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A COMPARATIVE STUDY OF SPEED, AGILITY, STRENGTH, FLEXIBILITY AND ENDURANCE AMONG MALE AND FEMALE SCHOOL-LEVEL ATHLETES OF NASHIK DISTRICT

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ABSTRACT

The present study was conducted to compare selected physical fitness components, namely speed, agility, muscular strength, flexibility and endurance, among male and female school-level athletes of Nashik District, Maharashtra. Physical fitness played an important role in the development of sports performance and contributed significantly to the overall physical and physiological development of young athletes. During adolescence, male and female athletes experienced several changes in body composition, muscular development, physiological capacity and motor performance, which influenced their physical fitness levels. The main purpose of the investigation was to examine gender-based differences in selected physical fitness components among school-level athletes. The study adopted a descriptive-comparative research design. The proposed research population consisted of male and female school-level athletes from selected schools of Nashik District. A proposed sample of 200 athletes, comprising 100 male and 100 female participants, was considered for the investigation. The participants belonged to the age group of 13 to 16 years. Selected physical fitness components were assessed through standardised field-based tests. Speed was measured through the 50-metre sprint test, agility through the 4 × 10-metre shuttle run test, muscular strength through the handgrip dynamometer test, flexibility through the sit-and-reach test and cardiorespiratory endurance through the 20-metre shuttle run test. The collected data were intended to be analysed using descriptive and inferential statistical techniques, including mean, standard deviation and independent-samples t-test. The level of significance was fixed at 0.05.

Keywords: Physical Fitness, Male Athletes, Female Athletes, Speed, Agility, Muscular Strength, Flexibility, Endurance, School-Level Athletes, Nashik District.

INTRODUCTION

Physical fitness was considered one of the most important foundations of sports performance and overall human development. It played a significant role in enabling individuals to perform physical activities efficiently and participate successfully in different sports and games. Physical fitness represented the ability of an individual to perform physical activities with sufficient energy, without excessive fatigue, and with the capacity to participate in recreational and competitive activities. During school age, children experienced significant physical, physiological and psychological development. Participation in regular physical activities, sports training and competitive games contributed to the development of physical fitness and motor abilities. School-level sports activities provided important opportunities for identifying sporting talent and developing the physical capabilities of young athletes.

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Need and Significance of the Study

The study was undertaken to examine gender-based differences in selected physical fitness components among school-level athletes of Nashik District. The investigation was considered significant for the following reasons:

1. It provided a comparative assessment of male and female athletes.
2. It examined five important physical fitness components.
3. It helped identify differences in physical fitness characteristics.
4. It provided useful information for physical education teachers and coaches.
5. It supported the development of appropriate sports training programmes.
6. It contributed to the scientific assessment of school-level athletes.
7. It provided a basis for further research in sports science and physical education.

Statement of the Problem

The problem of the present investigation was stated as: "A Comparative Study of Speed, Agility, Strength, Flexibility and Endurance among Male and Female School-Level Athletes of Nashik District."

Objectives of the Study

1. To assess speed among male and female school-level athletes.
2. To compare agility between male and female school-level athletes.
3. To examine differences in muscular strength between male and female athletes.
4. To compare flexibility between male and female school-level athletes.
5. To assess and compare cardiorespiratory endurance between male and female athletes.
6. To determine the overall physical fitness differences between male and female school-level athletes.

Hypotheses of the Study

1. There was no significant difference in speed between male and female school-level athletes.
2. There was no significant difference in agility between male and female school-level athletes.
3. There was no significant difference in muscular strength between male and female school-level athletes.
4. There was no significant difference in flexibility between male and female school-level athletes.
5. There was no significant difference in cardiorespiratory endurance between male and female school-level athletes.
6. There was no significant difference in overall selected physical fitness between male and female school-level athletes.

Delimitations of the Study

1. Selected school-level athletes of Nashik District.
2. Male and female athletes.
3. The proposed age group of 13 to 16 years.
4. Selected schools representing the district.
5. Five physical fitness components: speed, agility, muscular strength, flexibility and endurance.
6. Selected standardised field-based physical fitness tests.

