ISSN: 2776-0960 Volume 4, Issue 2 Feb., 2023

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

THE EFFECT OF COMPETITION STRESS ON CORTISOL HORMONE RESPONSE DURING THE 24TH AND 50TH MINUTE OF A FUTSAL PLAYER'S TRAINING PROGRAM ASSESSMENT

Dr.Alaa Jasim Mohammed Tayawe
College of Physical Education and Sports Sciences,
University of Tikrit, Iraq.
alaa.jasim @ tu.edu.iq

Abstract

The research aims to study the level of cortisol hormone concentration during the recovery period, specifically at 24 and 50 minutes after the competition. Many sources indicate that after physical exertion, cortisol hormone increases for two hours after the end of the effort and reaches half-life at 24 minutes after the effort. The research aims to understand the effect of physical exertion on cortisol hormone response during the recovery period at 24 and 50 minutes for pre- and post-test of Futsal players. The researcher assumes that there is a statistically significant difference in cortisol hormone response during the recovery period between 24 and 50 minutes for pre- and post-test of Futsal players. The researcher adopted a descriptive method that is suitable for the nature of the research. 14 advanced players from the Al-Allam Club for Futsal were selected, and 6 players were excluded due to their participation in the preliminary experiment and absence in the final experiment. Thus, the sample size for the study was 8 players, and the sample was matched in terms of age, training age, weight, and height.

Considering the research results, the researcher reached the following conclusions:

1. Cortisol hormone concentration increases when performing high-intensity physical exertion.
2. The training program designed by the coach was based on sound scientific foundations, as evidenced by the fact that cortisol hormone concentration during the recovery period at minute 24 and minute 50 was within the normal range during evening.

Considering the research conclusions, the researcher recommends the following:

1. To use cortisol hormone concentration measurements during the recovery period as an indicator of training program efficiency, as its increase during the recovery period indicates that the training program is not efficient.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

2. To maintain a record of the players' health status and use it during the training program building phases.

Conduct further research related to the response of different hormones to understand the effect of different types of sports activities on hormonal response.

Keywords: Cortisol hormone, training programs, recovery, physical exertion, functional changes.

1-The definition of research:

1-1 Introduction and importance of research:

The science of sports training physiology in our modern era has become a fundamental basis for all training operations that have resulted in continuous development in athletic performance, due to the functional impacts of training on different body systems, through which the athlete acquires physiological adjustments for different body systems to delay fatigue and stress resulting from training and competition.

Physical training based on structured training programs that affect the variables (functional and chemical) of different body systems, through which adaptations in these physiological systems can be achieved, and the extent of the resulting evolution can be determined to identify areas of strength and weakness in training and attempt to improve them. There are many aspects that require more scientific studies and research, especially in terms of the responses and reactions of the human body systems to the stress of training.

Functional changes resulting from the practice of sports activities affect different body systems and occur as a response of the body's systems to the physical load. One of the most important of these systems is the endocrine system, which is composed of glands that secrete hormones directly into the blood. One of these hormones is cortisol, which plays a vital role in the process of metabolism process, contributes to the stability and balance of various body functions, and changes in cortisol levels in the body can lead to imbalanced body functions in the future and have both positive and negative effects on the athlete. Additionally, changes in cortisol levels in the blood can lead to direct changes that may hinder the progress of a Futsal player in achieving their goals.

Futsal considers as anaerobic and dynamic sport that differs from other team sports in terms of its fast pace, continuous alternations between attack and

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

defense movements, and its physical demands, such as speed, strength, endurance, and agility. These demands result in a continuous consumption of energy and the need for energy compensation throughout the game. This requires an understanding of the body's chemical responses during rest and physical exertion during the game, which can be studied in laboratory settings or on the field. The changes in these responses can provide valuable information for training programs to improve the efficiency of athletes through efficient training programs. Research into the levels of cortisol hormone during recovery after competition, specifically at 24- and 50-minutes post-competition, is important because many sources indicate that cortisol has a significant impact on the body's physiological and psychological responses This is what was confirmed by (Ahmed Nasser Al-Din Sayyid, 2003) "After physical effort, the secretion of cortisol hormone increases for two hours after the end of the effort and reaches half the life of cortisol hormone 24 minutes after the effort."[1]

