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## The response of some fitness elements after anaerobic stress between low and moderate temperature degree for football players

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### Abstract

The study demonstrated that temperature has a significant effect on the players' performance. Moreover, the two ranges in temperature had a significant impact on the players' performance. For instance, cold temperatures decline physical efficiency and muscular function. Most importantly, the test proved that heat should be taken into account when setting up competitions and during exercise sessions. An important component in the research concerned defining the variables low and moderate temperatures when selected physical exercises were performed. These exercises concerned strength, durability, and explosive force. The tests were conducted using football players at the University of Mosul, where the different tests were measured into the temperatures; (10-12°C) and moderate (23-25°C). The study was set in a laboratory of the Faculty of Physical Education at the University of Mosul. For statistical data processing, arithmetic circles, standard deviations, value (T), probability amount, and error rate were used.

**Keywords:** Performance, athletic, temperature, flexibility, agility, explosive power

### 1. Introduction

Factors that affect sports performance are both internal and external. Internal factors come from within an individual, whereas, external factors come from the outside surroundings. This paper mainly focuses on the external environment. In this case, external factors concern temperatures and humidity [1]. When humans are exposed to cold temperatures, the body temperature decreases. Several studies demonstrate that abnormal body temperatures affect neuromuscular performance negatively. Moreover, studies show that cold environments decrease muscular function and the ability to move. In light of the above, this study seeks to enhance an understanding of the effects of different temperatures on certain physical activities. When humans are exposed to cold temperatures, the body temperature decreases. Several studies demonstrate that abnormal body temperatures affect neuromuscular performance negatively [2, 3, 4, 5]. Moreover, studies show that cold environments decrease muscular function [6, 7] and the ability to move [8, 9]. In light of the above, this study seeks to enhance an understanding of the effects of different temperatures on certain physical activities.

### 2. Objective of the Study

This study aims to identify the differences between certain physical activities in relation to low and moderate temperatures of football players.

### 3. Method and organization

The experiment was carried out on football players at the University of Mosul. The sample size consisted of fifteen players. The experiment was conducted in a laboratory that had a temperature between 10 to 12 °C. The study was arranged in the way that each football player had to enter the laboratory twenty-five minutes prior to warming up and carrying out the exercise with five minutes between each entry. This ensured that the body of each player had enough time to adjust to the given temperature.

### Agility Test

Running Zakzak way (Barrow)

The player must run in the shape of the number 8 and turn around the piles without touching or colliding with them. The player must repeat these three times as quickly as possible.

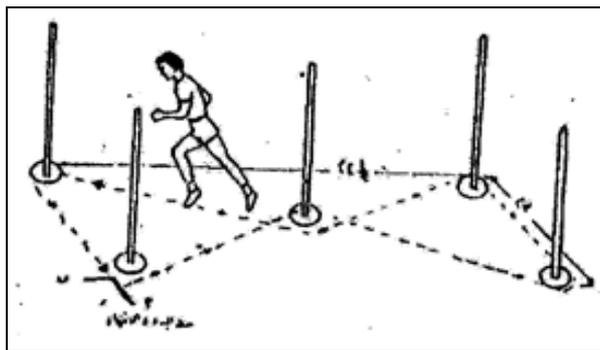


Fig 1.

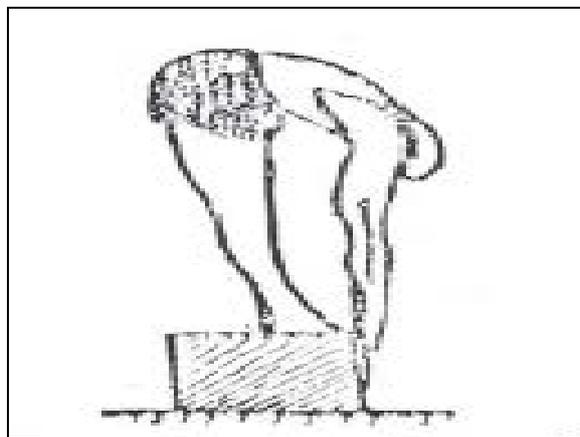


Fig 2.

**Flexibility Test**

The test is carried out using a table with a numbered ruler on the side: the zero is placed at the edge of the table from the top down. The measurement is made in centimeters. The player climbs onto the table, and from a standing position without bending the knees the player must bend the torso down slowly. The player must stretch as much as possible to find the maximum point on the ruler. If the fingertips did not reach the surface level, the conclusion is negative, and if the fingertips exceed the surface level the conclusion is positive.

