International Journal of Research and Technology (IJRT)

International Open-Access, Peer-Reviewed, Refereed, Online Journal

ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529

| An ISO 9001:2015 Certified Journal |

# Impact of Physical Measurements on Motor Performance Components among Tharu Tribal and Non-Tribal Secondary School Students in Bihar

**[1]Niraj Kashyap, [2]Dr. Alok Mishra**

[1]Research Scholar, Barkatullah University Bhopal

[2]Associate Professor, Physical Education, Barkatullah University Bhopal (M.P.)

**Abstract**

The present study aimed to investigate the impact of physical measurements, specifically height and weight, on motor performance components—agility, speed, and cardiovascular efficiency—among Tharu tribal and non-tribal secondary school students in Bihar. A total of 100 students, equally representing Tharu tribal and non-tribal populations, were selected using purposive sampling. Physical measurements were recorded using standardized anthropometric techniques, while motor performance was assessed through 50-meter dash (agility), shuttle run (speed), and 600-yard run/walk (cardiovascular efficiency) tests. Descriptive statistics, mean, standard deviation, and the critical ratio (CR) test were employed to compare the groups. The results of the study indicate that body height has a greater influence on motor performance components than body weight among Tharu tribal and non-tribal secondary school students in Bihar. While differences in agility and speed were significant in relation to height, cardiovascular efficiency remained unaffected. Conversely, variations in body weight showed minimal impact, with only the agility of non-tribal students differing significantly. Overall, the findings suggest that height contributes positively to agility and speed, whereas excessive or low body weight does not substantially alter motor performance.

***Keywords***: Physical measurements, motor performance, agility, speed, cardiovascular efficiency, Tharu tribal, non-tribal, secondary school students.

**Introduction**

Physical fitness and motor performance are critical components of overall health and development in adolescents. They not only contribute to the physical well-being of students but also play a significant role in enhancing academic performance, social interaction, and psychological health. Among the various factors influencing motor performance, physical measurements such as height and weight are considered primary determinants, as they affect balance, speed, agility, and cardiovascular efficiency. The relationship between anthropometric characteristics and motor abilities has been extensively studied across different populations, revealing that variations in body composition can significantly influence performance in physical tasks (Hoffman, 2014; Armstrong & Welsman, 2007).

In India, the tribal population exhibits unique lifestyle patterns, dietary habits, and environmental adaptations, which often result in distinct anthropometric and physiological characteristics compared to non-tribal populations. The Tharu tribe, primarily residing in

Bihar, Uttar Pradesh, and neighboring regions, is known for its active outdoor lifestyle, physical labor, and engagement in traditional games, which potentially influence both physical development and motor efficiency (Shukla, 1994; Yadav & Srivastava, 2014). On the other hand, non-tribal secondary school students, particularly in semi-urban and urban settings, may have different activity levels, dietary patterns, and sedentary behaviors that impact their physical measurements and motor performance.

Understanding how physical measurements affect motor performance components such as agility, speed, and cardiovascular efficiency is essential for designing effective physical education programs. Agility, the ability to change body position rapidly and efficiently, is influenced by body mass and limb coordination. Speed, defined as the ability to cover a distance in the shortest time, is affected by muscle strength, body weight, and overall body composition. Cardiovascular efficiency, often measured through endurance tasks like the 600-yard run/walk, reflects the integrated functioning of the heart, lungs, and circulatory system, which can be influenced by body size and physical conditioning (Kraemer & Ratamess, 2004).

Previous research indicates significant differences in motor performance between tribal and non-tribal adolescents, often linked to variations in physical measurements, lifestyle patterns, and habitual activity levels. For instance, tribal students frequently demonstrate superior cardiovascular endurance due to active engagement in daily physical tasks, whereas non-tribal students may excel in agility tasks due to structured sports training or targeted physical education programs (Sarkar & Paul, 2015; Dudhale & Bhate, 2015). Despite these insights, limited research has specifically examined the interplay between anthropometric factors and motor performance among Tharu tribal and non-tribal secondary school students in Bihar.

The present study addresses this gap by investigating the relationship between height and weight and motor performance components—agility, speed, and cardiovascular efficiency—among Tharu tribal and non-tribal secondary school students. By analyzing these associations, the study aims to provide valuable insights for physical educators, trainers, and policymakers to design tailored fitness programs that optimize physical development and motor skills in diverse adolescent populations. Moreover, the findings can contribute to promoting health awareness, encouraging balanced physical activity, and understanding the influence of anthropometric factors on motor performance in culturally and environmentally diverse groups.

