North Asian International Research Journal of Multidisciplinary

IRJIF IMPACT FACTOR:7.001

ISSN: 2454-2326 Vol.11,Issue 11 November-2025

Index Copernicus Value: 58.12 Indian Citation Index

NAIRJC UGC-Aligned | HEI-Approved Peer Reviewed Refereed Journal (Under New UGC Guidelines)

ANALYSIS OF PHYSIOLOGICAL STATUS AMONG DIFFERENT SCHOOL SYSTEM IN ANDHRA PRADESH.

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ABSTRACT

The present study aims to analyze the physiological status of students studying under different school systems in Andhra Pradesh. The investigation focuses on key physiological variables such as resting heart rate, blood pressure, vital capacity, muscular endurance, and body composition. Students from various school system including government schools, private schools, and residential schools were selected as subjects for the study. Standardized testing procedures were employed to assess physiological parameters, and appropriate statistical techniques were used for data analysis. The findings of the study revealed significant differences in selected physiological variables among students belonging to different school systems. Variations in physical activity patterns, availability of sports facilities, curricular emphasis on physical education, nutritional status, and lifestyle practices were identified as possible contributing factors to these differences. In general, students from school systems with structured physical education programs and better infrastructural support demonstrated superior physiological status compared to their counterparts. The study concludes that the type of school system plays an important role in influencing the physiological health of students. The results highlight the need for uniform and systematic physical education programs across all school systems in Andhra Pradesh to promote optimal physiological development and overall health among school children.

KEYWORDS: *Physiological Variables, Vo2 Max, Resting Pulse Rate, Government School, Private School, Residential School and Andhra Pradesh State.*

INTRODUCTION

Physical fitness and physiological efficiency are essential components of overall health and academic performance during adolescence. The school environment plays a vital role in shaping the physical, physiological, and psychological development of students, particularly during the formative years of 14 to 17 years, a period marked by rapid growth and maturation. Among the various determinants of physiological status, the type of

school systemGovernment, Private, and Residential has gained increasing attention due to differences in curriculum structure, availability of physical education programs, lifestyle patterns, and extracurricular opportunities.

Physiological status refers to the functional capacity of the body systems, especially the cardiovascular and respiratory systems, to meet the demands of daily activities and physical exertion. Variables such as maximal oxygen uptake (VO_2 max) and resting pulse rate are widely accepted indicators of cardiovascular fitness and overall physiological efficiency. VO_2 max represents the maximum ability of the body to uptake, transport, and utilize oxygen during intense physical activity and is considered a gold standard measure of aerobic endurance **(Bassett & Howley, 2000).** Resting pulse rate, on the other hand, reflects cardiac efficiency and autonomic balance, with lower values generally indicating better cardiovascular health **(McArdle, Katch, & Katch, 2015).**

In India, and particularly in Andhra Pradesh, school systems differ considerably in terms of infrastructure, physical education exposure, daily routines, nutritional habits, and participation in organized sports and physical activities. Government school students often have limited access to structured training programs and sports facilities, whereas private schools may offer better resources but face academic pressure that restricts regular physical activity. Residential schools, by contrast, generally follow a disciplined daily routine with compulsory physical training and games, which may positively influence students' physiological fitness levels.

Adolescence is a critical stage for developing lifelong fitness habits, and insufficient physical activity during this period may lead to reduced aerobic capacity, higher resting heart rate, and increased risk of lifestyle-related diseases in adulthood **(WHO, 2020).** Comparative analysis of physiological variables among different schoolx systems provides valuable insights into how environmental and institutional factors influence students' health and fitness. Such information is essential for educators, policy makers, and curriculum planners to design effective physical education programs that promote balanced development irrespective of school type.

Despite the recognized importance of physical fitness, limited scientific investigations have systematically compared the physiological status of students across different school systems in Andhra Pradesh. Therefore, the present study aims to analyze and compare selected physiological variables, namely VO_2 max and resting pulse rate, among Government, Private, and Residential school students aged 14 to 17 years. The findings of this study are expected to highlight the role of school environment in physiological development and provide a scientific basis for strengthening physical education policies and interventions at the school level.

METHODOLOGY

Research Design

The present study adopted a descriptive comparative research design to analyze the physiological status of students studying under different school systems in Andhra Pradesh, namely Government schools, Private schools, and Residential schools.

Selection of Subjects

A total of 300 school students were selected for the study using a random sampling technique. The subjects were equally drawn from the three different school systems**:**

Government Schools (n = 100)

Private Schools (n = 100)

Residential Schools (n = 100)

The age of the subjects ranged from 14 to 17 years. Only students who were physically fit and free from known medical conditions were included in the study. Prior consent was obtained from school authorities and participants before data collection.

