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# Comparative Analysis 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 current study compares the physiological and physical fitness indices of intercollegiate volleyball players from hilly and non-hilly parts of the Jammu region. A total of 160 intercollegiate volleyball players were picked, with 80 coming from hilly areas and 80 from flat areas. The factors used for this study include physiological variables such as body mass index (BMI) and resting heart rate, as well as physical fitness markers such as flexibility and speed. To examine physiological and physical fitness factors among intercollegiate volleyball players from hilly and non-hilly areas, descriptive statistics and an independent t-test were utilized at a significance level of 0.05. The findings suggest that there is significant variation in heart rate and no significant difference found in physical parameters i.e flexibility and speed and physiological parameter i.e body mass index between intercollegiate volleyball players from hilly and non-hilly areas of Jammu.

**Keywords**: Flexibility, Speed, BMI, Resting Heart Rate.

## INTRODUCTION:

In the modern world, everyone aspires to make rapid growth in all spheres of life, including sports and physical exercise. Scientific techniques can improve sports performance by providing insight into an individual's anatomy and physiology. Sports performance requires physical fitness, scientific procedures, equipment, physique, muscle composition, and physiological variables. These elements also affect the fitness, strength, and capacities of athletes. Physical fitness is the most significant component since it affects method efficiency. When selecting athletes for any activity, it's important to prioritize their physical fitness. Experts have observed that the performance of volleyball players is not solely determined by their skill mastery, but also by their physical and physiological strength and capacities. Physical fitness refers to an individual's ability to perform daily tasks without feeling compelled or stressed. It is influenced by factors such as body composition, cardio-respiratory fitness, muscle strength, and endurance. In addition to possessing the following skills—speed, endurance, power, and agility—a volleyball player must also have a healthy body and be knowledgeable about applying scientific methods in order to perform well. Players' physical and physiological fitness levels vary

depending on the level of competition. This study aims to compare the physical and physiological fitness of target ball players across different levels of competition.

## 2. Literature Review

**Kaur Manpreet and Singh Somanpreet (2020)** For the purpose of the study, total number of 100 subjects age ranged from 14-19 years old was selected from government and private school of Punjab. The subjects were randomly selected. The subjects were made thoroughly aware regarding the objectives of the study and different Health Related Fitness variables (Cardio-respiratory Endurance, Muscular Strength & Endurance, flexibility and Body Composition) were selected for this present study. The independent t test was applied to analyze the obtained data at level of significance 0.05 and the results indicates that a significant difference was found in the Cardio-respiratory Endurance, Muscular Strength & Endurance, and Body Composition of the government and private school of Punjab whereas, an insignificant difference was found in the Flexibility of government and private school of Punjab. [40]

**Singh, T. (2021)** The purpose of this study was to compare muscular power and speed between the Circle Style Male Kabaddi Players of Punjabi University Patiala and Panjab University Chandigarh. A total one hundred nine (N=109) circle style male kabaddi players of eight teams of both universities were selected. In this study the over head medicine ball throw test and 50 meters run test were used to measure the muscular power of upper body and speed of the players. The study had been analyzed with the help of mean, SD, SED and the comparison between groups was done with the help of 't' ratio. For Statistical Description the Statistical Package for Social Sciences (SPSS), version 21.0 was used. The study revealed that on the basis of the finding both Universities' players were possessing same degree of speed ability. But players of Panjab University Chandigarh were better in muscular power of upper body than the players of Punjabi University Patiala**.** [31]

**Singh, N. (2022)** The objective of the study was to find the differences of selected physical fitness components between the Volleyball and Football players of age 16-18 years. The subjects of this study were the boys of 16-18 years age selected from the four districts of Punjab viz. Amritsar, Tarn Taran, Gurdaspur and Pathankot. The subjects were 150 Volleyball players and 150 Football players. The purposive sampling method was used to select the sample. They were tested for their physical fitness components and comparisons were made. The physical fitness components were explosive power, speed, muscular endurance, balance and flexibility. Independent t-test revealed that there was a significant difference between Football players and Volleyball players on the variable explosive power and speed. The study concluded that Volleyball players had better explosive power whereas Football players had better speed. [14]

