

Mental, physiological and medical considerations for elite football players in the Saudi Pro League: a call for action

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INTRODUCTION

In 2023, the Saudi Professional League, known as the Roshn Saudi Pro League (RSL), garnered significant global attention due to its successful acquisition of high-calibre football players worldwide. This transformation was marked by the arrival to the Kingdom of Saudi Arabia (KSA) of football icon Cristiano Ronaldo in early 2023, a move that signalled the league's ambitious intentions.¹ In July 2023, the surprises continued to unfold, with the league securing the services of Ballon d'Or 2022-winner Karim Benzema,¹ and shortly after (ie, August 2023), the Brazilian superstar Neymar Da Silva Santos Junior, who joined his new Club with a staggering value of €90.00 million.¹ These monumental signings have propelled the overall market value of the RSL to an impressive €906.85 million.¹ However, as the RSL continues to attract football's iconic players, it is imperative to consider the unique and challenging environmental conditions of KSA/the Middle East. Many players are accustomed to milder European climates. They will now have to adapt to the extreme heat, high humidity and dust that characterise the Middle East environment for several months every year. These conditions are not only a discomfort² but also pose significant physiological and health challenges requiring meticulous attention and management.²

Ensuring the health and well-being of elite footballers is a responsibility that extends beyond the players themselves to the supporting medical and technical staff. As the RSL continues to rise in stature, it is incumbent on all stakeholders to prioritise players' health and safety, safeguarding the league's reputation and evolution. In this context, this editorial aims to explore the multifaceted challenges posed by the extreme climatic conditions of the Middle East, the potential health risks for players and the strategies

that medical and sports science teams should employ to mitigate these risks.

NAVIGATING THE MULTIFACETED CHALLENGES OF ELITE FOOTBALL IN KSA

As outlined in [figure 1](#) and [table 1](#), the challenging stressors that threaten the newly recruited players range from the pathophysiological responses to hyperthermic conditions and high mechanical load, to the mental health implications of cultural transition.³ It is imperative for the healthcare staff supporting these players to adopt a comprehensive, evidence-based approach, (1) not only addressing the immediate risks of heat-related illnesses and overuse injuries but (2) also proactively managing the mental health and well-being of players and their families as they adapt to a new and markedly different professional and personal landscape.

OPTIMISING PERFORMANCE AND HEALTH IN EXTREME CLIMATES: A COMPREHENSIVE APPROACH FOR ELITE SOCCER PLAYERS

Elite soccer performance places diverse bioenergetic demands on players, involving the phosphagen system, glycolytic pathway and oxidative metabolism.² Fatigue management and recovery strategies are critical due to high-intensity efforts and congested fixture schedules in constraining conditions. Due to the extreme climate, poor air quality and dusty/sunny conditions can pose respiratory challenges, vitamin-D deficiency issues and implications for players' mental well-being.⁴ Players face significant thermoregulatory demands in extreme heat/humidity. Efficient heat dissipation mechanisms, such as sweating and increased skin blood flow, are essential to maintain core body temperature.⁵ Hydration and electrolyte balance are critical to prevent heat-related illnesses. Acclimatisation strategies involving gradual exposure to heat and

