Morphological Physiognomic of Divyang Cricketers in West Bengal: A Pilot Study

Subhashis Biswas [1, *], Madhab Chandra Ghosh [1], Mukesh Kumar Verma [2]

[1] Department of Physical Education and Yoga, ICFAI University, Tripura, India
[2] Department of Physical Education and Social Science, NCERT, New Delhi, India
* Corresponding author email: subhashisbiswas@iutripura.edu.in

Abstract

Introduction: Morphological characteristics play a crucial role in determining performance, positional specialization and injury susceptibility in cricket. While extensive anthropometric profiling has been conducted on mainstream cricketers, limited research has examined Divyang (differently-abled) athletes, despite their increasing participation at competitive levels. This study aimed to investigate the morphological characteristics of Divyang cricketers in West Bengal. **Methods:** A cross-sectional descriptive study was conducted with 17 male Divyang cricketers (aged 17–36 years) representing West Bengal. Standardized ISAK protocols were used to measure body size, skinfolds, girths and bone breadths. Body composition was estimated and somatotype components were derived using the Heath-Carter method. **Results:** Batsmen presented with higher body mass (71.4±10.7 kg), BMI (25.38±2.4 kg/m²), body fat percentage (19.9±1.5%), and endomorphy (4.91±0.4), reflecting greater adiposity and muscularity. Bowlers were leaner with lower BMI (19.38±0.9 kg/m²), reduced fat percentage (10.3±3.7%) and higher ectomorphy (3.99±0.4), while all-rounders displayed balanced mesomorphic dominance (4.47±0.4) with moderate adiposity. Somatoplot analysis revealed clustering toward central mesomorphy suggesting limited morphological dispersion compared to mainstream cricket. **Discussion:** The study revealed Divyang cricketers demonstrate less role-specific somatotype differentiation, with functional efficiency and adaptability taking precedence over positional specialization. Moderate mesomorphic dominance provides muscularity necessary for cricket-specific tasks, while elevated endomorphic expression reflects mobility limitations and lower access to structured conditioning systems. **Conclusion:** Divyang cricketers in West Bengal predominantly exhibit mesomorphic tendencies with positional variations but reduced morphological diversity compared to mainstream cricketers. These insights highlight the importance of disability-sensitive conditioning, nutritional strategies and targeted training programs to enhance performance and reduce injury risks.

Keywords: Divyang cricket, Inclusive sports, Anthropometry, Somatotype, Body composition

Fisiognómica Morfológica de los Jugadores de Críquet de Divyang en Bengala Occidental: Un Estudio Piloto

Resumen

Introducción: Las características morfológicas desempeñan un papel crucial en la determinación del rendimiento, la especialización posicional y la susceptibilidad a lesiones en el críquet. Si bien se han realizado amplios perfiles antropométricos en jugadores de críquet convencionales, la investigación sobre los atletas Divyang (con capacidades diferentes) ha sido limitada, a pesar de su creciente participación en competiciones. Este estudio tuvo como objetivo investigar las características morfológicas de los jugadores de críquet Divyang en Bengala Occidental. **Métodos:** Se realizó un estudio descriptivo transversal con 17 jugadores de críquet Divyang masculinos (de 17 a 36 años) de Bengala Occidental. Se utilizaron protocolos estandarizados ISAK para medir la talla corporal, los pliegues cutáneos, el perímetro y la anchura ósea. Se estimó la composición corporal y se derivaron los componentes del somatotipo mediante el método de Heath-Carter. **Resultados:** Los bateadores presentaron mayor masa corporal (71,4 ± 10,7 kg), IMC (25,38 ± 2,4 kg/m²), porcentaje de grasa corporal (19,9 ± 1,5 %) y endomorfia (4,91 ± 0,4), lo que refleja mayor adiposidad y muscularidad. Los lanzadores fueron más