**Tiwari, L. (2024)** The purpose of the study was to compare the physical & physiological variables among the Inter District & Inter State Levels of Basketball players. Sixty (60) Male basketball players (30 inter district and 30 interstate) were randomly selected from Uttar Pradesh as a subject. The age of the subjects were ranged from 17-28 years. It was hypothesized that there would be a significant difference in the physical fitness variables and physiological variables among the Indian basketball players of different levels of competitions. The physical variables chosen were speed, endurance and power which were measured by 50m dash(sec), 2.4km. run(min.) and sergeant jump. The physiological variables were resting heart rate measured by manual methods and vital capacity which is measured by dry spirometre. The data collected on the different level of basketball player were analyzed by independent "t" test. The level of significance for testing the hypothesis was set at 0.05 level of

confidence. It is found that the interstate level players were better than inter district players with respect to speed, power and endurance. In terms of physiological variables namely RHR and vital capacity both the group were not differ significantly. [35]

**Singh N & Harish (2025)** the aim of the present study was to compare the mental toughness between Rural and urban racket sports players. Total hundred (n=100) players were selected for study as sample. The samples were further divided into two groups of 40 rural players and 60 urban players. The data was collected by using simple random sampling technique of sports person and age of the subjects was 18 to 30 years. In order to assess the mental toughness of rural racket sports players and urban racket sports players, the questionnaire by Sandeep Tiwari was used. The data was collected tabulated and subject to statistical analysis. Descriptive analysis was done by computing means, standard deviations and t-test. The result revealed that there is no significant difference found between the rural racket sports players and urban racket sports players. [53]

## 3. Methodology

### 3.1 Research Design

This is a survey study under Descriptive Research.

### 3.2 Selection of the Subjects

A group of 160 volleyball players in which male 80 and female 80 volleyball athletes, aged between 18 and 25, will be chosen from the Jammu area. This area will be split into two segments: hilly (80) and non-hilly (80). Eight colleges from the hilly section and five from the non-hilly section will be picked through convenience sampling, and from each college, 10 intercollegiate volleyball players will be intentionally selected.

### 3.3 Selection of the variables

The study selected physiological factors such as body mass index (BMI) and resting heart rate, as well as physical fitness factors such as Speed and Flexibility.

### 3.4 Statistical Analysis

The chosen physiological and physical fitness components of intercollegiate volleyball players will be compared and analyzed using an independent t-test with SPSS software to determine the significance of the findings. To test the hypothesis, the significance level was set at 0.05.

## 4. Other Sections

| S.No. | Tools / Test | Variables | Equipments | Scoring |
|---|---|---|---|---|
| 1 | Sit and Reach | Flexibility | Mat or flat surface | Distance |
| 2 | 50 Yard Dash | Speed | Paper, pencil | Distance |
| 3 | Stethoscopes | Heart rate | Stopwatch and scoring sheet | Beats in min. |
| 4 | Body Mass Index(BMI) | To measure the body fatness | BMI calculator | Acc. To norms |

## 5. Results and Discussion

The data collected for the study was analyzed using statistical methods, and the findings are presented in the tables below.

**Table:1 Summary of t-test findings comparing the Flexibility of hilly (80) and non-hilly (80) intercollegiate volleyball players in the Jammu region.**

| Flexibility | | |
|---|---|---|
| | Hilly | Non-Hilly |
| Mean | 24.98 | 25.39 |
| Stand. Dev. | 4.44 | 3.74 |
| SEM | 0.50 | 0.42 |
| n | 80 | 80 |
| t | 0.6357 | |
| d.o.f | 158 | |
| critical value | 1.653 | |

The computed 't' value is lesser than the critical value (0.6357>1.653). There is no significant difference in the flexibility among hilly (mean=24.98) and non-hilly (mean=25.39) intercollegiate volleyball players of Jammu region.