VARIABLES OF THE STUDY

Physiological Variables

Maximal Oxygen Uptake (VO_2 max)

Resting Pulse Rate

Criterion Measures

- ✓ VO_2 max was assessed using the Cooper 12-Minute Run/Walk Test. The total distance covered in 12 minutes was recorded, and VO_2 max was calculated using the standard Cooper test formula. The values were expressed in millilitres per kilogram per minute ($ml \cdot kg^{-1} \cdot min^{-1}$).
- ✓ Resting Pulse Rate was measured using a digital bio-monitor. The pulse rate was recorded in seconds after the subject had rested quietly in a seated position for at least five minutes.

Data Collection Procedure

The tests were conducted during school hours on standard athletic grounds under similar environmental conditions. Before administering the tests, all subjects were given proper instructions and a standardized warm-up session. Adequate rest was provided between measurements to avoid fatigue effects. All measurements were taken by the investigator to maintain uniformity**.**

Statistical Analysis

The collected data were statistically analyzed to determine differences in physiological variables among students of different school systems. Descriptive statistics such as mean and standard deviation were computed. To examine the significance of differences, appropriate inferential statistical techniques were applied, and the level of significance was fixed at 0.05.

Selected Physiological variables - Vo_2 Max

The data collected on Vo2 Max of among Govt schools, Govt aided schools and Private school boys have been statistically analyzed and presented in the following tables;

DESCRIPTIVE SCORES ON VO2 MAX SCORES AMONG GROUPS

(Scores in Ml/Kg/Lit)

Schools	Mean	SD	Min	Max	Range
Government Schools	45.10	3.49	12.00	28.00	16.00
Residential Schools	42.66	3.73	9.00	27.00	18.00
Private Schools	43.34	2.40	13.00	26.00	13.00

It is observed from table 4.10 that the mean value of govt school boys is 45.10, for govt aided school boys, it is 42.66 and for private school boys, it is 43.34. The standard deviation is 3.49, 3.73 and 2.40 respectively for govt, govt aided and private. The range of government is 16.00, government aided is 18.00 and that of private 13.00 respectively.

ANOVA OF Vo2 Max AMONG THE GROUP

SOURCES	SS	DF	MS	F RATIO
BETWEEN	318.58	2	156.26	56.05*
WITH IN	323.81	297	1.00	
TOTAL	643.39	299		

*Significant at .05 level for the degrees of freedom (2,98) (3.09)

Table 4.11 shows the obtained 'f' ratio value 146.05 which was greater then the required table value 3.09 with df 2 and at 0.05 level of confidence.

The result of the study showed that there was a significant difference on Vo2 Max among Govt schools, Residential Schools and Private school boys.

PAIR WISE COMPARISON OF MEAN SCORES OF VO2 MAX AMONG GROUPS

((Scores in Ml/Kg/Lit)

Government School Boys	Residential Schools Boys	Private School Boys	MD	CD
45.10	42.66		2.44*	0.30
45.10		43.34	1.76*	
	42.66	43.34	0.68*	

From the table 4.12, the result of the study showed that there was a significant difference between government and government aided, government and private, government aided and private school boys on agility. It was clear that the mean difference value of 2.44, 1.76 and 0.68 school boys respectively, proved to significant since this value is higher than the critical difference of 0.30.