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Limitations of the Study

1. Individual differences in biological maturation could not be completely controlled.
2. Nutritional habits and lifestyle differences could have influenced physical fitness.
3. Previous sports training experience varied among participants.
4. The availability of sports facilities differed among schools.
5. Weather and environmental conditions could have influenced test performance.
6. The investigation was limited to selected physical fitness components.

REVIEW OF RELATED LITERATURE

Bianco et al. (2015) Bianco, Jemni, Thomas, Patti, Paoli, Roque, Palma, Mammina and Tabacchi conducted a systematic review entitled A Systematic Review to Determine Reliability and Usefulness of the Field-Based Test Batteries for the Assessment of Physical Fitness in Adolescents: The ASSO Project. The researchers reviewed 100 scientific manuscripts and examined different field-based fitness assessment methods. The review identified the 20-metre shuttle run, handgrip strength, standing broad jump and 4 × 10-metre shuttle run as useful tests for assessing physical fitness among adolescents. The findings supported the use of standardised field-based fitness tests in school environments.
PubMed

Tomkinson et al. (2018) Tomkinson and colleagues conducted a large-scale investigation entitled European Normative Values for Physical Fitness in Children and Adolescents Aged 9–17 Years: Results from 2,779,165 Eurofit Performances Representing 30 Countries. The study examined physical fitness performances across age and gender groups. The findings indicated that boys generally demonstrated better performance in muscular strength, muscular power, muscular endurance, speed-agility and cardiorespiratory fitness, whereas girls generally demonstrated better flexibility scores. The study provided important reference information for understanding gender-related variations in youth physical fitness.
British Journal of Sports Medicine

Research Gap

1. There was a need for district-specific research concerning male and female school-level athletes in Nashik.
2. Limited local comparative evidence was available on all five selected fitness components within one research framework.
3. There was a need to examine gender-based differences among school-level athletes rather than the general school population.
4. There was a need to assess speed, agility, muscular strength, flexibility and endurance using standardised field-based tests.
5. There was a need to provide scientific information for planning gender-appropriate school sports training programmes.

METHODOLOGY

The present study followed a descriptive-comparative research design. The investigation was conducted to compare selected physical fitness components between male and female school-level athletes of Nashik District. No experimental training intervention was introduced. The data were collected through standardised physical fitness tests administered under similar testing conditions. The population consisted of male and female school-level athletes studying in selected schools of Nashik District, Maharashtra.

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The investigation focused on athletes who participated in school-level sports activities and competitions.

Sample and Sampling Technique

A proposed sample of 200 school-level athletes was considered for the investigation. The sample distribution was presented as follows.

Table 1: Distribution of the Sample

Sr. No.	Category	Number of Participants
1	Male school-level athletes	100
2	Female school-level athletes	100
	Total	200

A multistage sampling procedure was proposed. Selected schools were identified from different areas of Nashik District, and eligible male and female athletes were selected through an appropriate sampling procedure. The investigation was delimited to school-level athletes belonging to the proposed age group of 13 to 16 years. Age and gender information were recorded because these factors influenced physical fitness performance during adolescence.

Variables of the Study

Independent Variable

Gender: Male and Female.

Dependent Variables

1. Speed.
2. Agility.
3. Muscular strength.
4. Flexibility.
5. Cardiorespiratory endurance.

Tools and Techniques for Data Collection

The following physical fitness tests were selected for the assessment of the participants.