**Table:2 Summary of t-test findings comparing the Speed of hilly (80) and non-hilly (80) intercollegiate volleyball players in the Jammu region.**

| Speed | | |
|---|---|---|
| | Hilly | Non-Hilly |
| Mean | 7.95 | 7.99 |
| Stand. Dev. | 1.25 | 1.24 |
| SEM | 0.1398 | 0.1393 |
| n | 80 | 80 |
| t | 0.2052 | |
| d.o.f | 158 | |
| critical value | 1.653 | |

The computed 't' value is lesser than the critical value (0.2052 <1.653). There is no significant difference in the speed among hilly (mean=7.95) and non-hilly (mean=7.99) intercollegiate volleyball players of Jammu region.

**Table:3 Summary of t-test findings comparing the Speed of hilly (80) and non-hilly (80) intercollegiate volleyball players in the Jammu region.**

| Heart Rate | | |
|---|---|---|
| | Hilly | Non-Hilly |
| Mean | 86.53 | 93.44 |
| Stand. Dev. | 13.87 | 15.57 |
| SEM | 1.55 | 1.74 |
| n | 80 | 80 |
| t | 2.9648 | |
| d.o.f | 158 | |
| critical value | 1.653 | |

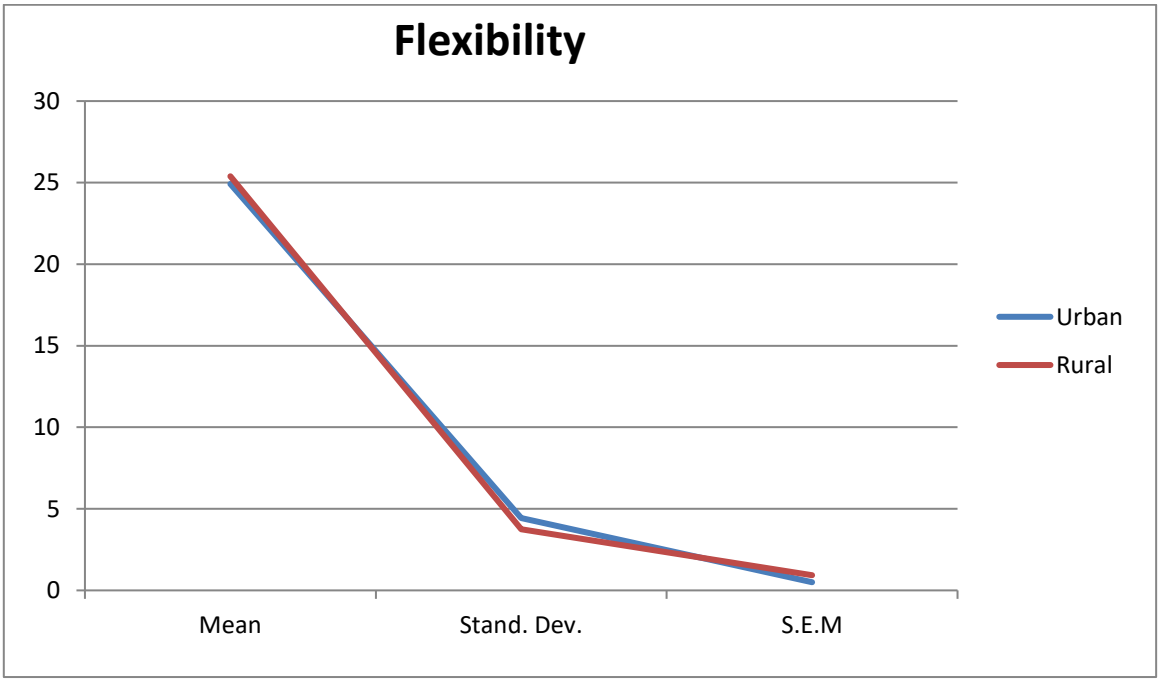
The computed 't' value is greater than the critical value (2.9648>1.653). There is a significant difference in the heart rate among hilly (mean=86.53) and non-hilly (mean=93.44) intercollegiate volleyball players of Jammu region.