**Explosive force test: long jump**

The player stands behind the starting line, and the feet are slightly separated from each other. When the player is ready, he must jump as far as possible and using his arms to assist him. The arms kind of follow a half-circle.

The arms begin in a stretched position over his head. Then he must swing his arms in front of him and swing them behind him and then back again.

The knees are bent and ready to jump. The distance is measured from the starting to the point where the players' heels touch the ground.

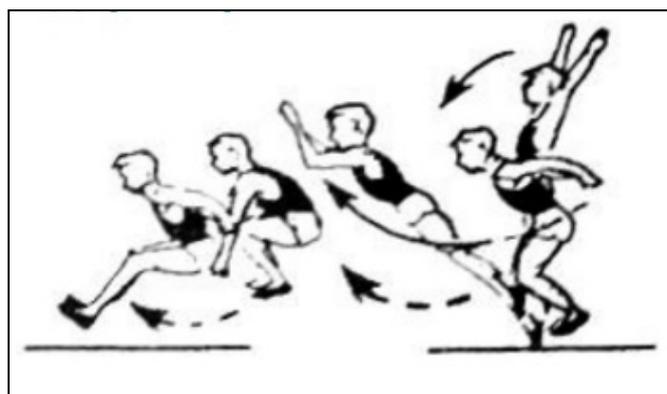


Fig 3.

**The Second Test**

This test was conducted using the same methodology as the

first test. However, this time the temperature was set between 23 and 25 °C instead of 10 to 12 °C.

**4. Findings and Discussion**

**Table 1:** Shows the arithmetic means, standard deviations, the value of T-statistics, probability and standard error of the fitness activities elements at low and moderate temperatures.

Statistics Fitness Elements	Arithmetic mean	standard deviation	Value of (t)	Probability	Error percentage	Morality
Agility at low temperature	8,5	6,29	52,11	0,0019	0,05	High morale
Agility at moderate temperature	7	0,54				
Flexibility at low temperature	8,2	0,77	- 10,04	0,0084	0,05	High morale
Flexibility at moderate temperature	10,5	0,83				
Explosive force at low temperature	202	11,3	- 13,69	0,0016	0,05	High morale
Explosive force at moderate temperature	207	10,51				

It is evident from table (1) that there is a significant difference in the element of agility, as the calculated value of (t) was (52,11) with a probability value (0,0019) at an error rate (0,05), as the calculated value of (t) was (52,11) with a probability value (0,0019) at an error rate of (0,05), and there

is a difference between the arithmetic means in favor of a moderate temperature of (1,5). In flexibility, a significant difference is observed between the low and moderate temperatures. The calculated value of (t) was (-10,04) the probability value (0,0084) at the error rate (0,05), with a

difference between the arithmetic mean for the degree of Moderate heat (2,3).

It is also noted that there is a significant difference in the explosive force variable between the low and moderate temperatures, so the calculated value (t) reached (-13,69) by the probability value (0,0016) at the error rate (0,05), and there is also a difference between the arithmetic means in favor of moderate temperature reached (5)

## 5. Conclusion

1. There is a significant difference between the player's physical performance and the different temperatures (10-12) and (23-25) Celsius, where the temperature of 23-25 Celsius has a positive impact on the player's performance. This result is consistent with previous studies, as (Roberts) mentioned a decrease in performance and muscle coordination in exercises conducted in the cold environment <sup>[10]</sup>.
2. There is a significant difference in flexibility between the temperature levels (10-12) and (23-25) Celsius in favor of the temperature (23-25) Celsius. This is consistent with previous studies where (Çakir) mentioned that increasing the temperature affects the elasticity of the muscles positively <sup>[11]</sup>. and (Pollock) stated that the environment temperature increases the elasticity of tissue attachment, which leads to the availability of a broader range of mobility for the joints and thus a greater muscle performance <sup>[12]</sup>.
3. There is a significant difference in the explosive strength between the temperature (8-10) and (23-25) Celsius in favor of the temperature (23-25) Celsius, in line with previous studies that stated that exposure to heat or a localized increase in muscle temperature, Muscle contraction and thus performance can improve during exercise that lasts less than a few seconds <sup>[13]</sup>. In another study, it was found that there was an increase in muscle strength in parallel with the increase in environmental temperature and body temperature from eleven men at four different temperatures at different times of the day <sup>[14]</sup>.

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