E-ISSN: 2707-7020
P-ISSN: 2707-7012
www.allsportsjournal.com
JSSN 2023; 4(2): 264-266
Received: 03-08-2023
Accepted: 08-09-2023

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Adaptation to environmental condition (Temperature and Humidity): An exploration performance of elite football referees in fitness test

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DOI: https://doi.org/10.33545/27077012.2023.v4.i2d.245

Abstract
Athletes have many challenges as a result of harsh weather conditions, while not all sports activities are limited by thermoregulatory variables. The purpose of this editorial is to identify specific instances when extreme temperatures either impede or improve performance, and to evaluate the effectiveness of acclimatisation procedures in circumstances where adapting to heat is necessary. Six proficient football referees undertook physical fitness assessments in Iraq and Malaysia. All referees and assistant referees in Iraq successfully passed the fitness test, despite the high temperature of 41 °C. In Malaysia, when the humidity soared to a peak of 98%, all referees and assistant referees, with the exception of one, successfully passed the fitness test. This research showcases the referees' capacity to adjust to environmental factors like as temperature and humidity, which may be linked to their meticulous preparation and training at elevated temperatures. Additionally, several referees used masks as a means to augment humidity levels.

Keywords: Exploration performance, football referees

Introduction
There is a common belief that performance is negatively affected in hot weather compared to moderate circumstances, and that it is necessary to acclimatise to this environment before competing. However, this may not hold true for every event, since it depends on the level of intensity and length of the performance. Elite athletes must also consider time efficiency when choosing event preparation amongst their demanding training and performance schedules. Despite the addition of valuable material in recent studies about this neglected field [3, 4], it is well acknowledged that endurance activities are often hindered by high temperatures [1, 2].

The most probable mechanism for this effect is a comprehensive thermoregulatory response that occurs when exposed to heat. This response includes an increase in heart rate during exercise, higher core and skin temperatures, a heightened perception of effort, thermal strain, thirst, and water loss, ultimately resulting in dehydration (as reviewed in references [3-5]). Hence, it is crucial for athletes to adequately equip themselves for competitions that can occur under demanding environmental circumstances. This approach is especially crucial in team sports and endurance events, where athletes need to maintain their performance for long durations. This may lead to a higher risk of athletes experiencing significant dehydration, overheating, or possibly dangerous body temperature increases [8].

This situation often leads to tiredness, decreased effort, reduced performance, and, in severe instances, heat disease [4-6]. Approximately half of the global population now resides in the Torrid Zone, which is located around the Earth's equator and experiences higher temperatures and more demanding physical conditions compared to the Temperate or Frigid Zones [8]. As a result, several significant athletic events are now planned to take place in geographical areas that encounter hot and humid climatic circumstances. The destinations mentioned are the 2015 International Association of Athletics Federations (IAAF) World Championships in Beijing during the summer, the 2016 Olympic Games in Brazil during the summer, and the 2022 Federations International Football Association (FIFA) World Cup in Qatar. It is crucial that competitive athletes be well prepared for such tournaments, especially

those who are more used to living and practicing in moderate climates and are not adapted to hot temperatures. Athletes who do not reside and practice frequently in the Torrid Zone would likely need to undergo some kind of heat acclimatisation training before participating in competitions in this area. Commonly, it is said that a period of 10-14 days of heat exposure is sufficient for heat acclimatisation. Nevertheless, these prolonged interventions may not be feasible for the majority of athletic programmes. This phase may provide significant challenges for high-performance athletes who have limited time due to availability, schedule, training, or logistical constraints. In response to this, there have been recent efforts to assess the efficacy of heat training programmes that last for 7 days or less [4, 5]. Elite athletes may sometimes be required to achieve peak performance in challenging environmental circumstances.

There is enough evidence to support the fact that engaging in intense physical activity under severe conditions, such as high altitude, excessive heat, or extreme cold, puts additional strain on both the body and the mind (Ekkekakis, 2001) [11]. Research has proposed that the impact of environmental change often affects psychological functioning before it affects physiological components (Kobrick and Johnson, 1991) [12]. Therefore, measuring psychological well-being might serve as an effective early warning sign for the negative consequences of environmental stress. Mood reactions have been identified as a significant psychological factor in this context. Research by Bahrke and Shukitt-Hale (1993) [13] has shown that mood responses may indicate changes in the environment. Additionally, studies by Beedie *et al*. (2000) [14] have shown that mood responses can also serve as predictors of athletic performance. Teaching athletes skills to control their mood states in challenging environmental situations is crucial for their success. This is an essential responsibility for sport psychologists who work in practical settings (Terry, 1995) [15]. The racing suit material's impermeability hinders the passage of air to the skin, consequently diminishing the body's capacity to cool itself via evaporation. An inability to dissipate accumulated body heat leads to an elevation in core temperature, resulting in a decline in psychomotor function (Ramsey, 1995) [16].

