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## Comparative study of selected physiological variables among individual, combative and team sport athletes

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### Abstract

The present study investigated selected physiological variables among Individual, Combative, and Team game players at the state level. Thirty male athletes aged 13-16 years from Belonia, Tripura, were purposively selected, with equal representation from three groups: Individual (athletics, swimming), Combative (wrestling, judo), and Team (football, handball). A static group comparison design was employed, and data were collected under standardized conditions using manual pulse count, stopwatch, and sphygmomanometer. The selected variables included resting pulse rate, breath holding time, systolic blood pressure, and diastolic blood pressure. Descriptive statistics and One-Way Analysis of Variance (ANOVA) at the 0.05 level of significance were applied. The results showed that Individual, Combative, and Team athletes had very similar physiological profiles. Mean resting pulse rate ranged between 63.0 and 64.2 beats/min, breath holding time between 76.3 and 79.0 seconds, diastolic blood pressure between 81.9 and 83.0 mmHg, and systolic blood pressure between 120.3 and 120.6 mmHg across groups. ANOVA values ( $F = 1.03$  for resting pulse rate,  $0.34$  for breath holding time,  $1.25$  for diastolic blood pressure, and  $0.70$  for systolic blood pressure) were all below the critical value ( $3.35$ ), indicating no significant differences among the groups. It was concluded that resting pulse rate, breath holding capacity, and blood pressure do not differ significantly between Individual, Combative, and Team game players at this competitive level. Future studies are recommended with larger and more diverse samples, inclusion of female athletes, wider age groups, and additional physiological and psychological variables to better understand sport-specific adaptations.

**Keywords:** Physiological variables, individual games, combative games, team games, sports physiology.

### 1. Introduction

Physical education has often been seen primarily as a profession suited for those pursuing a teaching career. However, history reflects that both physical and intellectual activity play a vital role in the survival and progress of a nation. Through games and sports, physical education cultivates values such as sportsmanship, cooperation, loyalty, sociability, self-control, leadership, patriotism, friendship, kindness, empathy, tolerance, and forgiveness. The habits formed through active participation in sports and games benefit not only individuals in their homes but also the larger community, ultimately strengthening national life. In addition, physical education enhances one's capacity for effective work and self-expression in the competitive environment of modern society.

As an essential component of education, physical education and sports are greatly influenced by advancements in science and technology. Today, athletes are able to achieve remarkable performances thanks to modern, scientifically based training methods, improved techniques and strategies, advanced equipment, and enhanced systems of preparation.

Furthermore, physical education goes beyond physical fitness—it addresses emotional responses, interpersonal relationships, group behavior, intellectual growth, and overall social and emotional development. In today's world, dynamic physical education is an indispensable tool for building individual well-being and national strength.

One of the major objectives of physical education is the development of neuromuscular skills. Physical educators should strive to construct precise and meaningful measuring devices to

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evaluate the extent to which this objective is achieved. Much of the physical education programme is developed to the acquisition of sports skills. Thus it is important that continued efforts should be made to construct valid, reliable and objective tests for various sports activities.

Physical education is an essential component of the educational process, focusing on the holistic development of an individual's physical, mental, emotional, and social abilities. It is not limited to improving physical fitness; rather, it involves a structured program that promotes motor skill acquisition, health maintenance, and personality development. The aims of physical education are broad, interrelated, and contribute significantly to overall human well-being.

One of the primary aims is the development of the neuromuscular system. Physical education enhances the interaction between the nervous and muscular systems, improving motor coordination, balance, and control over movement. By focusing on the mastery of fundamental motor skills such as running, jumping, throwing, catching, and balancing it lays the groundwork for efficient performance in both daily life activities and sports. Improved neuromuscular efficiency also contributes to better posture, refined movement patterns, and greater confidence in physical abilities.

Another important aim is the promotion of physical and mental growth. Physical education provides systematic opportunities for the development of the body's structural components, including bones, muscles, and joints. In addition, it stimulates mental processes by promoting concentration, alertness, problem-solving skills, and self-discipline. The integration of physical and mental training enables individuals to adapt to challenges, make quick decisions, and maintain composure under pressure, qualities that are essential both in sports and in everyday situations.

The cultivation of social qualities and moral values is another core aim. Through participation in group games, team sports, and cooperative activities, individuals learn values such as cooperation, loyalty, respect for rules, and empathy. Physical education nurtures sportsmanship, honesty, courage, and leadership skills while also encouraging acceptance of both victory and defeat with grace. These social and moral qualities contribute to positive interpersonal relationships and effective teamwork in various aspects of life.

