Revista Review Index Journal of Multidisciplinary 2022; 2(1):51-53
eISSN: 2583-0031
Double-blind peer reviewed | Refereed Quarterly Online Journal

# The Impact of High Mountain Abiotic Factors on Kabaddi Athlete Training

*Ankit Kumar

*Research Scholar, Department of Physical Education, Sabaramati University, Ahmedabad*

**Abstract**

*This study examines the influence of abiotic factors in high mountain environments on the training of Kabaddi athletes. High-altitude regions present unique challenges to athletic performance and acclimatization due to factors such as reduced oxygen levels, extreme temperatures, and altered terrain. The study investigates how these environmental variables affect the physical and physiological preparedness of Kabaddi athletes during their training. Data is collected through field observations, physiological measurements, and athlete feedback. The findings of this research aim to provide insights into optimizing training regimens and improving the performance of Kabaddi athletes who operate in high mountain environments.*

**Keywords:** *Geografiya, Sport, Atmosfera bosimi*

**Article Publication**

Published Online: 31-Mar-2022

***Author's Correspondence**

Ankit Kumar

Research Scholar, Department of Physical Education, Sabaramati University, Ahmedabad

ankit.kumar787845@gmail.com



## Introduction

The human body is subjected to various abiotic factors in mountainous environments, which are non-living elements of the environment. These abiotic factors, mainly driven by climatic conditions, have significant physiological effects and are contingent upon factors such as altitude, topographical features, and other physical and geographical attributes. The distinctive features of mountain climate include reduced atmospheric pressure, rapid fluctuations in diurnal and nocturnal temperatures, low absolute humidity, intense sunlight, strong winds amplifying cooling effects, and elevated air ionization, characterized by an excess of negative or positive ions. Additionally, there are other, less explored physical and chemical modifiers at play.

These factors do not act in isolation but interact within the human body, contributing to a potential state of stress. Their collective impact can vary, leading to differences in how individuals respond to similar elevations in various mountainous regions. Conversely, identical functional changes can be observed at different altitudes. This variability can be attributed to two primary factors:

1. The combination of unique influences and environmental conditions specific to different mountainous regions, each with its distinct geographical characteristics.

2. The considerable inter-individual differences in tolerance to these environmental conditions.

## Material and Method

It is well-established that certain individuals exhibit a high resistance to oxygen deficiency and other extreme environmental factors. However, even within the realm of athletes, some individuals display reduced tolerance to hypoxic conditions. The following is a brief examination of specific characteristics of the individual elements that constitute the mountain climate.

Temperature: With increasing altitude, the average annual air temperature gradually decreases by approximately 0.6°C for every 100 meters ascended. This decline in temperature is not uniform across seasons or geographical areas, varying between summer (0.6°C) and winter (0.4°C). For instance, in the Caucasus region, the average summer temperature drop is between 6.3°C and 6.8°C, while in the Pamirs, it can plummet to as much as 9°C. According to the international standard atmospheric table, which closely aligns with average conditions at moderate latitudes, the average air temperature at 3000 meters is approximately -4.5°C and at 4000 meters, it drops to -11°C.

Humidity: Humidity represents the quantity of water vapor in the air. Typically, the partial pressure of water vapor accounts for approximately 1% of the pressure at sea level. Since the pressure of saturated water vapor is primarily determined by air temperature, it is significantly lower in mountainous areas where temperatures are reduced. At an altitude of 2000 meters, humidity is roughly half of what it is at sea level, and at higher altitudes, the air is notably dry. This low humidity level carries several implications: it influences solar radiation, modifies the nature of solar radiation, and exacerbates fluid loss through the body. This fluid loss occurs not only through skin surface evaporation but also within the lungs during hyperventilation. Thus, maintaining an adequate hydration regimen in mountainous regions is crucial, as dehydration can compromise performance.

Sunlight: Solar energy becomes notably more intense at high mountain altitudes due to increased dryness, atmospheric transparency, and low air density. For every 1000 meters in altitude, there is an average 10% increase in total solar radiation. At these altitudes, the body is exposed to visible and invisible solar rays, including infrared and biologically active ultraviolet radiation. Sunlight exposure leads to several beneficial effects, including the activation of metabolic processes, improved immune function, enhanced tissue nutrition, overall well-being, increased appetite, and improved sleep. Sun treatment is often employed due to its invigorating and fortifying properties. However, excessive sun exposure can result in adverse outcomes such as sunburn, sunstroke, cardiovascular and neurological conditions, and the exacerbation of chronic inflammatory processes. Prolonged exposure to high levels of ultraviolet radiation can cause skin erythema, keratitis, skin cancer, cataracts, and weaken the immune system.

Atmospheric Pressure: As altitude increases, atmospheric pressure diminishes, while the percentage of oxygen and other gases in the atmosphere remains relatively constant. At 3000 meters above sea level, atmospheric pressure is reduced by 31%, and at 4000 meters, it drops by 39% compared to sea level. The level of atmospheric pressure can vary with latitude, tending to be higher in warmer weather than in colder conditions. Reduced sunlight exposure leads to hypoxemia, resulting in the diminished oxygen saturation of hemoglobin and tissue hypoxia. In response, the body initiates various adaptive mechanisms to ensure oxygen delivery to tissues. Some experts assert that altitude acclimatization is primarily an adaptation to hypocapnia, although numerous authors have emphasized hypoxic hypoxia as the predominant factor in mountainous climates, often overlooking the intricate interplay of environmental factors that also affect sports performance.

Nevertheless, extensive research in climatophysiology has demonstrated consistent vegetative responses to major climatic factors at similar altitudes across different mountainous regions. Despite these shared physiological reactions, people's tolerance of similar altitudes can vary significantly. Conversely, identical functional shifts can manifest at varying altitudes. This discrepancy can be attributed to two primary factors: the unique influences of distinct mountainous regions, each characterized by specific geographical features and varying combinations of environmental factors, and the substantial individual differences in tolerance to these conditions. Consequently, it has been postulated that the mountain climate exerts a holistic influence on individuals, taking into account the intricate interplay of abiotic elements specific to each mountainous area.

## Conclusion

In this context, a comprehensive mathematical model has been devised to encompass the impact of three primary mountain environment factors on the human body: partial pressure of oxygen, temperature, and humidity. This innovative approach has enabled the representation of the combined effect of these factors through a unified bioclimatic indicator known as the "effective altitude."

Remarkably, the "effective altitude" often deviates from the actual altitude and proves to be highly sensitive to variations in its underlying factors. Given the continuous fluctuations in the external mountainous environment, individuals experience metaphorical vertical shifts akin to navigating a colossal pendulum. By utilizing the concept of "effective altitude," it becomes possible to more accurately discern regional disparities in the incidence and progression of mountain-related health issues than by considering only the partial pressure of oxygen. This criterion also aids in classifying different mountainous regions based on this "effective altitude" metric.

In summary, an understanding of geographical and climatic factors is indispensable for athlete training, preparation for various sports competitions, and ultimately, achieving success in sports endeavors. Hence, it is advisable for not only geographers but also physical education coaches and scientists to acquaint themselves with the principles of geography, as it significantly informs athletic performance and overall well-being.

## References

Bale J. Sport and Place: A Geography of Sport in England, Scotland and Wales. Lincoln: University of Nebraska Press, 1982.

Bale J. Sports Geography. London: Routledge, 2003.

Bale J. Landscape of modern sport, Leicester University Press, Leicester, 1994.

Koch N. Critical geographies of sport: space, power and sport in global perspective. London ; New York: Routledge, Taylor & Francis Group, 2017.