**Review of Literature**

Several studies have examined the relationship between physical measurements and motor performance among adolescents, highlighting the influence of anthropometric characteristics on agility, speed, and cardiovascular efficiency. Devi (2000) observed that tribal students, owing to their active lifestyle, often demonstrated better endurance and muscular development compared to non-tribal peers. Similarly, Dhara, Chatterjee, and Pal (1995) reported notable differences in physical performance and body dimensions between tribal and non-tribal school students, suggesting that environmental and lifestyle factors play

a significant role. Ajesh and Sudheer (2013) emphasized the impact of physical measurements on cardiorespiratory fitness, noting that body composition can influence oxygen utilization and heart rate response during exertion. Hajam and Basir (2017) found that rural male students with higher physical activity levels had superior cardiovascular efficiency compared to urban counterparts. Sarkar and Paul (2015) highlighted that body weight and height significantly affect motor performance, particularly agility and speed, among school-going boys. Dudhale and Bhate (2015) reported that psycho-motor abilities, including coordination and speed, are strongly associated with height and muscular development in both tribal and non-tribal adolescents. Yadav and Rohilla (2011) emphasized that sports participation enhances cardiovascular endurance and agility, while anthropometric advantages further contribute to performance differences. Shukla (1994) explored the Tharu tribe, noting that their traditional lifestyle and active daily routines foster superior physical fitness. Purshottam and Dhingra (2017) examined the socio-cultural and nutritional patterns of Indian tribes, demonstrating that these factors influence growth and motor capabilities. Yadav and Srivastava (2014) specifically studied the Tharu tribe and highlighted how environmental adaptation and habitual physical work contribute to greater height, weight, and motor efficiency among tribal adolescents. Collectively, these studies underscore the importance of physical measurements as determinants of motor performance and provide a foundation for examining these associations among Tharu tribal and non-tribal secondary school students in Bihar.

**Methodology**

(a) **Sample Techniques**-Sample for the present study consists of 100 Tharu Tribal and Non-Tribal Secondary School Students in Trihut Bihar.

| **Area** | **Secondary Students** | |
|---|---|---|
| Trihut | **Tharu Tribal** | **Non Tribal** |
| | 50 | 50 |

**(b) Test used**

In the present study, selected physical measurements, specifically weight and height, were considered to examine their impact on motor performance components such as agility, speed, and cardiovascular efficiency among Tharu tribal and non-tribal secondary school students in Bihar. The median values of weight and height were calculated for the total sample, and students were categorized into high and low groups based on whether their measurements were above or below the median. This classification allowed for a comparative analysis of motor performance components across different physical measurement categories, enabling the researcher to understand how variations in body weight and height influence agility, speed, and cardiovascular efficiency in both tribal and non-tribal students.

(c) **Data Analysis**- Data analyzed with the help of t test.

(d) **Objective of the study**

International Journal of Research and Technology (IJRT)
International Open-Access, Peer-Reviewed, Refereed, Online Journal
ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529
| An ISO 9001:2015 Certified Journal |

1. To examine the impact of body weight on motor performance components (agility, speed, and cardiovascular efficiency) among Tharu tribal and non-tribal secondary school students in Bihar.
2. To investigate the influence of body height on motor performance components (agility, speed, and cardiovascular efficiency) among Tharu tribal and non-tribal secondary school students in Bihar.

(e) **Hypothesis of the study**

**Hypothesis 01** There is no significant difference in motor performance components (agility, speed, and cardiovascular efficiency) between students with high and low body weight among Tharu tribal and non-tribal secondary school students in Bihar.

**Hypothesis 02** There is no significant difference in motor performance components (agility, speed, and cardiovascular efficiency) between students with high and low body height among Tharu tribal and non-tribal secondary school students in Bihar.

**Interpretation**

**Hypothesis 01** There is no significant difference in motor performance components (agility, speed, and cardiovascular efficiency) between students with high and low body weight among Tharu tribal and non-tribal secondary school students in Bihar.

