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Fluid Deficiency and Its Effect on Some Biological Variables for Athletes

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Abstract

This paper to study Lack of fluids on the water condition of the body and Lack of fluid on aerobic and anaerobic work, This research is within the knowledge of researchers among the few studies conducted on the effect of fluid deficiency on sports performance, and it answers some questions related to sports training during the period of fluid deficiency and the effect of fluid deficiency on competitions that may take place during the period of fluid deficiency, and it opens horizons Research to answer many of the questions that many trainers ask about the best timing for training and whether or not the pressures on the body due to lack of fluids can be used to induce an adaptation that may have a positive effect on the high level of performance, as is the case when training at altitudes or not. ***METHODS****: The research sample was deliberately chosen from among athletes, and their number reached 10 players who volunteered to participate in this study and conducted its experiment, the two researchers used the descriptive approach (case study) due to its relevance to the nature of the objectives and procedures of this study.* ***RESULTS****: there are no statistically significant differences in the amount of water in the body between the normal state and the state of lack of fluids, and then there may be an adaptation of the body to the lack of water by increasing the secretion of the antidiuretic hormone, which works to retain the largest amount of water In the body, as well as increasing the secretion of the hormone Aldosterone, which works to get rid of potassium salts over the needs of the body and to retain sodium and water, which increases the volume of fluids in the body, and both work to maintain the osmolality of body fluids at normal limits, and these results are consistent with the results of studies.* ***Conclusions****: The effect of fluid deficiency on the body's water condition does not reach the degree of dehydration (> 2% of body weight), which can affect the physiological condition and thus athletic performance. Aerobic and anaerobic activity is not affected by the fluid deficiency.*

Keywords: *fluids, antidiuretic hormone, osmolality.*

I. Introduction

Scientific studies indicate that food and fluid intake before, during, and after training has important effects on performance(1). The absence of fluid intake during the day may have a greater impact on performance than the

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absence of food, especially when training and competition occur in stressful environments. Thermally, even mild dehydration may have adverse effects on several physiological and cognitive functions that are important components of athletic performance[(2)], and scientific research has indicated that in warm to hot climates dehydration is 2% or more. Bodyweight will impair aerobic exercise performance and may also lead to decreased mental/cognitive function[(3)], while low to moderate levels of dehydration produces a small but statistically significant decrease in high-intensity exercise and muscular capacity[(3,4)] Some research has focused on the effect of fluid deficiency on body composition and the state of body water[(2,5–8)].

But within the limits of the researchers' knowledge, no study focused on the effect of fluid deficiency on the aqueous state of the body and the anaerobic and anaerobic work of athletes. Therefore, it was important to determine whether fluid deficiency had any undesirable effects on the aqueous state of the body and athletic performance during work-based competitions Aerobic and anaerobic.[(4,9)]

Research Aims:

This research aims to identify the following:

1. Lack of fluids on the water condition of the body.
2. Lack of fluid on aerobic and anaerobic work.

Search Questions:

1. Does fluid deficiency affect the body's water indicators?
2. Does fluid deficiency affect the results of the aerobic and anaerobic work tests?

Importance of Applying the Research:

This research is within the knowledge of the researchers among the few studies conducted on the effect of fluid deficiency on sports performance, and it answers some questions related to sports training during the period of fluid deficiency and the effect of fluid deficiency on competitions that may take place during the period of fluid deficiency, and it opens horizons Research to answer many of the questions that many trainers ask about the best timing for training and whether or not the pressures on the body due to lack of fluids can be used to induce an adaptation that may have a positive effect on the high level of performance, as is the case when training at altitudes or not.

Research terms: -

Dehydration:

The terms "dehydration" and "water deficiency" are commonly used to describe TBW[(10).]

Osmolality:

Osmolality can be defined as the concentration of all solutes in a given weight of water and is expressed as units (mOsm / kg H2O milliosmoles)[(11,12).]