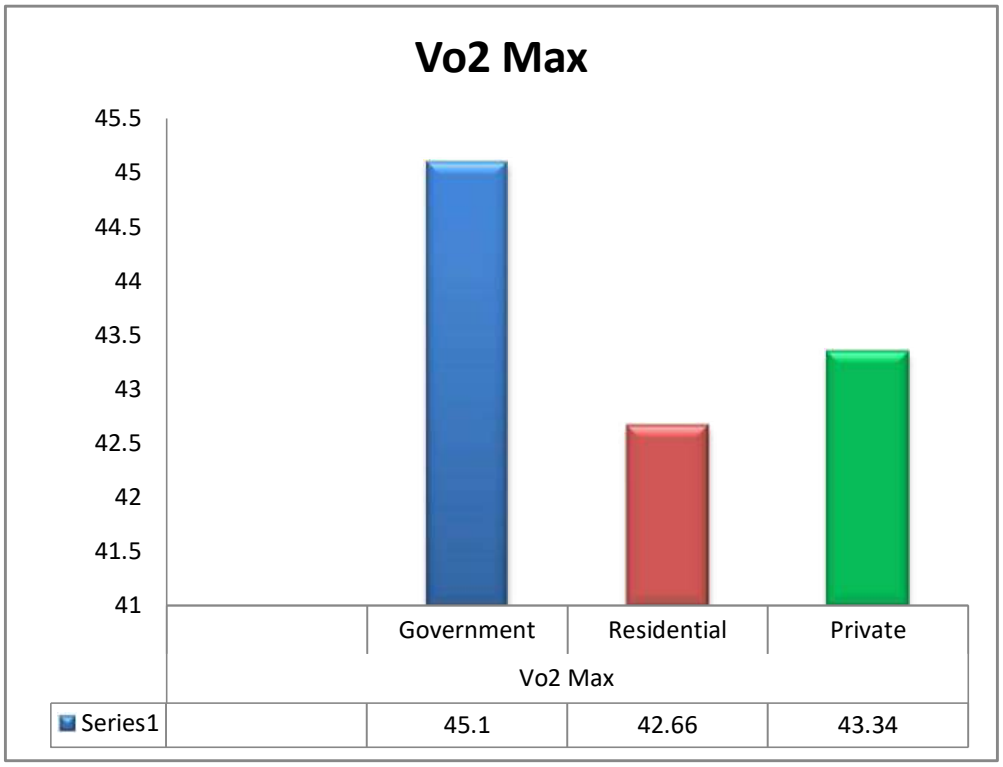

FIGURE I

GRAPHICAL REPRESENTATION OF MEAN SCORES OF VO2 MAX AMONG GROUPS

(Scores in Ml/Kg/Lit)

Resting Pulse Rate

The data collected on Resting Pulse Rate of among Govt schools, Residential Schools s and Private school boys have been statistically analyzed and presented in the following tables;

DESCRIPTIVE SCORES ON RESTING PULSE RATE SCORES AMONG GROUPS

(Scores in Seconds)

Schools	Mean	SD	Min	Max	Range
Government Schools	72.49	2.49	12.00	28.00	16.00
Residential Schools	74.13	2.73	9.00	25.00	13.00
Private Schools	73.85	2.40	13.00	24.00	14.00

It is observed from table 4.16 that the mean value of govt school boys is 72.49, for Residential Schools boys, it is 74.13 and for private school boys, it is 73.85. The standard deviation is 2.49, 2.73 and 2.40 respectively for govt, Residential Schools and private. The range of government is 16.00, government aided is 13.00 and that of private 14.00 respectively.

ANOVA OF RESTING PULSE RATE AMONG THE GROUP

SOURCES	SS	DF	MS	F RATIO
BETWEEN	292.53	2	146.25	69.32*
WITH IN	256.65	297	0.86	
TOTAL	549.09	299		

*Significant at .05 level for the degrees of freedom (2,98) (3.09)

Table 4.17 shows the obtained 'f' ratio value 69.32 which was greater then the required table value 3.09 with df 2 and at 0.05 level of confidence.

The result of the study showed that there was a significant difference on Resting Pulse Rate among Govt schools, Residential Schools and Private school boys.

PAIR WISE COMPARISON OF MEAN SCORES OF RESTING PULSE RATE AMONG GROUPS

(Scores in Seconds)

Government School Boys	Residential Schools Boys	Private School Boys	MD	CD
72.49	74.13		1.64*	0.11
72.49		73.85	1.36*	
	74.13	73.85	0.28*	

From the table 4.18, The result of the study showed that there was a significant difference between government and government aided, government and private, Residential Schools and private school boys on agility. It was clear that the mean difference value of 0.64, 1.36 and 0.28 school boys respectively, proved to significant since this value is higher than the critical difference of 0.11.