delgados con menor IMC (19,38 ± 0,9 kg/m²), porcentaje de grasa reducido (10,3 ± 3,7 %) y mayor ectomorfia (3,99 ± 0,4), mientras que los todoterrenos mostraron dominancia mesomórfica equilibrada (4,47 ± 0,4) con adiposidad moderada. El análisis de somatoplot reveló agrupamiento hacia la mesomorfia central, lo que sugiere una dispersión morfológica limitada en comparación con el críquet convencional. Discusión: El estudio reveló que los jugadores de críquet de Divyang demuestran una diferenciación de somatotipos menos específica de rol, con la eficiencia funcional y la adaptabilidad priorizando sobre la especialización posicional. La dominancia mesomórfica moderada proporciona la musculatura necesaria para las tareas específicas del críquet, mientras que la expresión endomórfica elevada refleja limitaciones de movilidad y un menor acceso a sistemas de acondicionamiento estructurados. **Conclusión:** Los jugadores de críquet de Divyang en Bengala Occidental presentan predominantemente tendencias mesomórficas con variaciones posicionales, pero una diversidad morfológica reducida en comparación con los jugadores de críquet convencionales. Estos hallazgos resaltan la importancia del acondicionamiento adaptado a la discapacidad, las estrategias nutricionales y los programas de entrenamiento específicos para mejorar el rendimiento y reducir el riesgo de lesions.

Palabras Clave: Críquet de Divyang, Deportes inclusivos, Antropometría, Somatotipo, Composición corporal

Introduction

Cricket is an integrated skill-based team sport. Previous studies repeatedly demonstrated that morphological variables are fundamental to team sports to govern positional preference, movement economy, stamina and resilience to injury (Cherif et al., 2022; Dingley et al., 2015). In cricket demands differ sharply across batting, bowling, wicket-keeping and fielding. Morphological traits such as stature, segment lengths, body mass and body-fat distribution can modulate skill execution and cumulative effectiveness. Fast bowlers tend to gain advantage from extended height and limb reach, while proficient batters harness a specific configuration of musculature and proportions to enhance shot timing and placement (Stuelcken et al., 2007). Such findings substantiate the view that morphology provides a stable substrate on which technical and tactical aptitude is cultivated and elevated. Within the larger field of sports science, the rise of Divyang cricket introduces a critical layer to the study of inclusive performance profiling. Divyang cricketers are distinguished by the presence of physical impairments yet engage in the sport at elite levels.

The term "Divyang" derives from Hindi, translating roughly as "divinely-formed body" or "differently capable," and is widely accepted throughout India to designate people with physical impairments. In the twenty-first century, Divyang participants have gained sustained visibility in global competitive sport. Divyang cricket has emerged as a leading stage for the display of endurance, technical finesse and competitive excellence. Now, Divyang cricket has evolved into an official sport that offers clear hierarchies of play, systematic pathways for talent discovery and legitimate prospects for entry into global and Paralympic competitions (Sarabia et al., 2020). Amendments to the standard Laws of Cricket address the diverse locomotor capabilities of its competitors, thereby preserving the sport's essential character while lightening barriers to participation.

Morphological characteristics observed among cricketers with locomotor disabilities serve as a driver of heightened competitive performance. Athletes with unilateral limb deficiency routinely reinforce postural stability, core trunk centration and inter-limb co-ordination to compensate for modified force vectors and shortened lever arms. Such responses lend themselves to systematic assessment using anthropometric protocols. These measures facilitate precision in positional categorisation within tactical rosters and the design of progressive, position-specific conditioning regimens that reinforce adaptive strengths while diminishing observable limitations.

Comprehensive analyses of Divyang cricketers have generated an anthroposcopic and morphometric data repository systematically stratified by field position. Similar explorations of Divyang cricket remain lamentably thin, impairing the progressive elaboration of evidence-led performance paradigms. To date, only a limited body of research has characterized the corporeal and psychosocial profiles of wheelchair basketball, para-athletics and swimming (Cherif et al., 2022; Dingley et al., 2015; Lemos et al., 2016; Sarabia et al., 2020). This shortfall engenders a palpable void in understanding the interplay between structure and cricket-specific output among Divyang athletes. In the absence of rigorously established realistic reference points, training prescriptions are subject to generalized.

The study is designed to fill the existing lacuna in the literature by conducting a systematic assessment of the anthropometric and morphological attributes of Divyang cricketers. Comparative analysis with normative datasets from mainstream counterparts will clarify both convergences and divergences in somatic configuration and the corresponding functional consequences. The ultimate objective of the study is to support evidence-driven strategies that broaden participation, mitigate the potential for injury and nurture high-level achievement among

cricketers with disabilities. The study also reinforces the belief that somatic characteristics are similar important as technical competence among the cricketers.