Urine osmolality:

In healthy humans, with a low intake of water, their urinary osmolality is greater than 800 mOsm / kg, while the urinary osmolality of 24 hours should be between 500 and 800 mOsm / kg.[13,14].

Specific Gravity (SG)

It is defined as the ratio between the density of an object (solid or fluid) and the density of water at a temperature of 4 ° C and under 1 atm.[15,16]

Urine specific gravity (USG):

The normal density of urine ranges between (1.005-1.030), USG values greater than 1.020 indicate a decrease in the amount of water in the body, while values less than or equal to 1.020 indicate an increase in the amount of water in the body[15,17].

Search procedures:

A- Research methodology:

The two researchers used the descriptive approach (case study) due to its relevance to the nature of the objectives and procedures of this study.

B- Research sample:

The research sample was deliberately chosen from among athletes, and their number reached 10 players who volunteered to participate in this study and conducted its experiment.

Table (1)

Properties of the selected research sample

N = 20

Variables	Arithmeticaverage	Standarddeviation	PearsonCoefficient
Age	20.6	0.512	0.508
Height	177.2	6.592	0.552
Weight	73.4	8.651	0.233-

It is evident from Table (1) that the values of the skew coefficients in the variables under discussion are limited to (± 3), which indicates the moderation of the data in these variables.

Measurements used in the research: -

A. Measuring body components: -

Body Mass Index (BMI) - the amount of water in the body, TBW.

B. biochemical measurements:

1- Urine osmolality.

2- Measurement of the specific gravity of urine.

Tools and devices used in data collection: -

- Rest meter to measure height in cm
- In Body 230 device to measure body composition.
- Stopwatch hours
- Bio Majesty JCA-BM6010 / C Urine Osmolality Monitor
- Urinometer to measure urine specific gravity.

Steps to implement the research experiment:

It was necessary for the researchers, before conducting the basic experiment, to try to control and unify all the variables of the experiment so that these variables do not negatively affect the results of the experiment, and this included ensuring the following:

1- The player's abstention from eating and drinking for at least 10 hours for two weeks.

2- The player does not feel tired as a result of previous physical exertion.

3- Not suffering from emergency diseases such as cold and influenza.

4- The number of sleeping hours to ensure complete rest.

5- Performing my searches at the same daily time.

6- Standardize the weekly training load cycle to ensure that different training loads do not affect the research results.

The procedures for implementing the research experiment were to follow the following set of steps:

1. Measuring body components using the In-Body 230 device to analyze body components (body mass index, BMI - the amount of water in the body (TBW).
2. Taking a urine sample from athletes.
3. Take a physical exertion test.

The procedures for implementing the research experiment were to follow the following set of steps:

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3. Take a physical exertion test.

The statistical method used:

Descriptive statistics (mean, standard deviation, Skewness, Wilcoxon Labrador metric test to measure the significance of differences).

II. Results:

Table (2)

The significance of the differences between the performance results during fluid deficiency and during the normal state in the variables (weight - BMI - the amount of water in the body TBW) under discussion n = 20.

Variables	Measurement	Arithmeticaverage	Standarddeviation	Average Ranks	Total Ranks	U	Z	P. Value
BMI	Lack of fluid	18.74	2.435	9.9	198	46	0.449	0.662
	Natural state	18.46	2.389	11.1	222			
TBW kg	Lack of fluid	27.5	4.334	9.85	197	44	0.487	0.643
	Natural state	27.83	4.332	11.15	223			

It is clear from Table (2) that there are no statistically significant differences between the performance results during fluid deficiency and the normal state in the variables under investigation.

Table (3)

Water loss percentage to body weight%

N = 20

Variables	Arithmeticaverage	Standarddeviation
The ratio of water loss during fluid deficiency to normalbody weight	% 0,612	% 0,543

Table (3) shows the percentage of lost water.

