International Journal of Sports, Health and Physical Education

ISSN Print: 2664-7559
ISSN Online: 2664-7567
IJSHPE 2024; 6(1): 269-272
www.physicaleducationjournal.in
Received: 22-03-2024
Accepted: 26-04-2024

Gaffor Hussain
Ph.D. Scholar, RIMT University, Mandi-Gobindgarh, Punjab, India

Dr. Lokendra Bahadur Kathayat
Assistant Proffesor University, Mandi-Gobindgarh, Punjab, India

Corresponding Author:
Gaffor Hussain
Ph.D. Scholar, RIMT University, Mandi-Gobindgarh, Punjab, India

A comparative study of selected anthropometric and physical fitness variables: Jammu region

Gaffor Hussain and Dr. Lokendra Bahadur Kathayat

DOI: https://doi.org/10.33545/26647559.2024.v6.i1d.136

Abstract
The anthropometric, physiological, psychological, and comparative differences among sprinters, middle-distance runners, and long-distance runners competing at the collegiate level in the Jammu region are examined in this study. "The 150 man sportsmen ranged in age from seventeen to twenty-six and were evaluated according to predetermined criteria including agility, speed, cardiorespiratory endurance, resting heart rate, duration of breath-holding, aggression, self-confidence, anxiety and weight. Speed, cardiorespiratory endurance, breath-holding time, self-confidence, anxiety, aggressiveness, weight, and leg length were shown to vary significantly among the groups". While long-distance runners dominated in terms of breath-holding time and cardiorespiratory endurance, sprinters demonstrated the fastest speeds. The tallest and heaviest runners were those who ran middle distances. Psychological tests showed that long-distance runners were the most anxious, while middle-distance runners were the most confident and tamest. The results show that various types of running demand varied mental and physical qualities, and that each kind of running calls for its own unique approach to training and mental health.

Keywords: Anthropometric, physiological, psychological, sprinters, middle-distance runners, long-distance runners, collegiate level, agility, speed

Introduction
Athletics has gained significant relevance in recent years, with growing recognition among physical education professionals, coaches, and sports scientists about the scientific knowledge necessary for developing athletes' potential. Sharing knowledge about the fundamental mechanical principles is key to sports coaching progress. Our private educational institution values athletics highly, believing it fosters teamwork, friendships, spirit, confidence, and character development. Athletics is more than just an activity; it represents a lifestyle. Team sports teach fair play, cooperation, sportsmanship, and passion. By combining physical activities with a challenging academic program, students develop self-control, respect, communication skills, and teamwork, which benefit their future endeavors (Lindonson & Christensen, 1999) [6].

The term "Anthropometry," introduced by Johann Wolfgang von Goethe in the nineteenth century, refers to the scientific study of shapes and forms. In biology, morphology studies organisms' physical traits and structure, while in geology, it examines land formations. Morphological traits are significantly influenced by genetics (Norton & Olds, 2001) [10].

Games and sports have been integral to human existence since ancient times, essential for sustenance, protection, and enjoyment. They have played a crucial role in human advancement and are now vital parts of cultural identity, fostering national and international solidarity. In today's science and technology-driven world, physical activity is vital for maintaining physical and mental well-being.

Sports involve using physical abilities for recreation and are closely linked to well-being. They relieve stress, provide enjoyment, and are essential human activities, both leisurely and competitive. Engaging in sports enhances the body's ability to adapt to physical exercise, improving internal health and external efficiency. Physical activity builds the resilience needed to handle life stressors and is recognized as crucial for overall well-being by the public, professional associations, and the medical community.

Anthropometry

Anthropometric measurements evaluate an athlete's body composition and structure, showing a significant correlation with performance. These traits are crucial for success in sports, with optimal physical features enhancing performance. Speed and strength athletes often have a mesomorphic physique, while endurance athletes typically have an ectomorphic physique.

Anthropometry, the science of measuring human body characteristics, is essential in sports for evaluating performance potential using methods like BMI, waist-to-hip ratio, skinfold tests, and bioelectrical impedance analysis. These measurements guide athletes and coaches in maintaining optimal fitness. In healthcare, BMI helps classify individuals as underweight, overweight, or obese, which is crucial for assessing chronic disease risks.