**Table:4 Summary of t-test findings comparing the Speed of hilly (80) and non-hilly (80) intercollegiate volleyball players in the Jammu region.**

| Body Mass Index | | |
|---|---|---|
| | Hilly | Non-Hilly |
| Mean | 20.15 | 20.08 |
| Stand. Dev. | 2.27 | 2.34 |
| SEM | 0.254 | 0.262 |
| n | 80 | 80 |
| t | 0.1999 | |
| d.o.f | 158 | |
| critical value | 1.653 | |

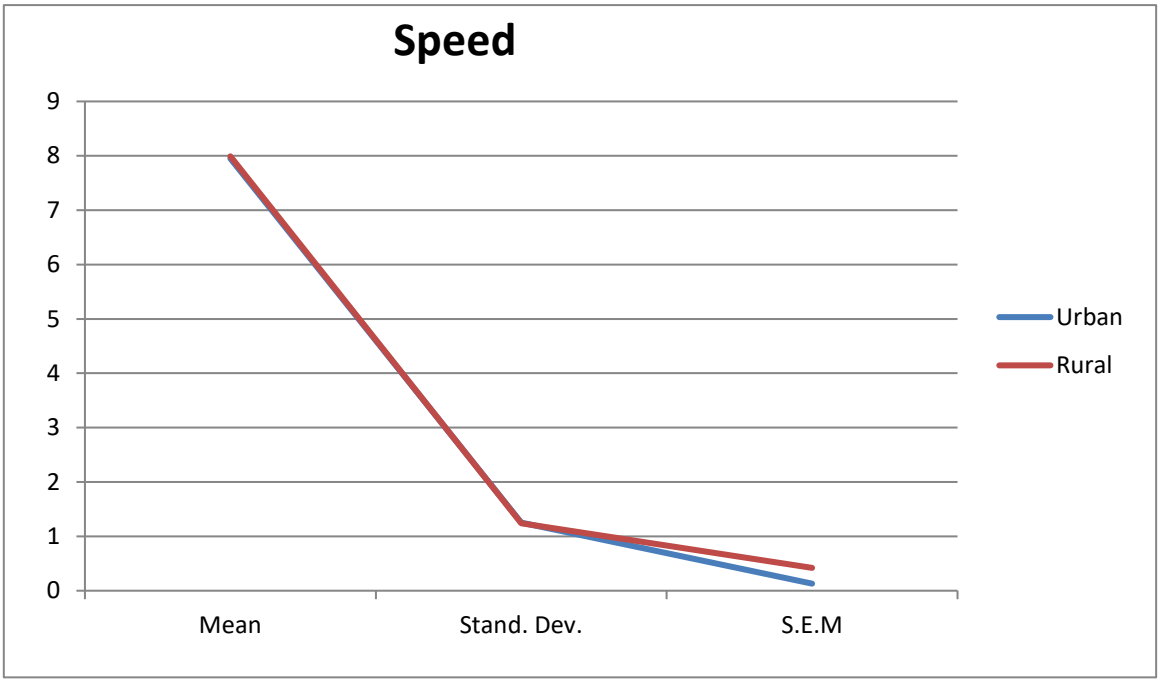
The computed 't' value is lesser than the critical value (0.1999<1.653). There is no significant difference in the body mass index among hilly (mean=20.15) and non-hilly (mean=20.08) intercollegiate volleyball players of Jammu region.