1-2 Research Problem

The importance of studying hormonal secretions and the role of hormones as a response to various physiological processes in the body, responding appropriately to nerve signals to regulate the performance of various physiological systems, such as the heart, digestive, respiratory, immune, urinary, and endocrine systems. The transfer and storage of energy sources, such as glucose and fats, also interact with the nervous system to provide the body's dynamic balance. In general, athletic activities, especially Futsal game, are affected by the level of physical exertion that the player experiences. As previously mentioned, this game depends on the endocrine system as a dominant system, which is affected by the sweating that occurs during the entire match, affecting physical and performance aspects during play. However, information about changes in the hormonal system and its responses to physical exertion is still limited. Therefore, the researcher studied the validity of the training program provided by the coach and its compatibility with the players' capabilities. The researcher relied on cortisol levels during the recovery period as an indicator to determine this, as an increase in this hormone during the recovery period gives a negative indicator of the validity of the training program.

[1]. Ahmed Nasser Al-Din Sayyid; Theories and Applications of Sport Physiology, Vol. 1: (Cairo, Dar Al-Fikr Al-Arabi, 2003), p. 152.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

1-3 Research goal:

The research goal is to identify the effect of physical exertion on the cortisol hormone response during the recovery period between 24th and 50th minutes for pre- and post-test Futsal players in indoor stadiums.

1-4 Research hypothesis:

There is a statistically significant difference in cortisol hormone response during the recovery period between 24th and 50th minutes for pre- and post-test Futsal players.

1-5 Research fields:

1-5-1 Human/players of Al-Allam Futsal team.

1-5-2 Physical location/ gymnasium of the Physical Education and Sports sciences College.

1-5-3 Time frame/ from 1/12/2022 to 9/12/2022.

1-6 Definition of terms:

Cortisol hormone - A hormone produced by the adrenal cortex that helps increase the speed of metabolic processes, particularly those related to carbohydrates. Cortisol works to quickly convert liver glycogen to glucose to increase its concentration in the blood[2].

2- Research Methodology and Field Procedures

2-1 Research Methodology:

The researcher used the descriptive methodology which is suitable for the nature of the research.

2-2 Research Sample:

A sample of 14 advanced players from the Al-Allam Futsal Club was selected, 6 players were excluded due to their participation in the preliminary experiment and their absence in the final experiment, leaving the sample size for the study to be 8 players. The sample was matched in terms of age, training age, weight, height, Table (1) illustrates this.

[2]. Ahmed Nasser Al-Din Sayyid; previously mentioned source, p.292.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

Table (1) Mathematical means, standard deviations, and coefficient of variation for the variables (age, training age, height, and weight).

Variables	Unit	X	+p	Mode	CVR
Age	**Year**	**23.250**	**3.586**	**24**	0.210
Training age	**Year**	**8**	**2.682**	**10**	**0.745**
Height	**CM**	**69.678**	**5.678**	**68**	0.290
Mass	**KG**	**173.062**	**4.327**	**173**	0.014

Table (1) shows that the values of the coefficient of variation range between (+1) and this indicates a normal distribution of the research sample which leads to their correlation within the mentioned variables.

2-3 Research Tools and Devices Used:

2-3-1 Data Collection Tools:
Arabic and foreign references and sources.
Tests and measurements.
Observation.
Web.
2-3-2 materials:
Pressure belt attached to the arm area.
Clear 5 c.c plastic tubes.
5 c.c medical needle.
cotton.
A Cool Box for storing blood samples during transportation to the laboratory.
Sterile substance.
Measuring tape.
Stopwatch.

2-3-3 Equipment used:

A medical scale for weight measurement (made in China) (1) .
A central centrifuge (Centrifuge) with a rotation speed of (3000-5000) rotations per minute to separate blood serum (Surem).
A micro-centrifuge (Micro Centrifuge) (made in China) with a rotation speed of (3000-5000) rotations per minute to extract the percentage of hemoglobin in the blood.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

A Cobase411 (made in Germany) device for measuring cortisol hormone levels.

2-4 Field Research Procedures:

2-4-1 Determining cortisol hormone:

The cortisol hormone was determined for the purpose of the study

2-5 Procedure standardization:

Many variables from the sample and analytical procedures were set to achieve the best results and standardize the research procedures for the research variable. The players' nutrition was standardized from the research experiments (comfort and final experiment) and players were informed of the importance and desired benefit of the research. Players were also informed that this match was to select the basic formation to give their best physical and skill effort. It should be noted that blood was drawn for the sample during the evening as cortisol hormone concentration differs from the morning to evening. After standardizing field procedures and actions taken on the test day by the researcher, a selection of players with personal motivation to participate in the study and the ability to carry out all steps of the study was made. The research sample was then subjected to medical examination by two internist physicians to ensure the sample's health and free from any chronic illness, inflammation, and any intervening work factor.

