

A Correlational Study of Physiological and Physical Fitness Parameters Among Intercollegiate Volleyball Players from Hill and Non-Hilly Areas in the Jammu Region

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Abstract

The study aimed to analyze and compare the relationship between selected physiological and physical fitness factors among intercollegiate male volleyball players from hilly and non-hilly areas of the Jammu region. A total of 160 participants, comprising 80 players from each region, aged 18 to 25 years, were included in the research. The chosen variables for assessment were flexibility, speed, heart rate, and body mass index (BMI). Data analysis was performed using independent sample t-tests and point-biserial correlation methods to identify mean differences and the strength of associations between the two regional groups.

The analysis showed no meaningful differences between players from hilly and non-hilly regions in terms of flexibility ($t = 0.6357$, $p > 0.05$), speed ($t = 0.2052$, $p > 0.05$), or body mass index ($t = 0.1999$, $p > 0.05$). In contrast, a significant variation was observed in heart rate ($t = 2.9648$, $p < 0.05$), with non-hilly players recording higher average heart rates than players from hilly areas. Furthermore, correlation results revealed only weak and statistically insignificant relationships between the players' region of residence and the measured variables (r values ranging from 0.015 to 0.228).

The study indicates that, apart from heart rate, the type of geographical terrain—whether hilly or plain—has little effect on the physical and physiological fitness levels of intercollegiate volleyball players in the Jammu region. These outcomes emphasize that uniform training practices and athletes' adaptability to their environments contribute to maintaining comparable fitness standards across different terrains.

Introduction

Volleyball is an energetic and fast-paced team sport that demands a well-rounded blend of strength, speed, agility, flexibility, and endurance. The physical and physiological fitness components play a crucial role in determining a player's overall performance. These attributes not only affect the precision and quality of skill execution but also shape an athlete's ability to adjust to varying training loads and environmental conditions.

The Jammu region of India is known for its remarkable geographical variety, featuring both mountainous and plain landscapes. Athletes from these contrasting areas often develop different levels of physical fitness and physiological adaptation shaped by altitude, climate, and daily lifestyle. Those from hilly zones tend to train under lower oxygen conditions, which can strengthen their cardiovascular

endurance, whereas athletes from non-hilly areas often gain advantages from organized training systems and superior sporting facilities.

Hence, the present study aimed to analyze and correlate the selected physiological and physical fitness variables—namely flexibility, speed, heart rate, and body mass index (BMI)—between intercollegiate volleyball players from hilly and non-hilly regions of Jammu.

Objectives of the Study

1. To compare the selected physical fitness variables (flexibility and speed) between hilly and non-hilly volleyball players.
2. To compare the selected physiological variables (heart rate and body mass index) between the two groups.
3. To determine the correlation between regional background (hill or non-hill) and selected physiological and physical fitness parameters.

Hypotheses

1. There will be no significant difference in flexibility, speed, heart rate, and BMI between hilly and non-hilly volleyball players.
2. There will be no significant correlation between geographical background and the selected physiological and physical fitness parameters.

Methodology

The research employed a descriptive and correlational design. A purposive sampling method was used to select 160 male volleyball players competing at the intercollegiate level. The sample included 80 players from the hilly areas and 80 from the non-hilly regions of Jammu. All participants were active intercollegiate athletes with at least two years of competitive playing experience.

Selection of the variables:

Physical Fitness Variables: Flexibility, Speed

Physiological Variables: Heart Rate, Body Mass Index (BMI)

Tools and Tests Used:

- Flexibility: Sit and Reach Test (cm)
- Speed: 50-meter Dash Test (seconds)
- Heart Rate: Measured in beats per minute (bpm) at rest
- Body Mass Index (BMI): Computed as weight (kg) / height (m²)

Statistical Analysis:

Descriptive statistics (Mean, SD, SEM), independent t-test, and point-biserial correlation (rpb) were employed to analyze the data. The level of significance was set at 0.05.

Results and Findings

Table 1. Correlation Between Regional Background and Selected Fitness Parameters

Parameter	Correlation Coefficient (r)	r ² (%)	Relationship Strength	Significance (p)	Interpretation
Flexibility	0.05	0.25	Very Weak Positive	> 0.05	Not Significant
Speed	0.02	0.04	Very Weak Positive	> 0.05	Not Significant
Heart Rate	0.228	5.20	Weak Positive	< 0.05	Significant
Body Mass Index	0.015	0.02	Very Weak Positive	> 0.05	Not Significant

The correlation analysis reveals that regional background exhibits minimal association with most fitness indicators. However, heart rate presented a weak but statistically significant positive correlation ($r = 0.228$, $p < 0.05$), suggesting that altitude-related environmental factors could play a role in shaping cardiovascular efficiency among athletes from hilly regions.