Materials and Methods

Study Design

This study employed a cross-sectional descriptive design to examine the morphological and somatotype characteristics of Divyang cricketers of West Bengal. The design was selected because it allows for the systematic collection of anthropometric and body composition data at a single point in time, enabling the construction of morphological profiles and somatotype classification.

Participants

Seventeen (N = 17) male Divyang cricketers voluntarily participated in this study. The participants ranged in age from 17 to 36 years and were affiliated with Divyang Cricket Association of West Bengal. All the Divyang cricketers had at least two years of structured cricket training and active competitive experience in national level tournaments.

Inclusion and Exclusion Criteria

The inclusion criteria for the present study considered only registered Divyang cricketers from West Bengal who were male athletes aged 17 years and above, with a minimum of two year of formal cricket training and competitive experience. Participants were required to provide informed consent, and in the case of minors under 18 years, parental or guardian consent was also mandatory. On the other hand, the exclusion criteria ruled out athletes suffering from acute injuries, those who had undergone recent surgeries or individuals with unstable medical conditions that could interfere with participation.

Measuring Parameters

All measurements were conducted according to the International Standards for Anthropometric Assessment (ISAK) protocols. Data collection was carried out with calibrated instruments and three measurements were taken to reduce technical error. Somatotype was calculated using Heath-Carter equation 1967 (Carter, 2003)

Table 1. Selected demographic and anthropometric variables were measures

Category	Parameters Recorded
Personal	Age
Body Size	Body Mass, Stature
Skinfolds (mm)	Biceps, Triceps, Subscapular, Supraspinale, Medial Calf
Bone Breadths (cm)	Bi-epicondylar Humerus, Bi-epicondylar Femur
Girths (cm)	Arm Girth (flexed), Calf Girth (max.)
Body composition	Percentage (%) of fat
Somatotype	Endomorphy, Mesomorphy, Ectomorphy

Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki and study protocol was approved by departmental research committee, The ICFAI University Tripura. Written informed consent was obtained from all participants and confidentiality of individual data was strictly maintained.

Statistical Analysis

Data were entered and processed using Jamovi free statistical software (Version 2.7.3) and Microsoft Excel 2021. According to distribution pattern descriptive statistics were calculated to summarize the morphological characteristics of the participants. This distribution pattern helped to identify clustering trends and dominant physique types among Divyang cricketers.

Somatotype analysis was performed to determine the distribution pattern of body types by calculating mean somatotype components (endomorphy, mesomorphy, and ectomorphy) and plotting the participants on a somatochart. To further illustrate the results suitable graph were used. The level of statistical significance for the study was set at $p < 0.05$.