**Table No. – 1**

Comparative results of difference in motor performance components (agility, speed, and cardiovascular efficiency) between students with high and low body weight among Tharu tribal and non-tribal secondary school students in Bihar

| motor performance components | **Sample** | **Body Weight** | **N** | **Mean** | **S.D.** | **'CR' Value** | **'P' Value** |
|---|---|---|---|---|---|---|---|
| agility | Tharu tribal | High | 25 | 8.87 | 1.3 | 0.77 | Not significant at 0.05 |
| | | low | 25 | 9.15 | 1.28 | | |
| | Non-Tribal | High | 25 | 7.57 | 0.62 | **1.99** | significant at 0.05 |
| | | low | 25 | 7.91 | 0.61 | | |
| | Total | High | 51 | 8.26 | 1.23 | 0.95 | Not significant at 0.05 |
| | | low | 49 | 8.49 | 1.16 | | |
| Speed | Tharu tribal | High | 25 | 10.95 | 0.79 | 0.23 | Not significant at 0.05 |
| | | low | 25 | 11.00 | 0.75 | | |
| | Non- | High | 2 | 11.8 | 0.7 | 0.15 | Not |

International Journal of Research and Technology (IJRT)
International Open-Access, Peer-Reviewed, Refereed, Online Journal
ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529
| An ISO 9001:2015 Certified Journal |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Tribal | | 5 | 2 | 9 | | significant at 0.05 |
| | | low | 25 | 11.86 | 0.76 | | |
| | Total | High | 51 | 11.39 | 0.89 | 0.19 | Not significant at 0.05 |
| | | low | 49 | 11.42 | 0.86 | | |
| cardiovascular efficiency | Tharu tribal | High | 25 | 104.84 | 17.77 | 0.87 | Not significant at 0.05 |
| | | low | 25 | 100.41 | 18.18 | | |
| | Non-Tribal | High | 25 | 118.25 | 5.47 | 1.07 | Not significant at 0.05 |
| | | low | 25 | 119.98 | 5.93 | | |
| | Total | High | 51 | 111.53 | 15.13 | 0.43 | Not significant at 0.05 |
| | | low | 49 | 110.18 | 16.24 | | |

df –48/198 Minimum values set for 0.05 level of significance 1.96

The results presented in Table No. 1 show the comparative effect of body weight on motor performance components (agility, speed, and cardiovascular efficiency) among Tharu tribal and non-tribal secondary school students in Bihar.

Agility: Among Tharu tribal students, the mean agility score for high-weight students was 8.87, while low-weight students scored 9.15. The calculated CR value of 0.77 was not significant at the 0.05 level, indicating no meaningful difference in agility due to body weight in this group. For non-tribal students, high-weight students scored 7.57, whereas low-weight students scored 7.91. The CR value of 1.99 was significant at 0.05, suggesting that lower body weight slightly favors better agility performance in non-tribal students. Considering the total sample, the mean scores were 8.26 for high-weight and 8.49 for low-weight students, with a CR value of 0.95 (not significant), indicating no overall significant difference.

Speed: Tharu tribal students showed mean speed scores of 10.95 for high-weight and 11.00 for low-weight students (CR = 0.23, not significant), and non-tribal students scored 11.82 and 11.86, respectively (CR = 0.15, not significant). Overall, high-weight students scored 11.39 and low-weight students 11.42 (CR = 0.19, not significant). These results suggest that body weight does not significantly influence speed performance in either group or the total sample.

Cardiovascular Efficiency: Tharu tribal students with high weight scored 104.84 and low-weight students 100.41 (CR = 0.87, not significant), while non-tribal students scored

International Journal of Research and Technology (IJRT)
International Open-Access, Peer-Reviewed, Refereed, Online Journal
ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529
| An ISO 9001:2015 Certified Journal |

118.25 and 119.98, respectively (CR = 1.07, not significant). For the total sample, high-weight students scored 111.53 and low-weight students 110.18 (CR = 0.43, not significant). These findings indicate that body weight does not have a statistically significant effect on cardiovascular efficiency in either group.

**Hypothesis 02** There is no significant difference in motor performance components (agility, speed, and cardiovascular efficiency) between students with high and low body height among Tharu tribal and non-tribal secondary school students in Bihar.

**Table No. – 2**

Comparative results of difference in motor performance components (agility, speed, and cardiovascular efficiency) between students with high and low body height among Tharu tribal and non-tribal secondary school students in Bihar

| motor performance components | **Sample** | **Body height** | **N** | **Mean** | **S.D.** | **'CR' Value** | **'P' Value** |
|---|---|---|---|---|---|---|---|
| agility | Tharu tribal | High | 31 | 9.13 | 1.38 | 0.85 | Not significant at 0.05 |
| | | low | 19 | 8.81 | 1.13 | | |
| | Non-Tribal | High | 27 | 7.7 | 0.57 | 0.45 | significant at 0.05 |
| | | low | 23 | 7.78 | 0.7 | | |
| | Total | High | 56 | 8.68 | 1.35 | 3.04 | significant at 0.01 |
| | | low | 44 | 7.98 | 0.82 | | |
| Speed | Tharu tribal | High | 31 | 10.83 | 0.76 | 1.75 | Not significant at 0.05 |
| | | low | 19 | 11.21 | 0.73 | | |
| | Non-Tribal | High | 27 | 11.78 | 0.73 | 0.52 | Not significant at 0.05 |
| | | low | 23 | 11.89 | 0.83 | | |
| | Total | High | 56 | 11.21 | 0.83 | 2.63 | significant at 0.01 |
| | | low | 44 | 11.66 | 0.87 | | |
| cardiovascular efficiency | Tharu tribal | High | 31 | 103.59 | 20.04 | 0.48 | Not significant at 0.05 |
| | | low | 19 | 101.06 | 14.23 | | |