A further aim is the enhancement of the organic systems of the body. Physical education strengthens vital systems such as the cardiovascular, respiratory, and muscular systems. Regular participation in physical activities improves heart and lung efficiency, promotes blood circulation, and builds muscular strength and endurance. These improvements not only enhance athletic performance but also support long-term health by preventing degenerative conditions and correcting poor posture.

Another significant objective is the conservation of health and the development of disease resistance. Physical education encourages regular exercise, which boosts immunity and enhances the body's ability to resist common illnesses. It also instils healthy lifestyle habits such as balanced nutrition, adequate rest, stress management, and avoidance of harmful practices. These habits collectively support the maintenance of optimum health throughout life.

## 2. Methodology

The study employed a descriptive comparative research design (static group comparison) to investigate differences in selected physiological variables among state-level male athletes from Belonia, Tripura. A total of 30 athletes, aged 13

to 16 years, were purposively selected and divided into three groups: Individual games (10), Combative games (10), and Team games (10). The physiological variables measured included resting pulse rate, breath holding time, systolic blood pressure, and diastolic blood pressure. Data were collected using standardized tools such as manual pulse count, stopwatch, sphygmomanometer, and stethoscope, under uniform testing conditions. Each test was administered following standard procedures, with necessary instructions provided to participants beforehand. The data were analyzed using descriptive statistics (mean and standard deviation) and one-way ANOVA to determine significant differences at the 0.05 level of confidence.

**Table 1:** Descriptive statistics of resting pulse rate among Individual, Combative and Team Games (In numbers)

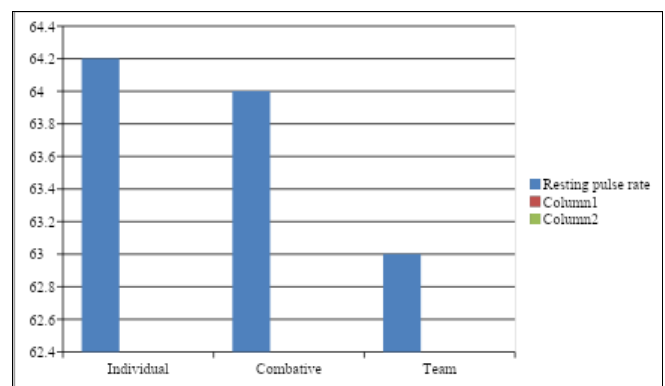
Category of Games	N	Mean	Std. Deviation	Minimum	Maximum
Individual	10	64.20	2.29	62	67
Combative	10	64.00	2.00	62	68
Team	10	63.00	1.63	62	67

**Table 2:** Analysis of Variance of resting pulse rate among Individual, Combative and Team Games (In numbers)

	Sum of Square	df	Mean Square	F	Sig
Between group	8.267	2	4.13	1.03	0.368
Within group	107.60	27	3.98		

Insignificant at 0.05 Level

The critical F-value at 2,27 degrees of freedom is 3.35. From Table-2, the calculated F-value (1.03) is lower than the required value (3.35). Therefore, the result is not statistically significant at the 0.05 level of significance.



**Fig 1:** Comparison of resting pulse rate among Individual, Combative and team Players

**Table 3:** Descriptive statistics of breath holding time among Individual, Combative and Team Games (In seconds)

Category of Games	N	Mean	Std. Deviation	Minimum	Maximum
Individual	10	78.10	7.72	63	97
Combative	10	79.00	8.04	65	88
Team	10	76.30	6.39	65	88

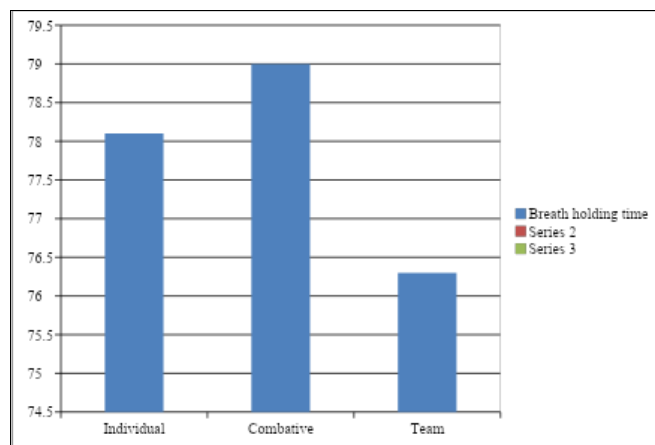
**Table 4:** Analysis of Variance of breath holding time among Individual, Combative and Team Games (In seconds)

	Sum of Square	df	Mean Square	F	Sig
Between group	37.80	2	18.90	0.343	0.713
Within group	1487.00	27	55.07		

Insignificant at 0.05 Level

For 2,27 degrees of freedom, the critical F-value is 3.35. According to Table-2, the obtained F-value (0.343) is less

than the required value of 3.35. Hence, the result is not statistically significant at the 0.05 level of significance.