Results

Table 2. Anthropometric and somatotype characteristics of Divyang Cricketers

Parameters	Batsmen (n=5)	Bowlers (n=4)	All-rounders (n=8)	Total (n=17)
Age (Years)	28.4±6.841 (19.906 -36.89)	18±0.816 (16.701 -19.3)	27.75±4.268 (24.182 -31.32)	25.65±6.244 (22.44 -28.86)
Body Mass	71.4±10.732 (58.075 -84.73)	56.4±9.076 (41.958 -70.84)	60.06±7.72 (53.608 -66.52)	62.54±10.36 (57.21 -67.86)
Height (cm)	167.3±6.27 (159.51 -175.09)	170.1±10.189 (153.89 -186.31)	167.68±7.022 (161.81 -173.55)	168.14±7.222 (164.42 -171.85)
BMI (kg/m2)	25.38±2.428 (22.364 -28.39)	19.38±0.937 (17.89 -20.87)	21.29±1.352 (20.16 -22.42)	22.04±2.824 (20.59 -23.49)
Biceps SF (mm)	6.76±1.129 (5.362 -8.17)	3.18±0.544 (2.317 -4.05)	4.45±0.587 (3.962 -4.94)	4.83±1.563 (4.03 -5.64)
Triceps SF (mm)	11.78±0.995 (10.548 -13.02)	6.48±3.459 (0.973 -11.98)	8.04±2.271 (6.139 -9.94)	8.77±3.028 (7.22 -10.33)
Subscapular SF (mm)	21.41±4.725 (15.544 -27.28)	8.36±4.031 (1.948 -14.78)	13.65±3.33 (10.862 -16.43)	14.69±6.176 (11.51 -17.86)
Supraspinale SF (mm)	15.01±2.147 (12.345 -17.68)	6.61±0.683 (5.526 -7.7)	10.4±2.734 (8.118 -12.69)	10.87±3.809 (8.91 -12.82)
Medial Calf SF (mm)	15.67±5.178 (9.236 -22.1)	5.55±1.32 (3.447 -7.65)	8±2.367 (6.024 -9.98)	9.68±5.134 (7.04 -12.32)
Bi-epicondylar Humerus (cm)	6.74±0.378 (6.27 -7.21)	6.6±0.294 (6.132 -7.07)	6.78±0.373 (6.463 -7.09)	6.72±0.344 (6.55 -6.9)
Bi-epicondylar Femur (cm)	9.66±0.488 (9.054 -10.27)	8.78±0.457 (8.047 -9.5)	9.35±0.389 (9.025 -9.68)	9.31±0.525 (9.04 -9.58)
Arm Girth (cm)	28.92±2.76 (25.495 -32.35)	23.9±1.612 (21.337 -26.47)	28.17±1.568 (26.861 -29.48)	27.39±2.747 (25.98 -28.8)
Calf Girth (cm)	33.75±4.231 (28.5 -39.01)	29.32±1.311 (27.235 -31.41)	34.09±2.919 (31.647 -36.53)	32.87±3.558 (31.04 -34.7)
Endomorphy	4.91±0.432 (4.373 -5.45)	2.08±0.939 (0.585 -3.57)	3.31±0.769 (2.666 -3.95)	3.49±1.271 (2.84 -4.14)
Mesomorphy	4.57±0.643 (3.772 -5.37)	2.16±1.006 (0.556 -3.76)	4.47±0.477 (4.072 -4.87)	3.96±1.205 (3.34 -4.58)
Ectomorphy	1.21±0.616 (0.441 -1.97)	3.99±0.467 (3.249 -4.74)	2.86±0.639 (2.322 -3.39)	2.64±1.199 (2.02 -3.25)
Body fat (%)	19.96±1.499 (18.099 -21.82)	10.3±3.739 (4.353 -16.25)	14.85±2.586 (12.683 -17.01)	15.28±4.386 (13.03 -17.54)
Amount of fat (kg)	14.33±2.855 (10.784 -17.87)	5.79±2.24 (2.224 -9.35)	9±2.456 (6.949 -11.06)	9.81±4.046 (7.73 -11.89)
Fat free mass (kg)	57.07±8.089 (47.028 -67.11)	50.61±8.803 (36.605 -64.62)	51.06±5.887 (46.138 -55.98)	52.72±7.379 (48.93 -56.52)

The Table 2 presents the anthropometric, skinfold, girth, breadth, and somatotype parameters of Divyang cricketers. Batsmen were generally older and heavier, with higher BMI, body fat percentage, and endomorphic

values, indicating a physique characterized by greater adiposity alongside muscularity. Bowlers, in contrast, were the youngest group and demonstrated lower body mass, BMI, and fat mass, but higher ectomorphy scores, suggesting leanness and a linear build. All-rounders exhibited an intermediate profile, with balanced mesomorphic dominance, moderate adiposity and greater muscle girths. Divyang batsmen exhibited significantly higher endomorphy compared to bowlers, indicating greater fat-related characteristics, while all-rounders demonstrated intermediate values. In terms of mesomorphy, both batsmen and all-rounders displayed significantly greater muscularity than bowlers. Conversely, bowlers recorded the highest ectomorphy, which was significantly greater than that of batsmen and all-rounders, reflecting a leaner physique. Body fat percentage followed a similar pattern, with batsmen showing the highest mean values, followed by all-rounders and bowlers the lowest. The batsmen of this study tend towards an endomorphic–mesomorphic build, bowlers towards an ectomorphic build and all-rounders exhibit a balanced mesomorphic tendency. Such role-specific morphological distinctions align with patterns observed in mainstream cricket but also highlight unique adaptations within Divyang cricketers, likely influenced by disability-related constraints and compensatory mechanisms.
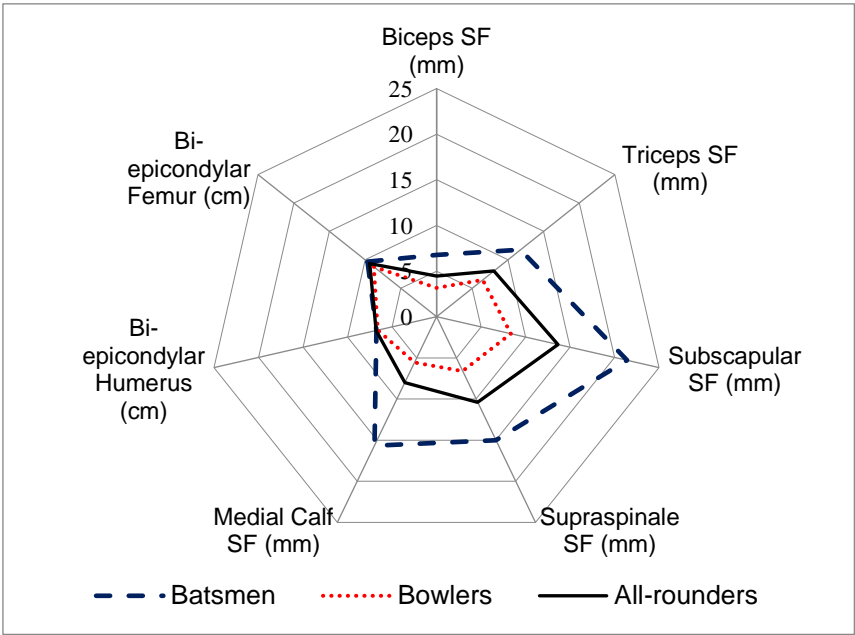