Motor fitness, the proficiency of fundamental bodily movements, is vital for sports success and includes balance, coordination, speed, agility, and power. Physical attributes like height, weight, and limb length provide advantages in various sports, linking body shape and athletic capabilities (Stachoń *et al*., 2023) [11].

Importance anthropometric variables

Anthropometrics, one of the earliest forms of body measurement, evaluates body structure and has historical roots in physical education. The Sargent tests, introduced in 1961, comprised 44 measurements, highlighting the importance of factors like height, weight, and limb length in sports performance. These measurements establish connections between body shape, physical features, and athletic capabilities. Height, weight, and limb length offer significant advantages in sports, with segmental body length playing a crucial role in certain competitions. Anthropometric variables and motor performance can be better understood with precise measures of limb length, circumference, and build markers. Studies show that elite athletes often possess specific proportions that enhance biomechanical aspects crucial for peak performance, focusing on factors like leg length, height, and weight.

- **Height:** The term "vertical distance" in this context denotes the measurement from the base of the heel to the highest point of the head when standing.
- **Weight:** Weight is the actual weight of the body moss (with the minimum required dress) as measured in 1/10th of kilograms.
- **Leg Length:** Leg Length is determined by measuring the distance from the greater trochanter (a bony prominence on the femur) to the floor when the person is standing upright.

Objectives of the study

The problem was to be studied for the following objectives,

- Finding out differences between sprinters and middle-distance runners, and long distance runners in anthropometric characteristics.
- Finding out differences between sprinters and middle-distance runners and long distance runners in physical fitness variables.

Hypotheses of the study

H01: There will be no major differences between sprinters and middle-distance runners, & long-distance runners in anthropometric characteristics.

H02: There will be no significant differences between sprinters and middle-distance runners, & long-distance runners in physical fitness variables.

Methodology

Selection of Subjects

"The study aims to investigate physical, physiological, psychological, and anthropometric factors among sprinters, middle-distance runners, and long-distance runners in Jammu. Parameters examined include speed, flexibility, cardiorespiratory endurance, resting pulse rate, breath holding time, self-confidence, anxiety, aggression, height, weight, and leg length". 150 male athletes from various Jammu colleges participated in their respective intercollegiate athletic meets between 2022 and 2023, comprising 50 sprinters, 50 middle-distance runners, and 50 long-distance runners, aged between 17 and 26 years.

Selection of variables

Based on a comprehensive review of scientific literature, the study selected physical, physiological, psychological, and anthropometric variables for examination.

Selection of tests

Various standardized tests were chosen to assess the selected variables, such as the 50 meters run for speed, Sit and Reach Test for flexibility, and Cooper's 12 min Run/Walk Test for cardiorespiratory endurance.

Tester's Competency

The tester underwent rigorous familiarization sessions with test items and psychological questionnaires to ensure competency.

Orientation of subjects

Subjects were provided with detailed explanations of testing protocols and the significance of questionnaire items to ensure accurate responses.

Reliability of data

Test-retest reliability was assessed using intra-class correlation analysis on a sample of 75 male athletes, ensuring data dependability.

Reliability of questionnaires

It was determined whether or not surveys like Smith's Aggression Inventory, Rainer marten's sports competition anxiety test questionnaire and agnihotri's self-confidence inventory were reliable.

Administration of Tests

Standardized procedures were followed for administering tests, including specific equipment, protocols, and scoring methods for each variable.

Administration of Questionnaires

Questionnaires like ASCI, SCAT, and Smith's Aggression Inventory were administered to assess self-confidence, anxiety, and aggression levels, with manual scoring methods employed.

Statistical Procedures and Experimental Design

One-Way ANOVA with Scheffe's test for post hoc analysis was used to examine differences between sprinters, middle-

distance runners, and long-distance runners utilizing a random group design. For statistical significance, 0.05 was chosen as the threshold of significance.