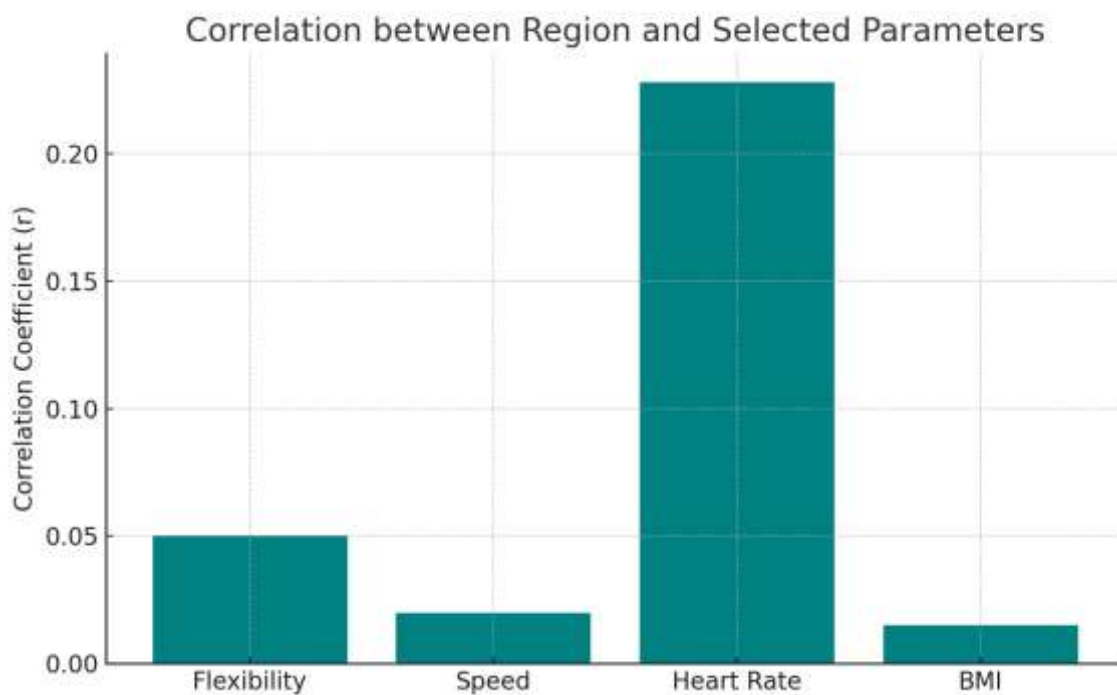


Figure 1: Correlation Coefficients (r) between Region Type and Selected Fitness Parameters.

Discussion

The results show that there were no notable differences in flexibility, speed, or BMI between volleyball players from hilly and non-hilly regions. However, players from hilly areas exhibited a significantly lower heart rate, indicating better cardiovascular adaptation. Overall, the weak correlations across most

fitness parameters suggest that the type of terrain has little influence on the physical fitness of well-trained volleyball players.

This aligns with earlier studies showing that altitude and other environmental conditions mainly influence cardiovascular responses, while an individual's training and conditioning largely determine overall fitness outcomes.

Conclusion

The findings indicate that flexibility, speed, and BMI do not differ significantly between intercollegiate volleyball players from hilly and non-hilly areas of the Jammu region. However, a notable variation in heart rate shows that players residing in hilly regions tend to have superior cardiovascular efficiency compared to their counterparts from non-hilly zones. Moreover, correlation analysis demonstrated weak and non-significant associations between geographical background and most fitness and physiological measures, implying that the type of terrain has only a minimal effect on the overall fitness levels of volleyball players.

References

1. American College of Sports Medicine. (2018). ACSM's Guidelines for Exercise Testing and Prescription (10th ed.). Wolters Kluwer.
2. Bompa, T. O., & Buzzichelli, C. (2019). Periodization: Theory and Methodology of Training (6th ed.). Human Kinetics.
3. Fox, E. L., Bowers, R. W., & Foss, M. L. (2012). The Physiological Basis for Exercise and Sport. McGraw-Hill.
4. Singh, R., & Kumar, P. (2020). Comparative study of selected physical fitness variables among volleyball players of different altitudes. *Journal of Sports Science and Fitness*, 9(2), 45–51.
5. Wilmore, J. H., & Costill, D. L. (2012). Physiology of Sport and Exercise (6th ed.). Human Kinetics.