Figure 1. Graphical representation of various skinfold and breadth measurements of Divyang cricketers

Figure 2. Somatoplot of Divyang Cricketers according to their specialization
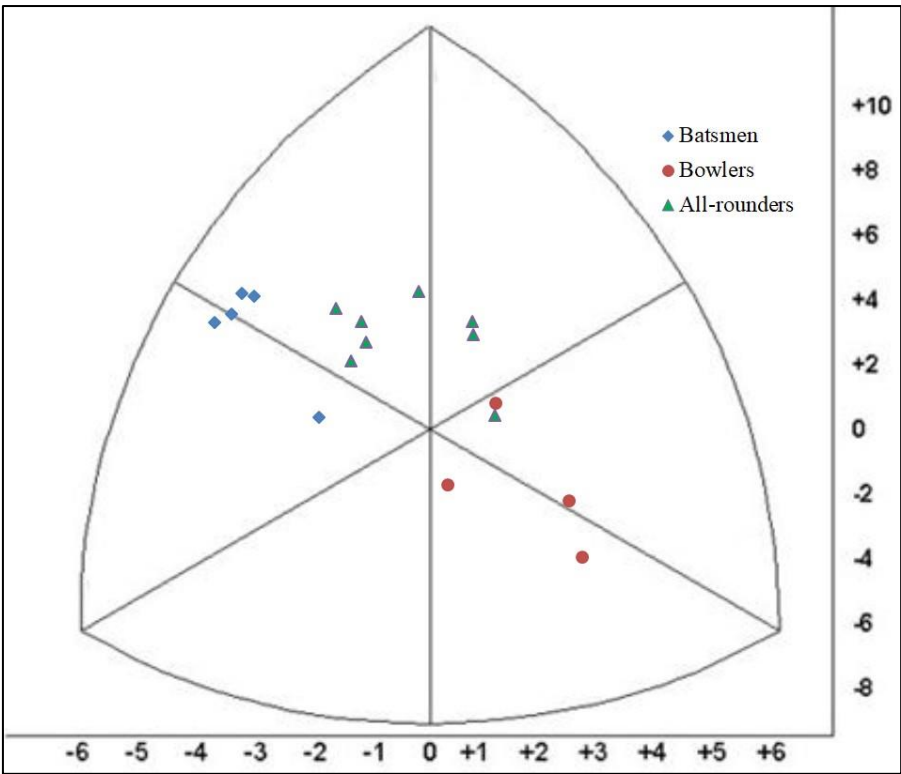
Figure 1 and 2 presents the radar plot and somatoplot distribution of Divyang cricketers across playing roles. The radar plot (Figure 1) highlights variations in anthropometric parameters, showing that batsmen generally recorded higher values in skinfolds (particularly subscapular and supraspinale), indicating greater adiposity, while bowlers displayed lower skinfold thickness and smaller girths, reflecting a leaner physique. All-rounders demonstrated intermediate values, suggesting a balanced profile between the two groups. The somatoplot (Figure 2) further illustrates role-specific clustering of somatotype components: batsmen predominantly occupy the endomorphic–mesomorphic region, bowlers are positioned towards the ectomorphic domain, and all-rounders cluster near the mesomorphic axis.

