



تأثير المنافسة الرياضية في الكرة الطائرة الشاطئية في عدد من مكونات البول

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الكلمات المفتاحية: الكرة الطائرة الشاطئية، مكونات البول، المنافسة الرياضية
مستخلص البحث:

درجة حموضة البول (PH) ودرجة حرارة الجسم بينما لم تحدث أي تغييرات في المكونات الاخرى الكلوكوز والبروتين والدم والاجسام الكيتونية.

The impact of sport Competition in Beach volleyball in some Urinary constituents

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Abstract

The study aimed to identify the effect of sports competition in beach volleyball in some urinary components. The sample consisted of (14) players representing clubs of Nineveh

هدفت الدراسة الى التعرف على تأثير المنافسة الرياضية في الكرة الطائرة الشاطئية في بعض مكونات البول، وتكونت العينة من (١٤) لاعباً يمثلون اندية محافظة نينوى بالكرة الطائرة الشاطئية، وكان متوسط أطوالهم وأوزانهم واعمارهم (١٨٨.٠٠ ± ٦.١٨٩) سم (٨١.٢٨ ± ٥.١٠٥) كغم، (١٢.٧١ ± ٢.٧٠١) سنة على التوالي، وقد تضمنت إجراءات البحث القياس القبلي (قبل البدء بالمنافسة والاحماء) ثم القياس البعدي (بعد المنافسة مباشرة) وتم قياس مكونات البول والتي شملت درجة حموضة البول (PH) والكلوكوز والبروتين والدم والاجسام الكيتونية. وتوصل البحث إلى ان المنافسة احدثت تغييرات في



systems such as the nervous, muscular, and respiratory systems have produced significant findings, contributing to the advancement of this field. However, despite their significance, these contributions remain insufficient; they highlight the pressing need to deepen research into a number of functional systems that have received insufficient attention within the athletic field, such as the urinary system. Many studies and researches have addressed this system in different sporting activities. (Al-Noaemy, 2006) and (Wankasi et al, 2006) both concluded that some abnormal changes appeared, such as the appearance of red blood cells, white blood cells, and proteins in the urine as a result of sports competition among football players, while no abnormal changes were observed in either glucose or the (pH) value in the urine (Al-Noaemy, 2006,246) (Wankasi et al, 2006). In contrast, the study by (Valverde et al, 2024) on triathlon athletes reported an increase in proteins and ketones, whereas (Al-Naimi, 2013), in a study conducted on long-distance runners (5000 meters), found no changes in ketone bodies or red blood cells (Al-Naimi, 2013, p. 99) (Valverde et al., 2024, pp. 401–402). Beach volleyball is a modern sport with unique characteristics. It is played on sandy beach courts and is considered a summer

Governorate in beach volleyball. Their average height, weight, and age were (188.00 ± 6.189) cm, (81.28 ± 5.105) kg, and (12.71 ± 2.701) years, respectively. The research procedures included pre-competition measurements (before the start of competition and warm-up) followed by post-competition measurements (immediately after the competition). Urinary components measured included urine pH, glucose, protein, blood, and ketone bodies. The study found that the competition induced changes in urine (pH) and body temperature, while no changes were observed in the other components, namely glucose, protein, blood, and ketone bodies.

Keywords: Beach Volleyball, Urine components, Competition.

1- Introduction

1-1 Introduction and the importance of the research

Contemporary studies in the field of physical education increasingly focus on physiological aspects due to their pivotal role in enhancing athletic performance through improving the functional efficiency of the body's various biological systems. Numerous research efforts conducted across diverse settings that have examined multiple body



significant sweat loss. These stressful factors can cause pronounced changes in urine composition. The researcher observed that there is a lack of studies specifically addressing the effect of beach volleyball competition on urinary components, this motivated the researcher to investigate the “The Impact of Sports Competition in Beach Volleyball on Certain Urinary Components”, given the need to explore how competitive beach volleyball affects urinary composition and whether the unique nature of this activity produces effects different from those observed in other sporting events.

1-3 Research objectives

This research aims to:

- To identify changes in some urine components before and after a beach volleyball competition.

1-4 Research fields

1. **Human field:** This study was applied to a sample of beach volleyball players from Nineveh Governorate clubs.
2. **Spatial field:** This study was applied in the Nineveh Sports Club beach volleyball stadium in Nineveh Governorate.
3. **Time field:** This study was conducted for the period from 10/ ٩ / 2025 to 1٢ / ٩ / 2025.

sport. While fun and recreational, it is physically demanding. The lack of research on it is a focus of interest and research. It is a dynamic team sport, derived from indoor volleyball, but played on sand, usually outdoors under varying weather conditions. This is confirmed by (Renan Muniz et al., 2025), citing (Hank, M et al., 2024), “beach volleyball requires substantial physical effort, powerful movements, high levels of endurance, and continuous periods of intense activity under harsh environmental conditions such as heat, sand resistance, and exposure to sunlight” (Renan Muniz et al., 2025,2). It is evident from previous research and studies that the majority of investigations have focused on various athletic activities, whereas beach volleyball has not received sufficient scientific attention. From this perspective, the significance of the present study lies in obtaining scientific information on the impact of this type of sporting activity on urinary components, thereby contributing to the scientific knowledge base of the College of Physical Education and Sports Sciences.