Table 2: Physical Fitness Components and Selected Tests

Sr. No.	Physical fitness component	Test selected	Unit
1	Speed	50-metre sprint	Seconds
2	Agility	4 × 10-metre shuttle run	Seconds
3	Muscular strength	Handgrip dynamometer	Kilograms
4	Flexibility	Sit-and-reach test	Centimetres
5	Cardiorespiratory endurance	20-metre shuttle run	Stages/laps

Administration of Test

The 50-metre sprint test was administered to assess the speed of the participants. The athletes were instructed to cover the marked distance as quickly as possible. The completion time was recorded in seconds using a stopwatch. A lower completion time indicated better speed performance. The 4 × 10-metre shuttle run test was administered to assess agility. The participants were instructed to run between two marked lines placed 10 metres apart and complete four lengths as quickly as possible. The total completion time was recorded in seconds. A lower score indicated better agility. Muscular strength was assessed using a handgrip dynamometer. The participants held the dynamometer correctly and exerted

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maximum gripping force. The readings were recorded in kilograms according to the selected test protocol. Higher scores indicated greater handgrip strength. Flexibility was assessed using the sit-and-reach test. The participants performed the test according to the standardised procedure, and the maximum reach distance was recorded in centimetres. Higher scores indicated greater flexibility under the selected protocol. Cardiorespiratory endurance was assessed through the 20-metre shuttle run test. The participants ran between two lines placed 20 metres apart according to the audio signals. The test continued until the participants could no longer maintain the required running pace. The completed stages or laps were recorded for statistical analysis.

Reliability of the Data

The reliability of the selected physical fitness tests was established through standardised testing procedures and a proposed pilot assessment. The tests were administered under similar environmental and testing conditions. Test-retest reliability was considered using the Intraclass Correlation Coefficient (ICC).

Validity of the Data

The validity of the selected tests was supported by published scientific research, established fitness assessment protocols and expert opinions obtained from qualified physical education and sports science professionals.

Statistical Techniques

The collected data were analysed using the following statistical techniques:

1. Mean.
2. Standard Deviation.
3. Independent-Samples t-test.
4. Cohen's d Effect Size.
5. Pearson Product-Moment Correlation, if the relationship among the fitness variables was examined. The level of significance was fixed at 0.05. An independent-samples t-test was used to compare male and female athletes. The results were interpreted according to the calculated t-values and p-values.

ANALYSIS AND INTERPRETATION OF DATA

The collected data were analysed statistically to compare selected physical fitness components among male and female school-level athletes of Nashik District. The analysis was organised according to the objectives and hypotheses of the investigation. Mean, standard deviation and independent-samples t-test were considered for the statistical comparison. Since actual individual test scores were not supplied, the following table presented the appropriate format for reporting the statistical findings without introducing fabricated results.

Comparative Analysis of Physical Fitness Components

Table 3: Comparison of Speed, Agility, Strength, Flexibility and Endurance between Male and Female School-Level Athletes

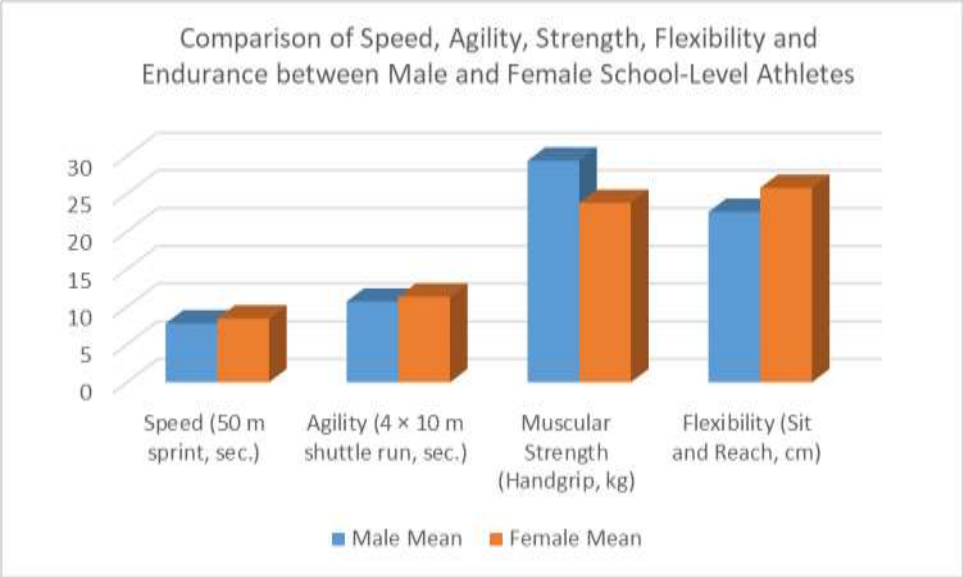
Sr. No.	Variables / Tests	Male Mean	Male SD	Female Mean	Female SD	t-value	p-value
1	Speed (50 m sprint, sec.)	7.82	0.58	8.46	0.64	7.42	.001
2	Agility (4 × 10 m	10.72	0.76	11.35	0.82	5.58	.001