**Fig 2:** Comparison of breath holding time among Individual, Combative and team Players

**Table 5:** Descriptive statistics of diastolic blood pressure among Individual, Combative and Team Games (In mm hg)

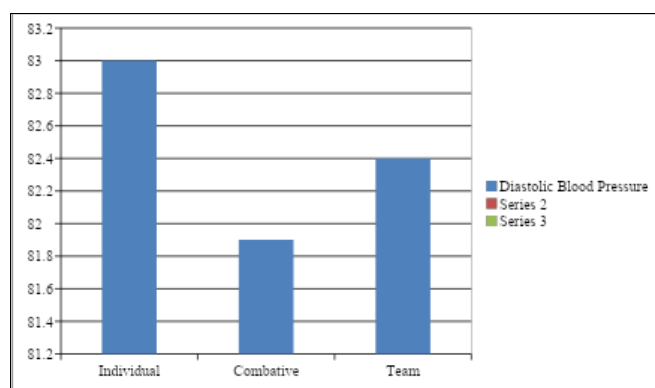
Category of Games	N	Mean	Std. Deviation	Minimum	Maximum
Individual	10	83.00	2.00	81	86
Combative	10	81.90	1.52	80	85
Team	10	82.40	0.96	81	84

**Table 6:** Analysis of Variance of diastolic among Individual, Combative and Team Games (In mm hg)

	Sum of Square	df	Mean Square	F	Sig
Between group	6.06	2	3.03	1.25	0.301
Within group	65.30	27	2.41		

Insignificant at 0.05 Level

At 2,27 degrees of freedom, the critical F-value is 3.35. From Table-2, the obtained F-value (1.25) is below the critical threshold of 3.35. Therefore, the result is not statistically significant at the 0.05 level.



**Fig 3:** Comparison of diastolic blood pressure among Individual, Combative and team Players

**Table 7:** Descriptive statistics of systolic blood pressure among Individual, Combative and Team Games (In mm hg)

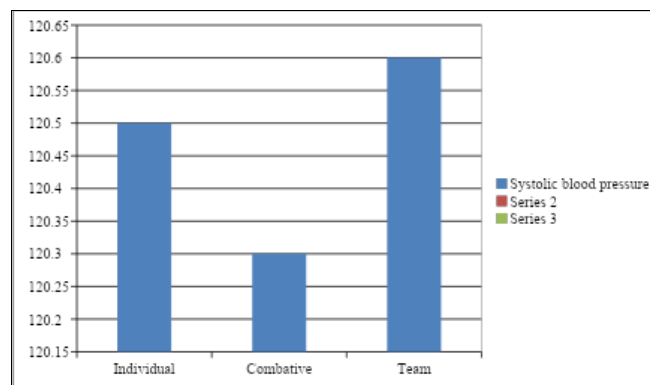
Category of Games	N	Mean	Std. Deviation	Minimum	Maximum
Individual	10	120.50	0.527	120	121
Combative	10	120.30	0.483	120	121
Team	10	120.60	0.699	120	121

**Table 7:** Analysis of Variance of systolic among Individual, Combative and Team Games (In mm hg)

	Sum of Square	df	Mean Square	F	Sig
Between group	0.467	2	0.233	0.70	0.505
Within group	9.00	27	0.333		

Insignificant at 0.05 Level

The critical F-value for 2,27 degrees of freedom is 3.35. As shown in Table-2, the calculated F-value (0.70) is less than the critical value of 3.35. Thus, the result is not statistically significant at the 0.05 level.



**Fig 4:** Comparison of systolic blood pressure among Individual, Combative and team Players

### 3. Results and Conclusion

The result of the study found no significant difference between individual, combative and team game players on selected physiological variables namely resting pulse rate, breath holding time, systolic blood pressure and diastolic blood pressure.

### 4. Conclusion

The study concludes that:

- Insignificant difference was found among Individual, Combative and Team Games in relation to resting pulse rate.
- Insignificant difference was found among Individual, Combative and Team Games in relation to breath holding time.
- Insignificant difference was found among Individual, Combative and Team Games in relation to diastolic blood pressure.
- Insignificant difference was found among Individual, Combative and Team Games in relation to systolic blood pressure.

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