Table (4)

Significance of differences between performance outcomes during fluid deficiency and during normalcy

(Biochemical) variables under investigation

N = 20

Variables	Measurement	Arithmeticaverage	Standarddeviation	Average / Ranks	Total Ranks	U	Z	P. Value
Osmolality of urine	Lack of fluid	412.6	26.852	15.4	308	1	3.705	0
Urine osmolality	Natural state	340.2	37.56	5.6	112			
Specific density	Lack of fluid	1030	2.642	13.6	272	19	2.359	0.018
Specific Gravity	Natural state	1008	2.47	7.4	148			

It is evident from Table (4) that there are statistically significant differences between performance results during fluid deficiency and during normalcy in the biochemical variables under investigation.

III. Discussing the Research Results:

To answer the first question, does the lack of fluids affect the water indicators of the body?

It is evident from Table (2) that there are no statistically significant differences in the amount of water in the body between the normal state and the state of lack of fluids, and then there may be an adaptation of the body to the lack of water by increasing the secretion of the antidiuretic hormone, which works to retain the largest amount of water In the body, as well as increasing the secretion of the hormone Aldosterone, which works to get rid of potassium salts over the needs of the body and to retain sodium and water, which increases the volume of fluids in the body, and both work to maintain the osmolality of body fluids at normal limits, and these results are consistent with the results of studies. Ramadan and others[18,19] reported that drought was present and returned to pre-fluid deficiency levels as consistent with the results of a study[20]. Where the results of this study indicated that there were

no statistically significant differences between measurements in total body water between measurements of normality and fluid deficiency.[12,16]

Table (3) indicates that the amount of water lost from the body did not reach the athletes to the dehydration stage (> 2% of the body weight), which could affect the physiological state, and this was confirmed by the results of biochemical measurements, where measurements of urine osmolality showed an increase in the percentage of water in the body in both my normal state and lack of fluids because it was less than 600 mg/kg as explained [21] This indicates that the concentration of mineral salts present in body fluids was within normal limits, although there are statistically significant differences between the states of fluid deficiency and normalcy.

The urine specific gravity values were at the normal level (1.005-1.030), although they were slightly inclined to lack water in the case of fluid deficiency, as explained [15], where he indicated that the USG values are more than 1.020. To the lack of water in the body, the average USG in our study was (1024.00), and these results are consistent with the results of the study carried out by [22] as the results of this study indicated that no significant changes were found. In total body water as well, but the urine specific gravity measured at the end of the RF was much higher than after Ramadan, After-RF, and then we can say that the decrease in the amount of water in the body as a result of fasting was not to the degree that would affect the performance level of the athletes. When measuring 2 x 25m freestyle and 800m freestyle.

To answer the second question, does the lack of fluid affect the results of the aerobic and anaerobic work tests?

About the effect of fluid deficiency on anaerobic work, Table (5) indicated that there were no statistically significant differences, and this is consistent with the results of the study carried out by [22] where it indicated that no significant changes were found in Total body water also, but urine specific gravity measured at the end of RF was much higher. After-RF, no effect of fluid deficiency on anaerobic capacity, anaerobic capacity, and LA clearance rate from blood was observed when performing the Wingate Anaerobic Test).

As for the effect of fluid deficiency on the aerial work, Table (5) indicated that there were no statistically significant differences during fluid deficiency and normalcy, and these results are consistent with the results of the study conducted by [23] where it indicated The lack of fluid has a negligible effect on aerobic performance and the performance of the 30-meter sprint test and the 30-second jump in elite judo players, as the results of the study [24] indicated that if the regular training regime is maintained, the fluid balance in Body, food intake and sleep duration Lack of fluids does not have harmful effects on exercise performance or body composition in young soccer players.

IV. Conclusions

In light of the nature of the procedures, the characteristics of the research sample, and the methods of data collection that were used, the following results were reached:

The effect of fluid deficiency on the body's water condition does not reach the degree of dehydration (> 2% of body weight), which can affect the physiological condition and thus athletic performance. aerobic and anaerobic activity is not affected by the fluid deficiency.

V. Recommendations

The two researchers recommend conducting further future studies that aim to try to study the adaptation resulting from lack of body fluids on the aerobic and anaerobic work of different classes of athletes.

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