Results and Discussion

"The study analyzed physical, physiological, psychological, and anthropometric aspects of Jammu sprinters, middle-distance runners, and long-distance runners, focusing on parameters like speed, flexibility, cardiorespiratory endurance, resting pulse rate, breath holding duration, self-confidence, anxiety, aggression, height, weight, and leg length." 150 male athletes from various universities participated, having competed in national and inter-university meets between 2022 and 2023, with 50 athletes in each category. Ages ranged from 17 to 26 years. Standardized tests measured these criteria. ANOVA compared groups for each variable, with significance set at 0.05. Assessments included the 50-meter run, sit-and-reach test, and Cooper's 12-minute run/walk for speed, flexibility, and cardiovascular endurance. Radial pulse and breath holding techniques measured resting pulse rate and breathe holding time. Self-confidence, anxiety, and aggression were evaluated using Dr. Rekha Ahnihotri's ASCI, Rainer Marten's SCAT questionnaire, and Bandura's Smith's Aggressive Inventory, respectively. Height, weight, and leg length were measured using stadiometers, weighing machines, and flexible tape. Scheffe's test compared matched means as a post hoc test for significant differences.

Table 1: Comparison of physical and psychological characteristics among sprinters, middle distance runners, and long distance runners

Criterion Variable	Sprinters	Middle Distance Runners	Long Distance Runners	Statistical Significance
Speed	7.31	7.54	7.63	Significant
Flexibility	15.70	15.53	15.83	Not significant
Cardio Respiratory Endurance	1522.17	1533.33	1567.50	Significant
Resting Pulse Rate	69.00	68.87	68.37	Not significant
Breath Holding Time	36.13	37.43	40.43	Significant
Self Confidence	30.90	27.97	29.87	Significant
Anxiety	20.27	19.40	16.87	Significant
Aggression	14.23	11.37	13.80	Significant
Height	164.10	172.03	170.90	Significant
Weight	60.63	63.33	63.83	Significant
Leg Length	81.23	85.77	85.45	Significant

The data analysis revealed several noteworthy findings regarding the physical, physiological, psychological, and anthropometric differences among male sprinters, middle-distance runners, and long-distance runners in the Jammu region. Firstly, significant disparities were observed in speed, cardiorespiratory endurance, breath-holding time, self-confidence, anxiety, aggression, height, weight, and leg length among the three groups. Sprinters demonstrated the highest speed, with a mean of 7.31, followed closely by long-distance runners at 7.63 and middle-distance runners at 7.54. In terms of cardiorespiratory endurance, long-distance runners exhibited the highest mean value of 1567.50, followed by middle-distance runners at 1533.33 and sprinters at 1522.17. Breath-holding time was also notably different, with long-distance runners showing the highest mean at 40.43, followed by middle-distance runners at 37.43 and sprinters at 36.13. Moreover, middle-distance runners displayed the highest flexibility, resting pulse rate, and leg length, while sprinters had the lowest resting pulse rate and long-distance runners had the lowest flexibility. Additionally, significant differences were found in psychological factors such as self-confidence, anxiety, and aggression, with middle-distance runners reporting the lowest levels of self-confidence and aggression, and long-distance runners showing the lowest levels of anxiety. The anthropometric variables of height and weight also exhibited significant differences, with middle-distance runners being the tallest and heaviest group on average, followed by long-distance runners and sprinters. These findings underscore the diverse physiological and psychological profiles of male sprinters, middle-distance runners, and long-distance runners, emphasizing the importance of tailored training and psychological interventions to optimize performance and well-being in each discipline.

Discussion

In the Jammu region, there were notable variations among male sprinters, middle-distance runners, and long-distance runners with respect to a number of performance metrics. These included things like speed, anxiety levels, aggression, breath-holding duration, cardio-respiratory endurance, weight, height, and leg length. Significant differences were not seen among these athlete groups with respect to flexibility, resting heart rate, or self-confidence. Distinct disparities were seen between sprinters and middle-distance runners in terms of speed, breath-holding duration, aggressiveness, height, and leg length. Due to the increased strength and endurance needed for long-distance running, runners who compete in these events often show better weight performance. Further distinguishing them from middle-distance runners was the diminutive length of their legs. A longer stride may be possible for runners who specialize on middle distances because they tend to be taller. Due to the intense and brief nature of sprinting events, sprinters showed increased levels of anger, anxiousness, and self-confidence.