**Fig:1 A graphical representation comparing the flexibility of intercollegiate volleyball players from hilly (n=80) and non-hilly (n=80) areas of the Jammu region (n=160) regarding the mean, standard error of the mean, and standard deviation.**



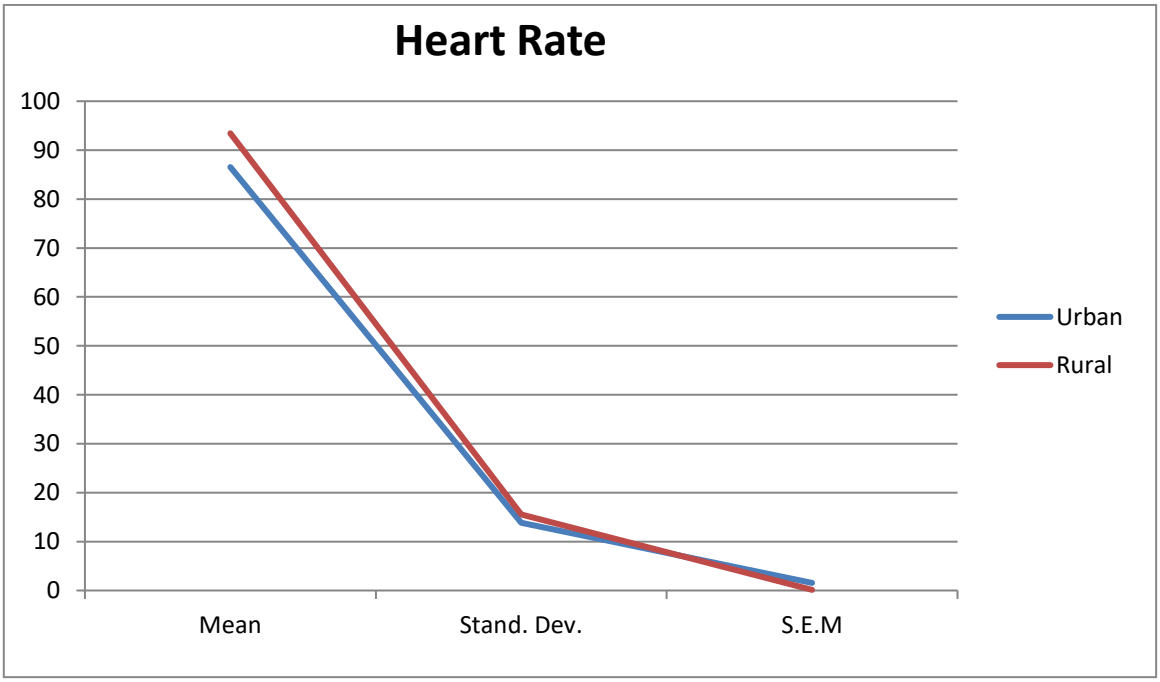

| | Mean | Stand. Dev. | S.E.M |
|---|---|---|---|
| Hilly | 24.98 | 4.44 | 0.50 |
| Non-Hilly | 25.39 | 3.74 | 0.42 |

**Fig:2 A graphical representation comparing the speed of intercollegiate volleyball players from hilly (n=80) and non-hilly (n=80) areas of the Jammu region (n=160) regarding the mean, standard error of the mean, and standard deviation.**