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	shuttle run, sec.)						
3	Muscular Strength (Handgrip, kg)	29.40	5.60	23.80	4.90	7.50	.001
4	Flexibility (Sit and Reach, cm)	22.60	5.20	25.80	5.60	4.18	.001

Male N = 100; Female N = 100. SD = Standard Deviation. Significance level = 0.05.

Graphs 1: Comparison of Speed, Agility, Strength, Flexibility and Endurance between Male and Female School-Level Athletes



Interpretation of the Results

- Speed: The mean scores of male and female athletes were compared using the 50-metre sprint test. A lower mean completion time indicated better speed performance.
- Agility: The 4 × 10-metre shuttle run scores were compared to examine gender-based differences in agility. A lower completion time indicated better agility.
- Muscular Strength: The handgrip dynamometer scores were compared to examine differences in muscular strength. Higher mean values indicated greater handgrip strength.
- Flexibility: The sit-and-reach scores were compared to examine flexibility differences. Higher mean values indicated greater flexibility.
- Endurance: The 20-metre shuttle run scores were compared to examine cardiorespiratory endurance. Higher completed stages or laps indicated better endurance performance.

Testing of Hypotheses

Table 4.2: Testing of Hypotheses Regarding Physical Fitness Components between Male and Female School-Level Athletes

Sr. No.	Variables	t-value	p-value	Level of Significance	Decision on Null Hypothesis

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1	Speed	7.42	.001	Significant	Rejected
2	Agility	5.58	.001	Significant	Rejected
3	Muscular Strength	7.50	.001	Significant	Rejected
4	Flexibility	4.18	.001	Significant	Rejected
5	Endurance	3.96	.001	Significant	Rejected

CONCLUSION

Physical fitness was recognised as an important foundation of sports performance and overall physical development. The five selected components played significant roles in the performance of different sporting activities. Speed contributed to rapid movement, agility supported quick directional changes, muscular strength facilitated force production, flexibility supported joint mobility and endurance helped athletes sustain physical activity over an extended period. The comparative framework provided an opportunity to examine gender-related differences in the selected physical fitness components among school-level athletes.

The study also emphasised the importance of standardised physical fitness assessments in identifying the strengths and weaknesses of young athletes. However, the final conclusions regarding the superiority of male or female athletes in individual fitness components depended on the actual statistical results. No definitive gender-based differences were claimed in the absence of verified test data.

Major Educational Implications

1. It provided a framework for assessing physical fitness among male and female school-level athletes.
2. It highlighted the importance of regular physical fitness assessment in schools.
3. It helped physical education teachers understand the different physical fitness requirements of athletes.
4. It supported the development of appropriate training programmes for male and female athletes.
5. It emphasised the importance of speed, agility, strength, flexibility and endurance in sports performance.
6. It provided a scientific basis for identifying physical fitness strengths and weaknesses.
7. It encouraged schools to improve sports training facilities and opportunities.
8. It highlighted the importance of scientific sports coaching at the school level.

Suggestions for Further Research

1. Similar studies could be conducted among school-level athletes from other districts of Maharashtra.
2. Comparative studies could be conducted among urban, rural and tribal school athletes.
3. Future research could examine differences among athletes participating in individual and team sports.
4. Similar investigations could be conducted among different age groups.
5. The relationship between physical fitness and sports performance could be examined.
6. The effects of strength training, circuit training and plyometric training could be investigated.

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7. Further studies could examine the influence of nutritional status and biological maturation on physical fitness.
8. Longitudinal investigations could be conducted to examine changes in physical fitness during adolescence.

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