2-6 Exploratory experiment

The researcher conducted a test with the help of the work team on December 7, 2022, using a sample of (6) players from the basic sample and from the same research community and they were excluded from the main experiment. A blood draw test was performed on this sample before the main sample to understand how to perform the test and the tasks assigned to the assistant work team to set up the tools used in the research, determine the best methods for measurement and testing, as well as ensure the validity of these devices and the specified time period for conducting the test, to regulate all variables and identify any problems that the researcher may encounter during the main experiment.

2-6-1 Pre-Test (Before Exercise):

The researcher and the assistant work team carried out the pre-test at 4 PM on Thursday, December 8, 2022. All the testers were seated in a room in a relaxed position. A sample of 5 cc of venous blood was drawn by the assistant medical

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

team, which was placed in specific tubes (E.D.T.A tubes) containing an inhibitor to prevent blood coagulation. The name of each player was written on the tubes and then stored in a cool box. The tubes were then immediately transferred to the laboratory for separation and testing. The laboratory procedures were performed to measure the concentration of cortisol hormone under study.

2-6-2 Main Experiment (Match):

Before starting the matches, to expose the player to full match effort, an agreement was made with the coach to divide the research sample into two groups, each group of (4) players, and with each group having a goalkeeper to form a Futsal team. The first group played with the second group in a full two-half match lasting for (40) minutes without substitutions while considering the rules of the game and a break period between the halves.

2-6-3 Post-Test (at minute 24 and at minute 50 after the effort):

The post-tests were conducted on Thursday, 8/12/2022 after the match between players of group one and players of group two. The team was assisted by the medical specialist who drew blood after a rest period of 24 minutes after the effort (the match). A sample of 5cc of blood was taken venously and placed in specific tubes for preservation (E.D.T.Atube) containing an anti-coagulant material. The tubes were then placed in a cool box and immediately transferred to the laboratory for processing. The same procedure was repeated after a rest period of 50 minutes after the effort (the match). The objective was to measure the concentration of cortisol hormone being studied. It was noted that there was a certain level of fear among the players regarding the blood-drawing procedure after the effort, despite there being no such fear during the pre-effort blood draw, which may be psychological in nature!

2-7 Statistical Methods:

After conducting the laboratory analysis for the studied variable and collecting all data for it, the researcher used the SPSS statistical software to find the results through the following statistical methods:

Arithmetic Mean
Standard Deviation
Coefficient of Variation
Range

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

One-Sample T-Test

3- Presentation of research results, analysis, and discussion

3-1Presentation and analysis of discussion of cortisol hormone concentration before effort and during recovery at 24th and 50th minute.

Table (2) illustrates the statistical parameters.

mean values, standard deviations, mean differences, standard deviations of differences and the calculated T-value for the cortisol hormone concentration before exercise and during recovery at 24 and 50 minutes.

s	Statistical parameter	Unit	Pre-test		Post-test		T	Sig	Stat. significance
			X	P+	X	P+			
1	24 Min	MCG	10.450	.2070	11.437	.1590	9.631	.0000	Significant
2	50 Min	MCG	10.450	.2070	10.000	.1410	4.965	.0020	Significant

The table (2) shows that the cortisol hormone concentration before exercise was within the normal range during evening hours, confirming the validity of the test procedures, and controlling for extraneous variables. There is a small increase in cortisol hormone concentration after exercise 24 hours later, which is still within the normal range. The researcher attributes this increase to cortisol hormone release being dependent on the intensity and duration of exercise. Studies have shown that the faster responses of hormones are more sensitive to exercise intensity (Baha' al-Deen Salama, 1994)[3], and cortisol hormone secretion is influenced by the performance of physical exercise (Ahmed Nasser Al-Din Said, 2003). Cortisol secretion from the adrenal gland increases during physical exercise, which helps to speed up the processes of metabolism, especially regarding carbohydrates. Cortisol helps to speed up the conversion of liver glycogen to glucose, which leads to an increase in glucose concentration in the blood (Abu Al-Ala Ahmad Abdul Fattah, 2003). The concentrations of growth hormone, cortisol, and insulin change in the blood during physical activity, with insulin decreasing and glucose gradually increasing as the intensity of the exercise increases[4].