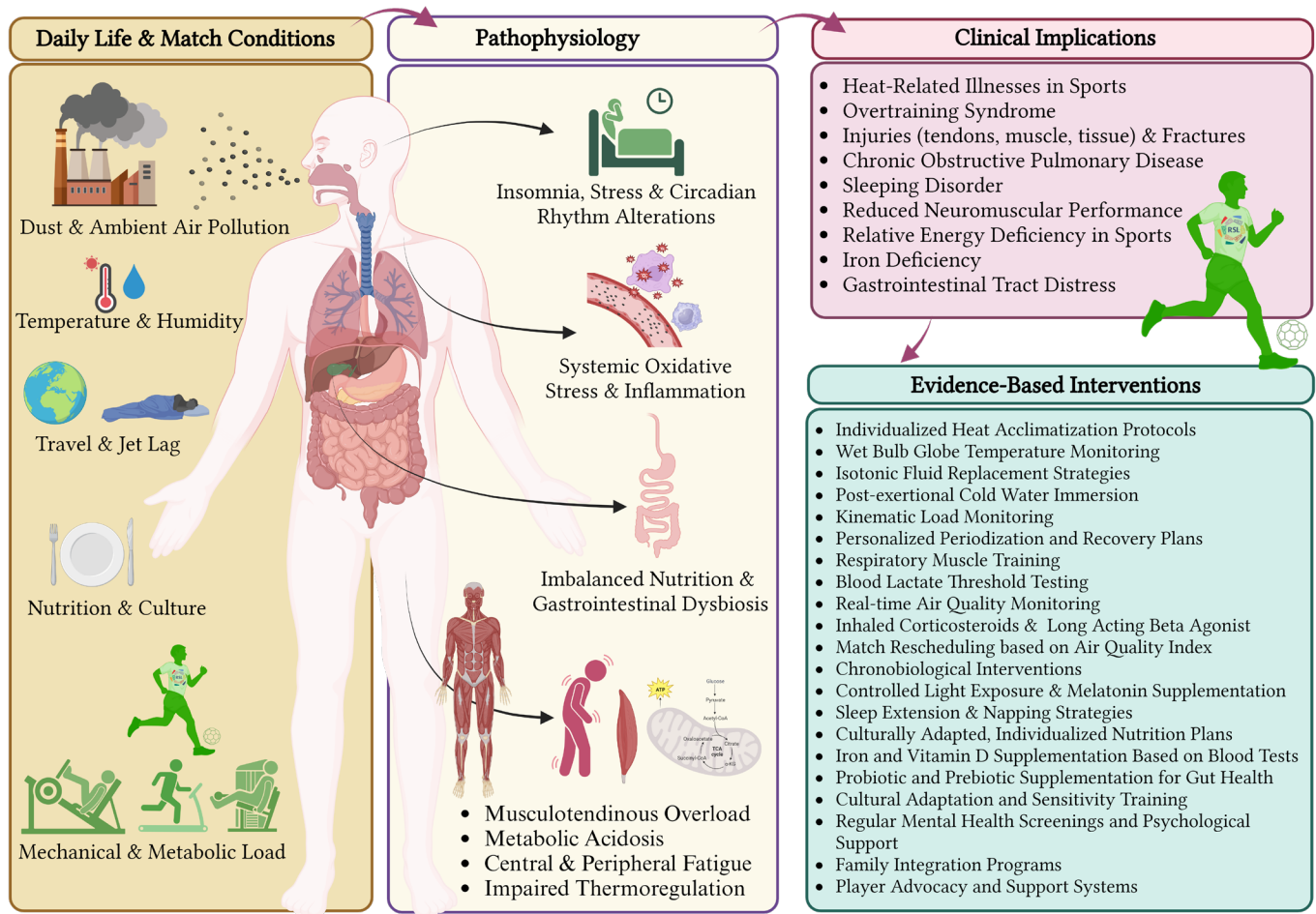


Figure 1 Key environmental and physiological stressors for players in the Saudi Pro League.

humidity are, therefore, key for the players with a specific focus on newly recruited ones.⁵

Elite players are subjected to intense physical and psychological strain, increasing the risk of hypohydration/dehydration, heat-related illnesses and injuries. Nutritional and hydration challenges are complex, especially in hot environments. Psychological stressors, including cultural adjustments and potential separation from family and friends, can affect the players' mental health and performance.⁶ Each player's response/adaptation to these conditions and demands is unique, influenced by genetics and pre-existing health conditions, deserving each an expert individualised approach.⁶

A CALL FOR ACTION

To optimise players' health in the constraining Middle East environment, a multidisciplinary approach should be considered: regular medical surveillance and monitoring, structured heat acclimatisation programmes, personalised nutrition and hydration strategies, psychological support services, evidence-based recovery and rehabilitation protocols and eventually environmental modifications when applicable, such as scheduling training/matches during cooler times and modifying facilities to provide shade and cooling systems. In this

regard, education and clear communication among all stakeholders are paramount.

This is a call for action to implement comprehensive heat policies grounded in scientific evidence in challenging environments in Middle-Eastern countries like KSA. These policies and guidelines should specify fair protocols for rescheduling or cancelling matches based on objective environmental measures (Wet bulb globe temperature and air quality index, among others) or religious and cultural considerations like Ramadan and prayer times.⁷ Enhanced medical support and emergency preparedness, including regular drills and updates on best practices, are also paramount.⁸ Investment in research to study the unique challenges players face during and after their football career should be considered. Players shall be educated and empowered to communicate their needs and concerns with their direct technical and medical supporting staff.⁸ Collaboration between clubs, governing bodies, healthcare professionals and researchers is vital, as is advocacy for players' welfare to engage policymakers and the broader public in support of necessary changes.

