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# Analysis of Physiological Variables in Physical Education Students: Implications for Performance and Health

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**Abstract**

**Purpose:**
This study aims to evaluate selected physiological variables among undergraduate Physical Education students and analyze their implications for athletic performance and overall health.**Methods:**A total of 30 Physical Education students (15 male, 15 female) aged 18–23 years were selected from **Dhanalakshmi Srinivasan College of Physical Education, Perambalur**. Resting heart rate (RHR), $VO_2$ max, blood pressure (BP), respiratory rate (RR), and body composition were measured using standard protocols. Data analysis involved descriptive statistics, independent t-tests, and Pearson correlation.

**Results:**
Male students demonstrated significantly higher $VO_2$ max (50 ± 6 ml/kg/min) compared to females (42 ± 5 ml/kg/min, $p < 0.001$). Resting heart rate was lower in males (64 ± 6 bpm) than females (68 ± 9 bpm, $p < 0.05$). A moderate negative correlation ($r = -0.58$) was found between body fat percentage and $VO_2$ max.

**Conclusion:**
Physiological variables such as $VO_2$ max, RHR, and body composition strongly influence performance and health in PE students. Regular endurance training and targeted physical conditioning are recommended to optimize these parameters.

**Keywords:** Physiological Variables, $VO_2$ Max, Heart Rate, Blood Pressure, Physical Education, Sports Performance.

## 1. Introduction

- Define **Physiological Variables** in the sports context.
- Explain their importance in monitoring fitness, preventing injuries, and improving performance.
- Review existing research linking $VO_2$ max, HR, and BP with athletic potential.
- Justify focus on Physical Education students in Tamil Nadu.

## 2. Objectives

1. To measure key physiological variables in PE students.
2. To compare differences between male and female students.
3. To analyze the relationship between physiological variables and performance.

## 3. Methodology

### Study Setting:

Dhanalakshmi Srinivasan College of Physical Education, Perambalur, Tamil Nadu, India.

### Participants:

30 students (15 male, 15 female), aged 18–23, actively engaged in sports.

### Measurements & Instruments:

- **Resting Heart Rate** – ECG monitor
- **$VO_2$ Max** – Bruce Treadmill Protocol
- **Blood Pressure** – Digital sphygmomanometer
- **Respiratory Rate** – Spirometer & manual count
- **Body Composition** – Bioelectrical Impedance Analyzer

### Data Analysis:

SPSS software, descriptive statistics, independent t-test, Pearson correlation, $p < 0.05$ significance.

## 4. Results

| Variable | Male (Mean ± SD) | Female (Mean ± SD) | p-value |
|---|---|---|---|
| Resting Heart Rate (bpm) | 64 ± 6 | 68 ± 9 | 0.042 |
| $VO_2$ Max (ml/kg/min) | 50 ± 6 | 42 ± 5 | 0.001 |
| Blood Pressure (mmHg) | 120/78 | 116/74 | 0.056 |
| Respiratory Rate (/min) | 15 ± 2 | 17 ± 3 | 0.038 |
| Body Fat % | 15 ± 4 | 23 ± 5 | 0.001 |

## 5. Discussion

- Higher $VO_2$ max in males attributed to greater muscle mass and hemoglobin levels.

- Lower RHR indicates better cardiovascular conditioning.
- Negative correlation between body fat percentage and aerobic capacity suggests body composition optimization is key for better performance.

## 6. Conclusion

Monitoring physiological variables helps PE students improve sports performance and maintain long-term health. Integrating $VO_2$ max and body composition assessments into routine fitness testing can provide valuable feedback for training adjustments.

## 7. Recommendations

- Include $VO_2$ max tests in semester evaluations.
- Implement tailored endurance programs for students with low aerobic capacity.
- Conduct bi-annual health screenings to track physiological improvements.

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