1-2 Research problem

Beach volleyball competitions impose high physiological demands due to intermittent high-intensity exercises, prolonged exposure to heat, and



2- Research procedures

2-1 Research methodology

The experimental method was used to design a single group. due to this method fits the nature of the research.

2-2 Research sample

The research sample consisted of (1٤) players representing the Nineveh Governorate beach volleyball clubs. They were chosen intentionally. Table (1) shows some of the research sample specifications.

Table (1)

Shows the statistical characteristics of some sample specifications

Variables	Mean	Standard Deviation
Height (cm)	188.00	6.189
Weight (kg)	81.28	5.105
Training age (years)	12.71	2.701

2-3 Techniques and tools used in research

- A rotating metal measuring tape for height measurement, Chinese-made, quantity (1).

1-5 Definitions of terms

- **Protein:** “It is a substance that is composed of the same elements that make up sugars and fats, to which nitrogen is added, as well as phosphorus and sulfur” (Gerard, 1984, 797).
- **Hydrogen exponent (pH) of urine:** “It is the function of measuring the concentration of hydrogen ions in the solution, values greater than (7) indicate an increase in the bases. The weak value ranges in (pH) urine (5- 7.8) and an average value of (6)” (Gerard, 1984, 796).
- **Red blood cells (RBCs):** “They are cells without a nucleus in the shape of a disc with concave sides when looking at them from the side. They contain hemoglobin, which gives the red color to the blood, and their number is about 5 million cells per cubic millimeter of blood in a man, and its number decreases by about half a million in a woman” (Arabs, 1989,437).
- **Ketone bodies:** “Ketone bodies are lipid-derived organic compounds that can serve as a circulating energy source for tissues during starvation/fasting or prolonged exercise” (Newman JC, Verdin E, 2014,42-52).



after one minute. Then, the sample is centrifuged for 5 minutes at a speed of 25 RPM. This process separates the sample into a supernatant and sediment. The supernatant is discarded, and a drop of the sediment is placed on a clean slide, covered with a cover slip, and examined under a microscope using a 40× objective lens.

2-5 Exploratory Experiment

On 10/9/2025, an exploratory experiment was conducted to verify the accuracy and proper functioning of the height, weight, and temperature measurement devices, as well as to ensure the suitability of the playing field.

2-6 Main Experiment

After verifying the measurement devices and completing all necessary preparations, the main experiment was conducted during the period from 11/9/2025 to 12/9/2025 as follows:

1- Pre- measurement

The core body temperature of the participants in the sample was measured, and urine samples were collected before the start of the athletic competition and before the warm-up. The urine samples were then transferred to the laboratory for analysis of their components.

- A medical scale from Mi company for weight measurement, Chinese-made, quantity (1).
- A mercury thermometer for measuring environmental temperature, Chinese-made, quantity (1).
- An electronic thermometer, Chinese-made, for measuring core temperature, quantity (1).
- Plastic containers for collecting urine samples, quantity (30).
- A sealed storage container for urine samples, quantity (1).
- A centrifuge device, quantity (1).

2-4 Description of Urinary Component Measurements

Urine samples should be collected using a clean-catch method after washing the genital area, preferably as a midstream sample. The sample is first examined visually using a multi-test reagent strip, and then analyzed microscopically in the laboratory to detect the presence of cells, bacteria, and chemicals that may indicate pathological conditions such as urinary tract infections, kidney problems, or diabetes.

The sample is placed in a plastic tube, and the chemical test strip is immersed for a few seconds and read



subsequently recorded in the data collection form after obtaining them.

2-7 Statistical Methods

The researcher used the following statistical methods:

- Arithmetic mean.
- Standard deviation.
- Paired-sample t-test.

All statistical analyses were performed using SPSS, version 26.

3- Results and Discussion

3-1 Presentation and Discussion of Urinary Component Results

2- Conducting the sports competition

The procedure included a 10-minute warm-up, followed by a full match. The match was conducted under environmental temperatures ranging from 40 to 42°C.

3- Post-measurement

Immediately after the competition, the core body temperature of the sample participants was measured, followed by the collection of urine samples. The samples were then transported to the laboratory for the analysis of urinary components. The results were

Table (2)

shows the statistical characteristics of urinary components between the pre-test and post-test.