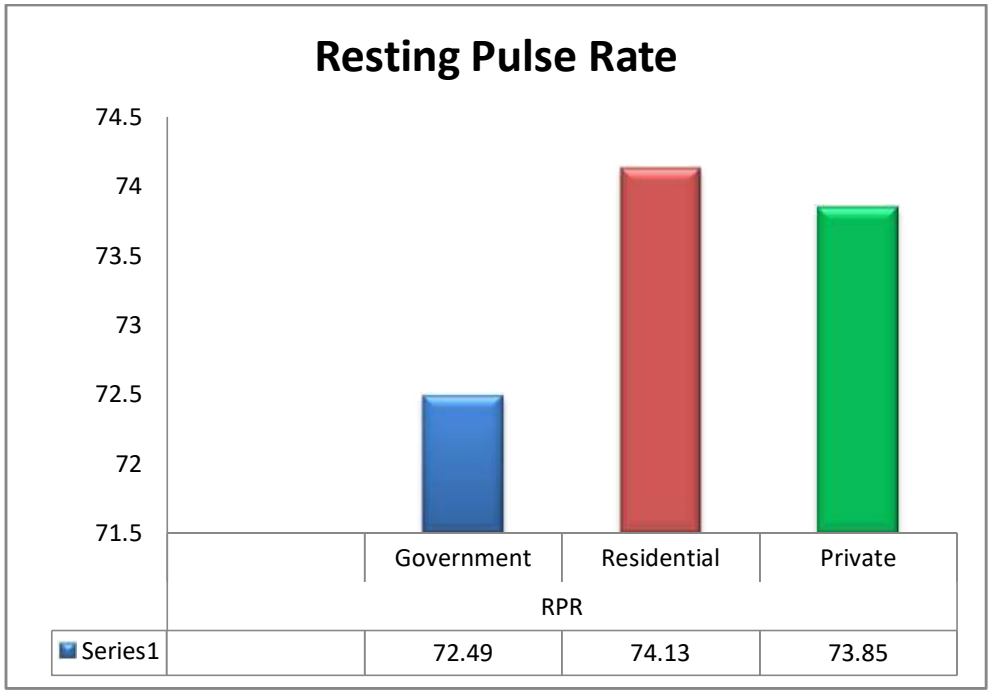

FIGURE II

GRAPHICAL REPRESENTATION OF MEAN SCORES OF RESTING PULSE RATE AMONG GROUPS

(Scores in Seconds)

FINDINGS

The purpose of the present study was to analyze and compare selected physiological variables namely maximal oxygen uptake (VO_2 max) and resting pulse rate among students of Government, Private, and Residential schools in Andhra Pradesh. The findings of the study revealed noticeable differences in physiological status among students belonging to the three different school systems, indicating the influence of school environment, lifestyle, and physical activity exposure on physiological fitness.

With regard to VO_2 max, the results demonstrated that students from Residential schools exhibited superior aerobic capacity compared to their counterparts from Private and Government schools. This finding may be attributed to the structured daily routine followed in residential schools, which typically includes compulsory physical training, regular participation in games and sports, morning exercises, and disciplined lifestyle practices. Continuous exposure to physical activity enhances the efficiency of the cardiovascular and respiratory systems, leading to improved oxygen uptake and utilization. These results are in line with earlier studies which have reported that regular physical activity and systematic training significantly improve aerobic endurance in adolescents **(Bassett & Howley, 2000; McArdle et al., 2015).**

Private school students demonstrated moderate levels of VO_2 max, performing better than Government school students but lower than Residential school students. Although many private schools possess better infrastructure and sports facilities, academic pressure, sedentary classroom routines, and limited compulsory physical education periods may restrict students' regular engagement in physical activities. Consequently, the potential benefits of available facilities may not be fully realized, resulting in average aerobic fitness levels.

Government school students recorded comparatively lower VO_2 max values. This may be due to inadequate sports infrastructure, limited trained physical education teachers, and fewer opportunities for organized physical activity. Additionally, irregular participation in physical training programs may negatively affect the development of aerobic capacity during adolescence, a critical period for cardiovascular adaptation.

In terms of resting pulse rate, Residential school students exhibited significantly lower resting pulse rates compared to Private and Government school students, indicating better cardiac efficiency and autonomic regulation. A lower resting pulse rate is generally associated with enhanced stroke volume and cardiovascular conditioning resulting from regular physical activity. These findings support the concept that habitual exercise leads to physiological adaptations that reduce cardiac workload at rest **(Wilmore & Costill, 2004).**

Private school students showed moderate resting pulse rates, while Government school students recorded relatively higher resting pulse rates. Higher resting pulse rate may reflect lower cardiovascular fitness and reduced physical conditioning, reinforcing the importance of regular and structured physical activity during school years.

Overall, the findings of the present study clearly suggest that the school system plays a significant role in influencing the physiological status of adolescents. The disciplined lifestyle and mandatory physical activity programs in residential schools contribute positively to students' physiological fitness, whereas lack of structured physical education in other school systems may limit physiological development. These results emphasize the need for strengthening physical education curricula and promoting regular physical activity across all school systems to ensure balanced physiological development among school-going children.

CONCLUSIONS

The significantly lower VO_2 max observed among Government school boys suggests reduced ability of the cardiovascular and respiratory systems to uptake and utilizes oxygen efficiently during prolonged physical activity. This difference may be attributed to limited exposure to structured physical training, inadequate sports infrastructure, and fewer opportunities for organized games and regular physical education sessions in Government schools. In contrast, Private and Residential schools generally provide better facilities and more systematic physical activity programs, leading to superior aerobic fitness levels.

The higher resting pulse rate recorded among Government school boys further supports the finding of lower cardiovascular fitness. A higher resting pulse rate indicates reduced stroke volume and lower cardiac efficiency, which are commonly associated with insufficient physical conditioning. Regular participation in physical activity is known to induce favorable cardiac adaptations such as increased stroke volume and reduced resting heart rate; the absence or inconsistency of such activities among Government school boys may have contributed to this outcome.

In conclusion, the significant differences in VO_2 max and resting pulse rate between Government school boys and those from Private and Residential schools emphasize the urgent need to strengthen physical education programs in Government schools. Introducing regular, structured physical activity, improving sports facilities,

and ensuring qualified physical education teachers can play a crucial role in enhancing the physiological fitness and overall health of Government school students.

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