International Journal of Research and Technology (IJRT)

International Open-Access, Peer-Reviewed, Refereed, Online Journal

ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529

| An ISO 9001:2015 Certified Journal |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Non-Tribal | High | 27 | 118.85 | 4.94 | 0.35 | Not significant at 0.05 |
| | | low | 23 | 119.43 | 6.61 | | |
| | Total | High | 56 | 109.22 | 17.08 | 0.68 | Not significant at 0.05 |
| | | low | 44 | 112.08 | 13.64 | | |

df –48/198 Minimum values set for 0.05/0.01 level of significance 1.96/2.58

Table No. 2 presents the comparative effect of body height on motor performance components (agility, speed, and cardiovascular efficiency) among Tharu tribal and non-tribal secondary school students in Bihar.

Agility: Among Tharu tribal students, high-height students scored a mean of 9.13, while low-height students scored 8.81 (CR = 0.85, not significant at 0.05), indicating no significant effect of height on agility in this group. Non-tribal students with high height scored 7.7 and low-height students 7.78 (CR = 0.45, significant at 0.05), suggesting a minor but significant variation in agility among non-tribal students. Considering the total sample, high-height students scored 8.68 and low-height students 7.98 (CR = 3.04, significant at 0.01), reflecting a clear overall trend that greater height is associated with better agility performance across the combined groups.

Speed: In Tharu tribal students, high-height students had a mean speed of 10.83 compared to 11.21 for low-height students (CR = 1.75, not significant), showing no significant effect. Non-tribal students scored 11.78 for high-height and 11.89 for low-height students (CR = 0.52, not significant). However, in the total sample, high-height students scored 11.21 and low-height students 11.66 (CR = 2.63, significant at 0.01), indicating that overall, taller students demonstrate slightly lower speed, which is statistically significant when considering all participants.

Cardiovascular Efficiency: Tharu tribal students with high height scored 103.59 and low-height students 101.06 (CR = 0.48, not significant). Non-tribal students scored 118.85 for high-height and 119.43 for low-height students (CR = 0.35, not significant). The total sample scored 109.22 for high-height and 112.08 for low-height students (CR = 0.68, not significant), suggesting that body height does not significantly influence cardiovascular efficiency in either group or overall.

**Verification of the Hypothesis:**

The null hypothesis 1 stated that there is no significant difference in motor performance components between students with high and low body weight among Tharu tribal and non-tribal secondary school students. Based on the results, this hypothesis is partially accepted, as only the agility of non-tribal students showed a significant difference, whereas all other components (speed and cardiovascular efficiency) across both groups did not exhibit significant differences. The null hypothesis 2 stated that there is no significant

difference in motor performance components between students with high and low body height. The results indicate that this hypothesis is also partially accepted, as overall agility and speed demonstrated significant differences, while cardiovascular efficiency did not, suggesting that height influences certain motor performance components but not all.

**Conclusion: -**

The present study aimed to investigate the comparative impact of selected physical variables—body weight and body height—on motor performance components (agility, speed, and cardiovascular efficiency) among Tharu tribal and non-tribal secondary school students in Bihar. The findings reveal that body weight has a limited effect on motor performance, with only agility of non-tribal students showing a significant difference, while speed and cardiovascular efficiency remained largely unaffected across both groups. In contrast, body height demonstrated a more noticeable influence, particularly on agility and speed, although cardiovascular efficiency was not significantly affected.

These results suggest that while both weight and height are important physical characteristics, height appears to play a more consistent role in enhancing certain motor performance components, particularly agility and speed. Additionally, differences between Tharu tribal and non-tribal students highlight the influence of lifestyle, environmental exposure, and habitual physical activity on motor abilities. The study underscores the need for tailored physical training and fitness programs that consider individual anthropometric characteristics to optimize motor performance and physical development among secondary school students.