Results and Discussion

Six elite football referees from Iraq did the fitness test in Iraq (Baghdad) 1\ 9\2019 and did the fitness test on Malaysia (Kuala Lumpur) 29\11\2019.

Fitness Test for Referee (R)

	Pass	Not pass
Speed (40 M) (6 times)	6 sec	Above 6 sec
Intravel (75 M) (15 sec and rest 18sec)	40 times (10 lap) 48 times (12 lab) (excellent)	Below 40 times

Fitness Test for Assistant Referee (AR)

	Pass	Not pass
CODA (Change Of Direction Ability)	10 sec 1 times	Below 10 sec
Speed (30 M) (5 times)	4.70 sec	Above 4.70 sec
Intravel (75 M) (15 sec and rest 20sec)	40 times (10 lap) 48 times (12 lab) (excellent)	Below 40 times

Fitness Test in Iraq

Temperature was 41 °C and Humidity was 40%

The result of referees in Iraq was:

Name	CODA	Speed	Interval
Zaid Thamer (R)		Pass	Pass 12 lap(Excelent)
Ameer Dawod (AR)	Pass	Pass	Pass 12 lap(Excelent)
Wathik Medalel (AR)	Pass	Pass	Pass 12 lap(Excelent)
Mayaid Mohammed (AR)	Pass	Pass	Pass 12 lap(Excelent)
Akram Ali (AR)	Pass	Pass	Pass 12 lap(Excelent)
Ahmed Sabah (AR)	Pass	Pass	Pass 12 lap(Excelent)

Show in this table all referees was pass the fitness and excellent in interval did 12 lap, the referee show adaptation to high increase in temperature and moderate increase in humidity.

Fitness Test in Malaysia

The result of referees in Malaysia was:

First: Temperature was 30 °C and Humidity was 91%

Name	Speed	Interval
Zaid Thamer (R)	Pass	Pass 12 lap(excellent)

In this table showed the referee adaptation to high increase in humidity and moderate increase in temperature pass all fitness tests and was excellent in interval 12 lap.

Second: Temperature was 28 °C and Humidity was 95%

Name	CODA	Speed	Interval
Ameer Dawod (AR)	Pass	Pass	Pass 10.5 lap
Wathik Medalel (AR)	Pass	Pass	Pass 10 lap
Mayaid Mohammed (AR)	Pass	Pass	Not Pass 8.5 lap
Akram Ali (AR)	Pass	Pass	Pass 11 lap

In this table showed different result all AR pass the fitness test and adaptation to highly increase in humidity reach to 97% and moderate increase in temperature except one can't pass.

Third: Temperature was 32 °C and Humidity 96%

Name	CODA	Speed	Interval
Ahmed Sabah (AR)	Pass	Pass	Pass 11 lap

In this table showed the AR was pass all fitness test and adaptation to highly increase in humidity and increase in temperature.

Temperature and humidity play important rule in performance of referee fitness test and in sometime had negative effect on performance if the referee not prepared and using different training in high temperature and high humidity.

There is a common belief that in order for exercise-induced heat acclimatisation to be most successful, athletes should do the same kind of activity that they would do during competition [17]. An effective method to do this is by using advanced ergometry with specified parameters in a controlled hot and/or humid environment inside an enclosed heat chamber, utilising the athlete's typical training mode. Considering the anticipated climatic conditions of the specific sports event, it is not sufficient to just be exposed to high temperatures without also experiencing increased

humidity in order to adequately prepare for hot and humid surroundings [22]. If suitable for the athlete, including specific humidity exposure into the acclimatisation plan may be beneficial. High humidity, which is a problematic feature of heat exposure, is currently under-researched [22]. Adapting to these situations necessitates adjusting the amount and intensity of training to ensure that the correct exercise and recuperation methods are used. Measuring the level of heat stress during training sessions using tools like ingestible temperature capsules might enhance this procedure. Submaximal heat stress tests that include physiological and performance assessments may be used throughout the acclimatisation phase to determine the extent of adaptation achieved [23].

Conclusion

Males participating in endurance sports are likely to see a decline in athletic performance in extremely warm to hot situations. Conversely, this is not true for competitors participating in short-distance sprint competitions. Short-term heat acclimatisation programmes lasting 7 days provide athletes some thermoregulatory adaptations and performance advantages. However, according to current studies, longer acclimation durations of 8-14 days might yield greater results. Nevertheless, substantial new research indicates that STHA may be beneficial [5], considering the logistical challenges of busy training and competition schedules. Coaches and athletes are inclined to prioritise shorter-term procedures. Efficiency in achieving shorter-term acclimatisation may be enhanced by using tactics that include manipulating the duration of active and passive heat exposure, as well as including additional sessions during the adaptation period.

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