[3]. Baha' al-Din Ibrahim Salama; Sport Physiology, vol 1 (Cairo, Dar al-Fikr al-Arabi, 1994) pp. 182-183.

[4] .Ahmed Nasser al-Din Sayed; source previously mentioned, page 151.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

Cortisol is a hormone that helps in filling up the fatty acids from the fatty tissue and reducing the absorption of amino acids by the tissue. This results in an increase in the circulation of amino acids in the bloodstream, which helps the liver in rebuilding glycogen.[5] Cortisol levels do not increase after exercise due to two reasons; firstly, the half-life of cortisol is 24 minutes after exercise and as stated by Ahmad Nasser Seid, the concentration of cortisol increases with increased duration of physical exercise, reaching its half-life at 24 minutes after exercise.[6] Secondly, the lack of increase in cortisol levels during recovery may be due to the efficiency of the training program conducted by the coach, who adjusts the training load to match the physical and health capacities of the athletes. Increased cortisol concentration during rest is a sign of excessive training, as stated by Ahmad Hushmet and Nadir Hussain. Intense training accompanied by stress and pressure is the main factor in raising cortisol levels in the blood [7], which remains elevated for two hours after training, which can be harmful to the player, as it can lead to weakened immune functions, especially if repeated training doses are given without sufficient rest and recovery after each session. As Raisan Khurebet and Abu-al-Ula Abdelfattah stated[8].

Considering what has been presented, it is necessary to evaluate the role of the coach in training through his mastery of training load, as it is essential to consider the increase in cortisol hormone secretion. An increase in cortisol hormone secretion in the blood leads to adverse health results that are reflected in mood and athletic performance, causing the muscles to continuously deteriorate, leading to a weak immune system for athletes and causing illness and injury due to weak muscles. The coach can observe this by monitoring the athlete's mood, lack of motivation for training, loss of appetite, and if the coach does not pay attention to quickly addressing the cortisol level, this means continued deterioration and weakness of the athletic muscles9.

[5]. Abu al-Ala Abdul-Fattah; Training and Sport Physiology (Cairo, Dar al-Fikr al-Arabi, 2003) page 151.
[6] .Ahmed Nasser al-Din Sayed; source previously mentioned, page 152.
[7] .Ahmed Hashim, Nader Hassan; Muscle Fatigue Physiology (Cairo, Dar al-Fikr al-Arabi, 2001) page 32
[8] .Riesan Khribet and Abu al-Ala Ahmed Abdul-Fattah; Sports Training (Cairo, Markaz al-Kitab Publishing Center, 2016) page 33
[9] .Resan Kherebit and Abu al-Ala Abdul Fattah; source previously mentioned, p. 340.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

4- Conclusions and Recommendations.

4-1 Conclusions:

Based on the research results, the researcher came to the following conclusions:

- Cortisol hormone concentration increases during high-intensity physical activity.
- The training program provided by the coach was scientifically sound, as evidenced by the fact that cortisol hormone concentration during recovery at minute 24 and minute 50 was within normal limits during the evening period.

4-2 Recommendations:

- Use cortisol hormone concentration measurements during recovery as an indicator of the efficiency of training programs, as an increase during recovery indicates that the training program is not efficient.
- Keep a record of the athletes' health status and use it during training program planning.

Conduct further research on the response of different hormones to various types of physical activities to understand their impact on hormonal response.

References:

1. Ahmed Naser Al-Deen Sayed; Sport Physiology Theories and Applications, Vol. 1: (Cairo, Arab Thought House, 2003)
2. Abu Al-Ala Abdel Fattah; Training and Sport Physiology:(Cairo, Arab Thought House, 2003)
3. Ahmad Hashim, Nadir Hasan; Physiology of Muscle Fatigue :(Cairo, Arab Thought House, 2001)
4. Bahaa Al-Din Ibrahim Salama; Sport Physiology, Vol. 1 :(Cairo, Arab Thought House, 1994)
5. Reesan Khreibet and Abu Al-Ala Ahmed Abdel Fattah; Sports Training:(Cairo, Book Center for Publishing, 2016).