**References**

1. Ajesh, P. T., & Sudheer, G. P. (2013). A study on cardiorespiratory fitness among tribal and national male students. Asia Pacific Journal of Marketing and Management Review, 2(9), 1–7.
2. Bandyopadhyay, A. (2015). Influence of anthropometric characteristics on motor performance of school-going children. Journal of Human Kinetics, 47(1), 89–95. https://doi.org/10.1515/hukin-2015-0079
3. Beunen, G., & Malina, R. M. (2008). Growth and physical performance relative to the timing of the adolescent spurt. Exercise and Sport Sciences Reviews, 36(1), 22–30.
4. Chatterjee, S., & Das, P. (2019). Comparative analysis of physical growth and agility among tribal and non-tribal adolescents in Eastern India. Indian Journal of Physical Education, Sports and Applied Science, 9(3), 41–48.
5. De, A. K., & Bhattacharya, A. (2002). Anthropometric and physical fitness characteristics of rural and urban boys of West Bengal. Indian Journal of Physical Anthropology, 27(2), 57–63.
6. Devi, S. (2000). A comparative study of physical fitness and psychological traits of tribal and non-tribal high school students of high altitude areas.
7. Dhara, P. C., & Sengupta, P. (2015). A study on physical growth and motor fitness among different ethnic groups. Journal of Human Biology, 32(4), 210–218.

8. Dhara, P. C., Chatterjee, H., & Pal, D. (1995, October). A comparative study of physical performance and body dimension between tribal and non-tribal school students. NIS Scientific Journal, 18(4), 47–53.
9. Dudhale, S., & Bhate, B. (2015). A comparative study of psycho-motor abilities of tribal and non-tribal gymnasts. Research Journal of Physical Education Sciences, 3(2), 9–10.
10. Ghosh, R., & Chatterjee, S. (2018). Relationship between height, weight, and physical performance among Indian school students. Asian Journal of Sports Medicine, 9(2), 102–108.
11. Hajam, B. A., & Basir, S. (2017). A comparative study of physical fitness among rural and urban male students of District Anantnag in Jammu and Kashmir. Asia Pacific Journal of Research, 1(1), 1–7.
12. Jeyavel, M., & Natarajan, R. (2017). Influence of body composition on agility and speed performance among adolescent boys. International Journal of Physical Education, Sports and Health, 4(4), 139–142.
13. Koley, S., & Singh, J. (2010). Effect of anthropometric variables on motor performance among school-aged children. Journal of Human Sport and Exercise, 5(3), 240–251.
14. Kumar, S., & Sharma, R. (2016). Physical fitness comparison between tribal and non-tribal youth of Jharkhand. International Journal of Applied Research, 2(4), 455–458.
15. Majumdar, P., & Pal, H. (2020). Relationship between physical measurements and motor ability of adolescent boys. European Journal of Physical Education and Sport Science, 6(10), 1–10.
16. Malina, R. M. (2007). Physical growth and biological maturation of children and adolescents. Pediatric Exercise Science, 19(2), 122–135.
17. Mondal, A., & Das, P. (2014). Comparative evaluation of anthropometric characteristics and motor performance among rural and urban students. Journal of Sports Science and Fitness, 3(1), 33–39.
18. Panda, B., & Rout, S. (2018). Anthropometric correlates of speed and agility performance among tribal boys of Odisha. Indian Journal of Movement Education, 5(2), 57–63.
19. Purshottam, & Dhingra, V. (2017). Understanding the Indian tribal life and their issues. International Journal of Advanced Research, 5(July), 1588–1595.
20. Sarkar, S., & Paul, A. (2015). Comparative study on health-related physical fitness between tribal and non-tribal school-going boys. International Journal of Advance Research in Management and Social Studies, 4(7), 1–7.
21. Sharma, M., & Yadav, R. (2021). Relationship between height, weight, and cardiovascular endurance among secondary school students. International Journal of Sports, Exercise and Physical Education, 2(3), 24–30.
22. Shukla, P. K. (1994). The Tharu of Bihar: A historical and anthropological study. Indian History Congress, 55, 646–654.

23. Singh, A., & Gupta, V. (2019). Comparative study on motor fitness components of tribal and non-tribal adolescents in Central India. Journal of Physical Education Research, 6(2), 72–79.
24. Yadav, M., & Rohilla, K. (2011). A comparative study of physical fitness among sportsmen and non-sportsmen students in Bhiwani District of Haryana. International Journal of Multidisciplinary Research and Development, 1(5), 177–178.
25. Yadav, P. N., & Srivastava, S. K. (2014). The eco-friendly lifestyle: Study of Tharu tribe in Tarai region of U.P., Uttarakhand, and Bihar. Indian Journal of Social and Political Studies, 1(1), 15–20.