Discussions

The present investigation provides a novel insight into the somatotype characteristics of Divyang cricketers. Analysis of the somatoplot reveals that the majority of Divyang cricketers are concentrated within the endomorphic–mesomorph to central mesomorph category, indicating a physique characterized by well-developed musculature with moderate adiposity. This pattern mirrors morphological tendencies reported in mainstream cricketers, particularly all-rounders and bowlers, who often demonstrate balanced mesomorphic dominance for strength, endurance, and skill execution (Kitchin & Howe, 2014; Koley, 2011; Silva et al., 2013).

Elite mainstream cricket populations exhibit distinct somatotype profiles that correlate strongly with on-field positional demands. Top-order batsmen typically present with an endomorphic–mesomorphic composition, characterised by moderate levels of body fat and subcutaneous muscle, which optimise endurance during lengthy innings. Fast bowlers tend to fall within the ectomorphic–mesomorphic spectrum, possessing low fat mass and high muscle power, features that enhance both the speed of approach and the kinetic intensity of ball delivery (Norton et al., 1996; Peacock, 2003; Stuelcken et al., 2007). The somatotype distribution among Divyang cricketers reveals a markedly narrower spread on the somatoplot, indicating a relative homogeneity of form. Such restricted dispersion may indicate a form of selective morphological accommodation, whereby cricketers with intermediate body proportions exhibit the robustness and adaptability necessary to meet both mechanical and operational cricketing demands, even when faced with locomotor constraints.

Despite prior recommendations of photoscopic somatotyping for populations with impairments (Heath & Carter, 2003), the current investigation utilized the Heath-Carter anthropometric technique. This choice was underpinned by the identification of normal growth trajectories in Divyang cricketers when compared with the Revised Indian Academy of Pediatrics (IAP) Growth Charts, 2015 (Khadilkar & Khadilkar, 2015), which indicated continuity in stature and weight centiles. No pathological variation in the height-weight profile was detected, thus endorsing the applicability of standard traditional measurements. Adoption of the Heath-Carter approach secured methodological integrity and facilitated direct alignment with the wider body of cricket literature, thereby incorporating Divyang cricketers into the international dialogue on athlete body composition and morphology.

Cricket-oriented scientific research indicates that the somatotype pattern represents functional dimensions that govern both athletic performance and injury mitigation. Dominance of the mesomorphic component correlates with augmented muscular strength and aerobic power, both critical for the stable execution of batting, the explosive deceleration in fast bowling, and the rapid directional changes in fielding (Biswas & Biswas, 2021; Stuelcken et al., 2007). In contrast, a pronounced endomorphic traction often correlates with premature onset of fatigue and attenuation of agility, which may compromise efficacy within the accelerating tempo of match play (Silva et al., 2013). However a reduced variance in the ectomorphic traits has been observed in Divyang cricketers. Fast bowlers exhibit dominant ectomorphic traits, characterized by lower body fat and effective kinematics, which are essential for fast bowling (Koley, 2011; Stuelcken et al., 2007). However, Divyang bowlers tend toward the central mesomorphic axis, which implies that functional effectiveness during competitive play supersedes the drive for extreme positional specialization. Previous research has consistently demonstrated a dominant mesomorphic trend across cricket playing roles (Biswas & Ghosh, 2020; Dhar et al., 2021; Koley, 2011). The Divyang cricketers in the study show a modest mesomorphic expression, offset by higher endomorphic scores. This difference may be due to variations in training methods and the resulting changes in energy use caused by the body adapting to impairments. Furthermore, the relative scarcity of targeted sport-specific conditioning programmes might amplify the observed deviations in somatotype distribution.

The findings of the study resonate with broader trends documented in several adaptive sports. In wheelchair basketball, competitors typically present meso-endomorphic somatotypes, characterised by high muscle mass and moderate levels of subcutaneous fat, while para-swimmers reveal a predominance of ectomorphic characteristics to enhance buoyancy (Bawari et al., 2023). Similar observations apply to Indian Divyang cricketers, who preserve a muscular frame adequate for powerful batting and accurate throwing but show a slow, uniform increase in body fat. This trend is likely linked to limited mobility and a corresponding decline in overall training

volume. The somatoplot distribution bolsters the argument that adaptive cricket encourages a moderate morphological uniformity, unlike the marked positional differentiation evident in elite able-bodied cricket.

