.61	1.09	13.80	.54	8.60	.000	Sig.

*Significant if (sig) ≤ (0.05).

Discussion

Table (2), which summarizes the findings, reveals that there was development in the experimental group during the post-test that involved complex physical exercises supported by a ball in SAQ method. The development in the level of lactic acid concentration was in favor of the post test. This is what verifies the research hypotheses, which states that there are significant differences between the pre and posttests of the experimental group. The researcher attributes this development to the exercises in which the players were trained with a high intensity according to the method of periodic training with a high intensity, in order to reach a high level of adaptation. Adaptation to training is a set of changes that occur by repeating the exercise on a regular basis” (Al-Madamgha, 2008, 28).

The changes in the organs and systems of the body of the athlete are the result of the special requirements that appear on the physical efforts on the player’s body through the exercises that she performs

depending on the volume, intensity and sequence of training. To achieve the main objective of training with this method, anaerobic energy systems are stressed in order to develop functional capabilities. When the objective of high-intensity anaerobic training was to produce lactate and train the female athletes for these exercises, such exercises would increase anaerobic glycolysis. Thus, more product to the concentration of lactic acid would be made. (Khouribet and Abdel-Fattah, 2016) confirmed “The main goal of training lactate production is to push the athlete to perform high-intensity exercises, which stimulates anaerobic glycolysis to its highest level. Naturally, this results in an increase in lactate production as a result of lactate metabolism in the absence of oxygen” (Khouribet and Abdel-Fattah, 2016, 204).

Through the above, researchers believe that anaerobic glycolysis is the ability to produce the necessary energy in the absence of oxygen, which depends on the high training loads that the player endures, which clearly affect the level of functional and physical abilities. (Hussain, 1998) confirmed that “adaptation processes depend primarily on the intensity of the stimulus, biological and physiological actions and responses that show special repercussions due to the weakness or strength of the stimulus used” (Hussain, 1998, 289). The occurrence of this development is due to the fact that anaerobic workout has clearly affected the level of achievement as a result of the physical stresses that appeared through the level of accumulation of lactic acid concentration. If the relationship was direct between the level of lactic acid concentration and intensity, this would lead the athletes to exert more efforts to endure a higher level of lactic acid concentration. (Zaher, 2011) confirmed that "there is a direct relationship between the level of lactic acid accumulation and the intensity of the exertion. The higher the performance, the higher the level of lactic acid. This is due to the acute shortage in the amount of oxygen consumed, leading to the accumulation of lactic acid." (Zaher, 2011, 177). Regarding training guidance and its legalization, (Al-Ta'i, 2022) mentions that the development of the lactic energy system must direct training from a technical point of view through rationing the components of the training load in a direction that makes the rate of lactic acid accumulation in the muscles and blood greater than the rate of its disposal. (Al-Ta'i, 2022) (268)

It is also shown from Table (3), which presents the results obtained, that there was superiority in the experimental group over the control group in the post tests of the research variable (lactic acid concentration level) to the use of compound exercises supported by the ball in SAQ method. The high intensity and anaerobic exercises and the high intensity interval training method included physiological adaptations in the experimental group players. This training method is primarily aimed at developing anaerobic abilities. The use of exercises with high intensity combined with various physical abilities has effectively affected the level of the players' abilities to endure the loads of exercises with the pressures caused by these training workouts. (Abdel-Fattah, 1994) mentioned that “in order to obtain real physiological adaptations, the athlete must organize regular and continuous training for a period of not less than 8-12 weeks” (Abdel-Fattah, 1994, 443). This is what happened to the experimental group. The players trained for 8 weeks on a regular basis and performed outstandingly in all training units, as this was evident in the level of results achieved. (Khouribet, 1997) mentioned that the process of adaptation leads to a higher level of explosive power and the ability to make great efforts the higher the level of explosive power. That is, the performance of the physical load requirements becomes easier, easier and less tiring as a result of adapting to these requirements.” (Khouribet, 1997, 336)

The use of exercises according to the anaerobic and anoxic energy system has imposed high stress on the functional organs of female futsal players. (Al-Taie, 2022) confirmed that performing lactic acid exercises imposes on the body high requirements for lack of oxygen, high rate of oxygen debt, consumption of energy sources, and a large accumulation of lactic acid in the muscles and blood” (Al-Ta'i, 2022, 265-266). The SAQ method ball-supported compound training developed anoxic capacity, which showed an increase in the level of functional efficiency to withstand the accumulation of lactic acid in the blood due to anaerobic glycolysis (anaerobic glycolysis) to rebuild the compound (ATP) inside the muscle cell with an oxygen deficit. This led to the hydrogen ion (H⁺) is released within the respiratory system and thus combines with pyruvic acid to form lactic acid. The chemical variables are the most important influences and pathways that the body follows to produce energy, where the accumulation in the muscle and blood of lactic acid is one of these variables. (Zaher, 2011) confirmed that the physiological changes associated with adaptation to anaerobic work should be observed with the lactic acid system. The ability of fast muscle fibers to break down glycogen to produce energy appears in the absence of oxygen. With prolonged training,

the amplitude of lactic anaerobic work would increase. Therefore, the concentration of lactic acid in the blood of trained athletes increases due to the increase in the amount of energy consumed by breaking down glucose without the presence of oxygen. The athlete can also withstand performance and fatigue despite the conditions of lack of oxygen and increased accumulation of lactic acid. (Zaher, 2011, 204). Hence, it shows us the ability of the effect of the compound physical exercises supported by the ball in SAQ method, which was prepared by the researcher. The time of its performance was within the anaerobic system with high intensity and incomplete rest periods with the use of the high intensity interval training method. The principle of rest is adopted in this method, which is the return of the pulse to (120-130) d/min, meaning incomplete rest. This was indicated by (Al- Madamgha, 2008) by stating that the method of using the pulse rate can help the trainer in calculating the training intensity as an objective measure to evaluate the reactions of the functional organs and systems of the athlete's body to training stimuli." (Al- Madamgha, 2008, 113)

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