Variables	Pre-test		Post-test		t test	Probability(P)	Significance
	Mean	Standard Deviation	Means	Standard Deviation			
PH	6.07	0.755	5.46	0.570	2.88	0.013	Significant
Sugar	0	0	0	0	.	.	Not Significant
Albumin	0	0	0	0	.	.	Not Significant
Ketones	0	0	0	0	.	.	Not Significant
Blood	0	0	0	0	.	.	Not Significant
Leukocytes	0	0	0	0	.	.	Not Significant
Core temperature	37.00	0.099	37.94	0.85	24.19	0.000	Significant

The tabular t-value at an error rate of ≤ 0.05 in front of a degree of freedom (13) = 1.77



heavy muscular exercise leads to a significant increase in urine alkalinity due to enhanced bicarbonate secretion during the body's acid neutralization process (Moriguchi et al., 2002, pp. 31–39). In contrast, (Kamińska et al., 2020), in a study comparing beach and indoor handball matches, found that urine pH decreased after competition as a result of increased sweating and fluid loss, which led to higher urine concentration and acidity (Kamińska et al., 2020, p. 6). The findings of the present study are consistent with those of (Muniz-Santos et al., 2025), who used Sportomics analysis on Olympic beach volleyball players. They observed clear metabolic changes associated with minor disturbances in electrolytes and acid-base balance during competition, and indicated that environmental and thermal stress contribute to modulating kidney responses and urine regulation (Muniz-Santos et al., 2025, pp. 5–7). These results also align with Al-Noaemy, 2006) and (Buckler, 1973), who noted that moderate-intensity physical load does not lead to a significant increase in urinary lactic acid compared to resting levels (Al-Noaemy, 2006, p. 244) (Buckler, 1973, pp. 193–197). The researcher attributes the change in urine pH to being variable, depending on environmental conditions (temperature and humidity), hydration status, and

It is evident from Table (2) that there is a significant difference at a significance level of ≤ 0.05 in urine pH and core body temperature between the pre-test and post-test for the beach volleyball competition. The calculated t-value for urine pH was (2.88), while the t-value for core body temperature between the pre-test and post-test was (24.19). In contrast, no significant differences were observed in the other urinary components, including glucose, albumin, ketones, blood, and leukocytes. These results indicate that sports competition in a beach environment elicits clear physiological responses in certain vital indicators, particularly those related to acid-base balance and thermoregulation, while other urinary components remain within normal limits. This suggests that the exertion falls within the physiological rather than pathological range. Changes in urine pH serve as a direct marker of alterations in the body's acid-base balance during physical activity. Repeated exertion between attacks, without adequate rest, can increase the production of hydrogen ions (H^+) and lactic acid, potentially lowering the pH and increasing acidity in body fluids, whereas compensatory responses via the kidneys and bicarbonate systems may elevate it depending on the intensity and duration of the activity. The study by (Moriguchi et al., 2002) indicated that



rather than appearing immediately after physical exertion (Al-Naimi, 2013, p. 12).

4- Conclusions and Recommendations

4-1 Conclusions

- 1- The beach volleyball competition demonstrated a limited physiological effect, reflected in changes in urine pH and a clear increase in core body temperature after the competition. This indicates an acid-base response and thermoregulatory adjustment resulting from the nature of the exertion, the high-temperature external environment, and elevated sweating and fluid loss.
- 2- The competition did not lead to increases or changes in other urinary components, such as glucose, albumin, ketones, blood, and leukocytes, indicating that the competition did not cause renal stress or pathological alterations, and that the body's responses remained within normal physiological limits.

4-2 Recommendations

- 1- Ensure proper hydration of players before, during, and after the competition to compensate for fluid and electrolyte loss, reduce

competition intensity. Regarding core body temperature, the results showed a significant increase after the competition. The researcher attributes this to the fact that beach competitions elicit unique physiological responses that differ from those observed in indoor sports, due to the exposed beach environment characterized by high temperatures, intense solar radiation, and the sandy nature of the playing field. This is consistent with the findings of (Zetou et al., 2008), who reported that beach volleyball players experience high fluid loss during official competitions, leading to increased body temperature and decreased body weight after the match (Zetou et al., 2008, pp. 139–145). On the other hand, the absence of significant differences in other urinary variables such as glucose, blood, and albumin indicates that the competition did not cause renal stress or tissue damage. This is consistent with (Gonçalves et al., 2022) who noted that the appearance of albumin in urine after exertion may be temporary and limited, and is detectable only when using sensitive tests such as microalbuminuria (Gonçalves et al., 2022, pp. 1–10). This finding also aligns with (Al-Naimi, 2013) who reported no changes in ketone body levels, attributing this to the possibility that ketone bodies require a certain period to be excreted in the urine,



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- acid-base disturbances, and limit increases in body temperature.
- 2- Conduct regular and comprehensive medical tests for athletes participating in beach competitions to monitor any abnormal changes that may indicate renal stress or imbalances in urinary ion regulation.
 - 3- Consider environmental conditions during competitions (temperature, humidity, timing), as they have a direct impact on thermoregulation and fluid balance in the players.

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