The role differentiation remains a hallmark of elite cricket, yet it is muted in the Divyang cohort. Within the mainstream code, bowlers typically exhibit a more ectomorphic morphology than batsmen, a somatotype well-aligned with the bioenergetic demands of fast bowling (Stuelcken et al., 2007). In the Divyang assemblage, however, the somatoplot reveals a narrow clustering of phenotypes, suggesting that impairment-related limits attenuate the capacity for traditional positional specialisation. The diminished morphological heterogeneity signals that the constraints of impairment supersede cricket role as a somatotypic determinant, producing a considerable convergence in body composition across the group. The resultant somatotypic profile appears as a negotiated settlement between functional competency and competition-specific adaptation. The findings further reveal a void in the translational nexus between research and elite preparation for Divyang cricketers. Whereas their mainstream counterparts benefit from systematic, evidence-informed conditioning protocols tailored to sculpt morphology for peak output, Divyang athletes encounter a scarcity of customised regimens that heed their distinctive physiological and biomechanical constraints. Current endomorphic predispositions may be moderated through targeted strength and conditioning, impairment-sensitive aerobic training, and bespoke nutritional protocols. Together, these observations underscore the necessity for sport science frameworks that are explicitly inclusive and responsive to the full diversity of elite cricket.

Dominant practice in mainstream cricket routinely utilises anthropometric profiling, yet cricketers with disabilities remain chronically under-represented in the morphometric literature. The sanctioned endomorphic trend, therefore, constitutes a mutable manifestation, potentially mitigated via the incorporation of disability-centred strength and conditioning workshops, tailored aerobic regimens, and micronutrient-specific nutritional enactments (Goosey-Tolfrey, 2010; Molik et al., 2018; Silva et al., 2013). Somatoplotted data corroborate the exigent necessity for a sport-science infrastructure that inclusively accommodates all athletes. While elite cricketers are routinely assessed via standardised anthropometric protocols, Divyang competitors remain conspicuously absent from the available morphometric corpus, thereby accentuating the necessity for integrative enquiries that underpin equitable athletic progression. By delineating normative anthropometric parameters for Divyang cricketers, the present analysis amplifies the anthropometric literature and simultaneously supplies actionable evidence for coaches, strength-and-conditioning specialists, and multidisciplinary support personnel. Importantly, comparative literature highlights that, when exposed to systematic, targeted interventions, this cohort may realign toward a mesomorphic phenotype, a shift that encompasses not only potential fortification of performance indicators on the cricket ground but also the possible attenuation of the performance decrements customarily correlated with heightened adipose constituents.

Conclusiones

Morphological and somatotype profiles of Divyang cricketers in West Bengal reveal distinctive adaptations shaped by both cricket-specific demands and disability-related constraints. Divyang batsmen leaning toward endomorphic–mesomorphy, bowlers toward ectomorphy and all-rounders showing balanced mesomorphy. However, functional efficiency and adaptability compensate strict positional specialization in Divyang cricket. The moderate mesomorphic dominance identified provides a biomechanical advantage in maintaining muscularity. Although, an elevated endomorphic expression indicates higher adiposity linked to mobility restrictions and training limitations. The study highlights the necessity of personalized conditioning and disability-sensitive training programs to optimize physique for performance and injury prevention.

References

Bawari, B., Adhikari, R., Easow, J., Pullinger, S.A. (2023). Somatotype and Body Composition of Indian Male and Female Swimmers, and their Relationship to Countermovement Jump Performance. *International Journal of Kinanthropometry*, 3(2): 84–95. https://doi.org/10.34256/ijk23210

Biswas, A., Ghosh, A.K. (2020). Anthropometric profile of district level cricketers of west Bengal. *International Journal of Physical Education, Sports and Health*, 7(5): 240–244. https://doi.org/10.22271/kheljournal.2021.v8.i6d.3210

Biswas, S., Biswas, A. (2021). Somatotype of Regional Cricketers of West Bengal in India. *European Journal of Sports Exercise Science*, 9(3): 11–17. https://www.scholarsresearchlibrary.com/articles/somatotype-of-regional-cricketers-of-west-bengal-in-india.pdf

Carter, J.E.L. (2002). Part 1: The Heath-Carter anthropometric somatotype-instruction manual. *Department of Exercise and Nutritional Sciences San Diego State University*, 1-26.