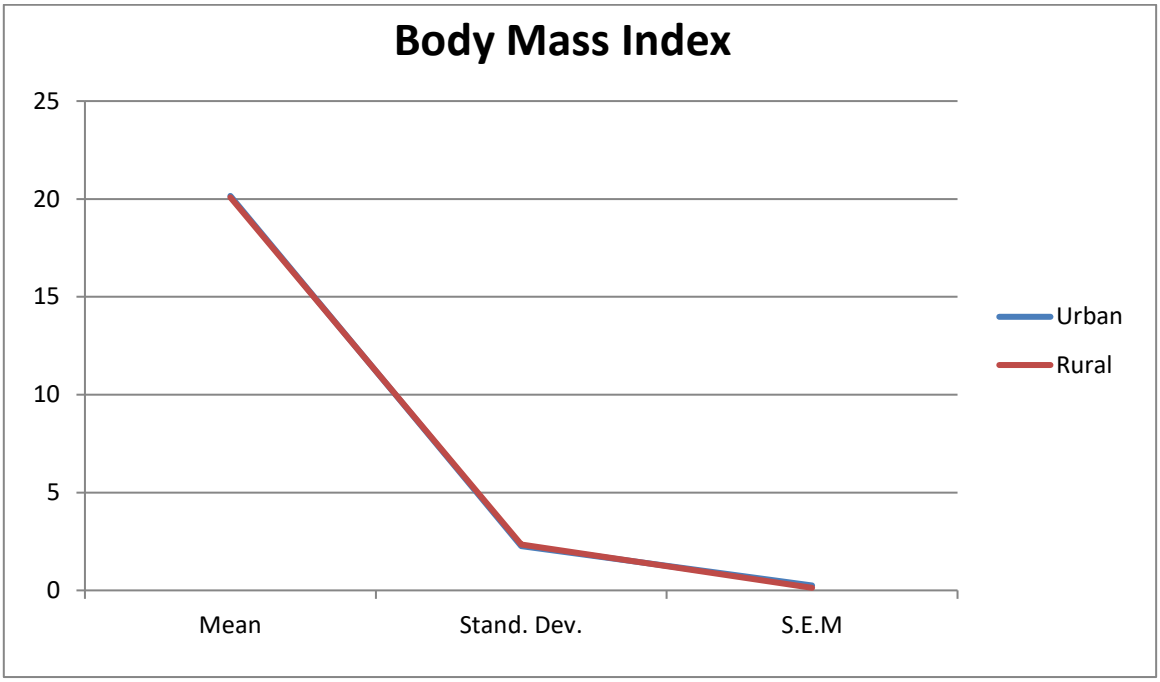

| | Mean | Stand. Dev. | S.E.M |
|---|---|---|---|
| Hilly | 7.95 | 1.25 | 0.13 |
| Non-Hilly | 7.99 | 1.24 | 0.13 |

**Fig:3 A graphical representation comparing the heart rate of intercollegiate volleyball players from hilly (n=80) and non-hilly (n=80) areas of the Jammu region (n=160) regarding the mean, standard error of the mean, and standard deviation.**



| | Mean | Stand. Dev. | S.E.M |
|---|---|---|---|
| Hilly | 86.53 | 13.87 | 1.55 |
| Non-Hilly | 93.44 | 15.57 | 1.74 |

**Fig:4 A graphical representation comparing the body mass index of intercollegiate volleyball players from hilly (n=80) and non-hilly (n=80) areas of the Jammu region (n=160) regarding the mean, standard error of the mean, and standard deviation.**




| | Mean | Stand. Dev. | S.E.M |
|---|---|---|---|
| Hilly | 20.15 | 2.27 | 0.25 |
| Non-Hilly | 20.08 | 2.34 | 0.26 |

### 5.1 Discussion

The purpose of the study was to compare the physical fitness and physiological characteristics of intercollegiate volleyball players. The results showed substantial variations in heart rate but no significant differences in flexibility, speed, or body mass index factors. This suggests that athletes from different teams may follow comparable training routines, which could result in similar physiological adaptations and fitness levels. Environmental and contextual variables, such as nutritional practices, recovery times, and match schedules, may have also had an impact on the results. Although these aspects are outside the focus of the current study, they should be addressed in future research to provide a more full picture of performance variation.

## 6. Conclusion

Within the limitations of the study and approach, the following conclusions were reached: Hilly and non-hilly intercollegiate volleyball players differed significantly in characteristics such as heart rate. There was no significant difference between urban and rural intercollegiate volleyball players in factors such as flexibility, speed, and body mass index. To acquire a better understanding of their impact on

physiological and physical fitness outcomes, future research should consider including additional variables such as psychological aspects, recuperation methods, and dietary habits.

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