The 2023 surge in the RSL is a monumental step for football in KSA and the Middle East. However, bringing a profound responsibility to protect the health and

Table 1 Pathophysiological responses, clinical consequences and interventions in elite football players: the case of the Saudi Pro League

Match conditions	Pathophysiological responses	Potential clinical consequences	Evidence-based interventions
A hyperthermic and humid environment	<ul style="list-style-type: none"> ▶ Impaired thermoregulation ▶ Elevated core temperature ▶ Altered electrolyte balance 	<ul style="list-style-type: none"> ▶ EHS ▶ Exercise-associated hyponatremia ▶ Heat syncope ▶ Rhabdomyolysis 	<ul style="list-style-type: none"> ▶ EHS Emergency preparedness (ie, immediate access to CWI) ▶ Individualised heat acclimatisation protocols ▶ WBGT monitoring ▶ Isotonic fluid replacement strategies ▶ Post-exertional CWI
High mechanical and metabolic load	<ul style="list-style-type: none"> ▶ Musculotendinous overload ▶ Metabolic acidosis ▶ Central and peripheral fatigue 	<ul style="list-style-type: none"> ▶ Tendinopathies ▶ Stress fractures ▶ Exercise-induced hypoventilation ▶ Overtraining syndrome 	<ul style="list-style-type: none"> ▶ Kinematic load monitoring ▶ Personalised periodization and recovery plans ▶ Respiratory muscle training ▶ Blood lactate threshold testing
Ambient air pollution	<ul style="list-style-type: none"> ▶ bronchial hyperresponsiveness ▶ Altered pulmonary gas exchange ▶ Systemic inflammatory response 	<ul style="list-style-type: none"> ▶ Exercise-induced bronchoconstriction ▶ Hypoxemia 	<ul style="list-style-type: none"> ▶ Real-time air quality monitoring ▶ Inhaled corticosteroids and LABA ▶ Match rescheduling based on AQI
Trans meridian travel and jet lag	<ul style="list-style-type: none"> ▶ Circadian rhythm disruption ▶ Sleep architecture alterations ▶ Hormonal imbalance 	<ul style="list-style-type: none"> ▶ Insomnia ▶ Reduced neuromuscular performance ▶ Increased injury risk due to altered proprioception 	<ul style="list-style-type: none"> ▶ Chronobiological interventions ▶ Controlled light exposure and melatonin supplementation ▶ Sleep extension and napping strategies
Nutritional and cultural adaptation	<ul style="list-style-type: none"> ▶ Altered macronutrient and micronutrient intake ▶ Gastrointestinal dysbiosis ▶ Energy availability imbalance ▶ Vitamin D deficiency 	<ul style="list-style-type: none"> ▶ Relative energy deficiency in sport ▶ Iron-deficiency anaemia ▶ GI distress 	<ul style="list-style-type: none"> ▶ Culturally adapted, individualised nutrition plans ▶ Iron and vitamin D supplementation based on blood tests ▶ Probiotic and prebiotic supplementation for GIT health
Social and lifestyle transition	<ul style="list-style-type: none"> ▶ Elevated cortisol levels ▶ Altered neurotransmitter activity ▶ Social isolation and loneliness 	<ul style="list-style-type: none"> ▶ Depression and anxiety disorders ▶ Adjustment disorder ▶ Reduced cognitive and psychomotor performance ▶ Family stress due to separation 	<ul style="list-style-type: none"> ▶ Social adaptation and sensitivity training ▶ Regular mental health screenings and psychological support ▶ Family integration programmes ▶ MBSR and meditation programmes

AQI, Air Quality Index; CWI, cold water immersion; EHS, exertional heat stroke; GI, gastrointestinal; GIT, gastrointestinal tract; LABA, long-acting beta agonist; MBSR, mindfulness-based stress reduction; WBGT, wet bulb globe temperature.

performance of the players. This editorial emphasises the urgent need for research and evidence-based interventions tailored to the unique challenges of elite football in extreme conditions. During this exciting new football chapter, KSA can set a global example in player health and safety. We believe this can efficiently be done with Middle Eastern international collaboration with neighbouring countries, merging experiences for the good of Middle Eastern football.

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