Cherif, M., Said, M.A., Bannour, K., Alhumaid, M.M., Chaifa, M. Ben, Khammassi, M., Aouidet, A. (2022). Anthropometry, body composition, and athletic performance in specific field tests in Paralympic athletes with different disabilities. *Heliyon*, 8(3): https://doi.org/10.1016/j.heliyon.2022.e09023

Dhar, K., Farooque, S.M., Gogoi, S.K. (2021). Somatotype profile of the state level cricketers of Tripura. *International Journal of Physical Education, Sports and Health*, 8(6): 240–244. https://doi.org/10.22271/kheljournal.2021.v8.i6d.3210

Dingley, A.A., Pyne, D.B., Burkett, B. (2015). Relationships between Propulsion and Anthropometry in Paralympic Swimmers. *International Journal of Sports Physiology and Performance*, 10(8): 978–985. https://doi.org/10.1123/ijspp.2014-0186

Goosey-Tolfrey, V. (2010). Supporting the paralympic athlete: focus on wheeled sports. *Disability and Rehabilitation*, 32(26), 2237–2243. https://doi.org/10.3109/09638288.2010.491577

Carter, J.L., Heath, B.H. (1990). *Somatotyping: development and applications* Cambridge university press, 5.

Esparza-Ros, F., Vaquero-Cristóbal, R., Marfell-Jones, M. (2019). *International standards for anthropometric assessment.* International Society for the Advancement of Kinanthropometry (ISAK).

Khadilkar, V.V, Khadilkar, A.V. (2015). Revised Indian Academy of Pediatrics 2015 growth charts for height, weight and body mass index for 5-18-year-old Indian children. *Indian Journal of Endocrinology and Metabolism,* 19(4): 470. https://doi.org/10.4103/2230-8210.159028

Kitchin, P.J., Howe, P.D. (2014). The mainstreaming of disability cricket in England and Wales: Integration 'One Game' at a time. *Sport Management Review*, 17(1): 65–77. https://doi.org/10.1016/j.smr.2013.05.003

Koley, S. (2011). A study of anthropometric profile of indian inter-university male cricketers. *Journal of Human Sport and Exercise*, 6(2): 427–435. http://dx.doi.org/10.4100/jhse.2011.62.23

Lemos, V.D.A., Alves, E.D.S., Schwingel, P.A., Rosa, J.P.P., Silva, A. Da, Winckler, C., Vital, R., De Almeida, A.A., Tufik, S., De Mello, M.T. (2016). Analysis of the body composition of Paralympic athletes: Comparison of two methods. *European Journal of Sport Science*, 16(8): 955–964. https://doi.org/10.1080/17461391.2016.1194895

Molik, B., Laskin, J.J., Kosmol, A., Marszałek, J., Morgulec-Adamowicz, N., Frick, T. (2018). Relationships between anaerobic performance, field tests, and functional level of elite female wheelchair basketball athletes. *Human Movement*, 14(4): 366–371. https://doi.org/10.2478/humo-2013-0045

Norton, K., Olds, T., Olive, S., Craig, N. (1996). Anthropometry and sports performance. *Anthropometrica*, *1*: 287-364.

Peacock, B. (2003). What Kind of Shape Are You In? Anthropometry and Appearances. *Ergonomics in Design*, *11*(1): 4-31. https://doi.org/10.1177/106480460301100102

Sarabia, J.M., Doménech, C., Roche, E., Vicente-Salar, N., Reina, R. (2020). Anthropometrical Features of Para-Footballers According to Their Cerebral Palsy Profiles and Compared to Controls. *International Journal of Environmental Research and Public Health*, 17(23): 9071. https://doi.org/10.3390/ijerph17239071

Silva, D.A.S., Petroski, E.L., Araujo Gaya, A.C. (2013). Anthropometric and Physical Fitness Differences among Brazilian Adolescents who Practise Different Team Court Sports. *Journal of Human Kinetics*, 36(1): 77.

Stuelcken, M., Pyne, D., Sinclair, P. (2007). Anthropometric characteristics of elite cricket fast bowlers. *Journal of Sports Sciences*, 25(14): 1587–1597. https://doi.org/10.1080/02640410701275185

Conflicts of Interest

The authors declare no conflict of interest for this study.

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