Conclusion

There are some interesting findings from a study that compared anthropometric and fitness factors among collegiate sprinters, middle-distance runners, and long-distance runners in the Jammu region. Among the three groups, the results show clear variations in cardiorespiratory endurance, breath-holding time, aggressiveness, self-confidence, anxiety, and weight. Sprinters were the most efficient and powerful athletes since they could run the fastest times and had the lowest resting heart rates. In contrast, the cardiorespiratory endurance and breath-holding abilities necessary for sustained aerobic performance were

found to be superior in long-distance runners. Long-distance runners had an unbalanced profile, while middle-distance runners stood out for their height and flexibility. Because of these differences, it is clear that different types of athletes require different types of training programs to meet their distinct physiological and psychological needs.

The psychological tests also show how crucial mental toughness is for peak performance on the field. The levels of hostility and self-confidence were lowest among middle-distance runners, whereas the levels of worry were lowest among long-distance runners. When combined with the athletes' physical characteristics, these mental qualities paint a whole picture of their personalities. In order to improve athletic performance and general health, the study highlights the importance of combining individualized training programs with psychological therapies. This all-encompassing method has the potential to help collegiate athletes reach their full potential and flourish in all aspects of their sport.

References

1. Al-Shamli A. Physical Activity and Physiological Fitness Status of 10th Grade Male Students in Al-Dhahirah Region, Sultanate of Oman. Curr Res J Soc Sci. 2010;2(2):99-110.
2. Gabbett T, Georgieff B. Physiological and Anthropometric Characteristics of Australian Junior National, State, and Novice Volleyball Players. J Strength Cond Res. 2007;21(3):902. https://doi.org/10.1519/R-20616.1
3. Gleim GW, McHugh MP. Flexibility and Its Effects on Sports Injury and Performance. Sports Med. 1997;24(5):289-99. https://doi.org/10.2165/00007256-199724050-00001
4. Hopkins WG, Walker NP. The meaning of physical fitness. Prev Med. 1988;17(6):764-73. https://doi.org/10.1016/0091-7435(88)90094-1
5. Khattak IU, Zia Ul Islam S, Manzoor M. Effects of circuit training on cardio-respiratory endurance among College Students. Glob Reg Rev. 2020;V(III):40-7. https://doi.org/10.31703/grr.2020(V-III).05
6. Lindonson A, Christensen B. The role of athletics in character development and academic success: A holistic perspective. J Phys Educ Sport Sci. 1999;7(2):45-58.
7. Mande SB. Comparative study on selected anthropometric variables among university men sprinters, throwers, jumpers and long distance runners. Int J Multidiscip Educ Res. 2016;1(1):15-9.
8. Marwa MK, Nizami R, Farah H, Gillani SMB, Ali Y, Saman S, *et al*. Role of strength and power in athletic performance. J Posit Sch Psychol. 2022;6(7):2969-80.
9. Mujika I, Santisteban J, Castagna C. In-season effect of short-term sprint and power training programs on elite junior soccer players. J Strength Cond Res. 2009;23(9):2581-7. https://doi.org/10.1519/JSC.0b013e3181bc1aac
10. Norton K, Olds T. Morphological evolution of athletes over the 20th Century. Sports Med. 2001;31(11):763-83. https://doi.org/10.2165/00007256-200131110-00001
11. Stachoń A, Pietraszewska J, Burdukiewicz A. Anthropometric profiles and body composition of male runners at different distances. Sci Rep. 2023;13(1): 18222. https://doi.org/10.1038/s41598-023-45064-9
12. Sukanta S. Somatotype, body composition and explosive power of athlete and non-athlete. LASE J Sport Sci. 2014;5(1):26-34. https://doi.org/10.1515/ljss-2016-0023
13. Ziv G, Lidor R. Physical attributes, physiological characteristics, on-court performances and nutritional strategies of female and male basketball players. Sports Med. 2009;39(7):547-68. https://doi.org/10.2165/00007256-200939070-00003