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Somatotype Variations Among Young Male and Female Handball Players Across Different Playing Positions

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Abstract

This study examined whether young male and female handball players differ in morphological characteristics and somatotype profiles across playing positions. The sample included 124 Slovenian handball players: 68 males (16.85±1.72 years) and 56 females (15.36±1.20 years), grouped as backs, wings, pivots, or goalkeepers. Anthropometric measurements were conducted in accordance with ISAK protocols, and somatotypes were determined using the Heath–Carter method. Positional differences were analysed using one-way analysis of variance (ANOVA) or the Kruskal–Wallis test, as appropriate. Significant positional differences were observed in both genders. Male pivots were the heaviest (96.44±11.20 kg) and most robust players, exhibiting significantly greater skeletal diameters and limb girths compared with wings, who were the lightest and leanest. Among female players, backs were significantly taller (174.33±5.20 cm) than wings, while goalkeepers demonstrated the highest endomorphic component (5.04±0.95) and the largest thigh girths. A significant effect of playing position on endomorphy was identified in both male ($p = 0.006$) and female players ($p = 0.032$). Overall, the results indicate clear position-related morphological tendencies, with notable differences between male and female players.

Keywords: *handball, antropometry, somatotypes, athletic performance*

Introduction

According to historical accounts, early versions of handball were developed at the end of the 19th century, when educators such as Holger Nilsson attempted to create an indoor team game suitable for school settings and both sexes (Kamolovich, 2024). To reach an elite level in handball, it is essential not only to possess strong technical skills and tactical intelligence, but also to exhibit optimal morphological characteristics and key performance attributes, including exceptional muscular power, speed, high-intensity running endurance, and ball-throwing velocity (Martínez-Rodríguez et al., 2020; Schwesig et al., 2016).

The study of physique, body shape, and composition in athletes across different sports, and their association with athletic performance, has long been a subject of considerable scientific investigation. Somatotyping represents one of the most widely applied methods for the assessment of body composition. Owing to its specificity, somatotype analysis has been extensively employed in research on exercise physiology, sports science, and human biology. This approach is particularly valuable in the identification of morphological characteristics that may facilitate talent detection and the early selection of young athletes for specific sporting disciplines (Carter & Heath, 1990). Consistent research in team handball provides strong evidence that an athlete's physical, physiological, and anthropometric profile is not merely incidental but is fundamentally linked to their designated playing position (Alneama et al., 2023; Haugen, Tønnessen, & Seiler, 2016).

Recent comprehensive reviews establish a general framework for somatotypes in team sports. A scoping review by Martínez-Mireles, García-García & Sánchez-López (2025), encompassing

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3,757 elite athletes, reported that while male athletes predominantly exhibit an endomorphic–mesomorph profile, female athletes are more frequently characterized by a mesomorph–endomorph build. This aligns with empirical data specific to handball, which show that players are generally robust athletes with a high body mass index attributable to a significant muscular component (Ruscello et al., 2021). This general profile, however, is significantly nuanced by position-specific morphological characteristics that are crucial for competitive efficiency (Leuciuc et al., 2022).

For instance, pivots are consistently identified as the most physically imposing players, characterized by high muscle mass and robustness (Bon, Sibila & Pori, 2015), the greatest height, weight, and lean mass variables (Gligoroska et al., 2024), and an endomorph–mesomorph somatotype (Leuciuc et al., 2022). In stark contrast, wings differ the most from other players (Bon, Sibila & Pori, 2015), being significantly shorter, lighter, and the leanest on the court (Gligoroska et al., 2024). Goalkeepers are typically tall with high body mass and the greatest body fat component (Bon, Sibila & Pori, 2015), fitting an ecto-endomorph profile (Leuciuc et al., 2022). Meanwhile, backcourt players are described as mesomorphic, with high levels of soft lean mass and skeletal muscle mass (Gligoroska et al., 2024; Leuciuc et al., 2022). These position-specific locomotor and technical demands reinforce the necessity of specialized morphological profiles; for instance, the higher running volume and fast-break frequency of wings align with their leaner, more ectomorphic build, whereas the high-contact nature of the pivot position necessitates the robust, mesomorphic characteristics previously described (García-Sánchez et al., 2023).

Mohoric, Abazovic & Paravlic (2022) investigated the morphological and performance characteristics of elite handball players across different playing positions and age categories. Their findings revealed variations in body composition and aerobic fitness between positions and age groups. However, the authors emphasized that scouts and coaches should place particular importance on body height and power-related variables. These results hold significant relevance for talent identification programs. The clear distinctions in morphological and performance profiles among positions and age groups offer valuable guidance for coaches in developing position-specific training programs and improving the overall effectiveness of their training approaches.

Despite the extensive literature describing anthropometric and somatotype characteristics of elite adult handball players, considerably less attention has been directed toward adolescent populations, particularly at the national level. In Slovenia, where handball has a long-standing tradition and a well-established youth development system, position-specific morphological data for young players remain limited. The absence of such evidence complicates early talent identification processes and the development of position-oriented training strategies during critical stages of athletic development.

The purpose of this study is to examine and compare the morphological characteristics and somatotypes of male and female handball players in relation to their specific playing positions. By analyzing the physical profiles of both genders, this research seeks to clarify how anthropometric traits align with the modern technical and locomotor demands of the game.

Methods

Participants

The sample of participants consisted of 124 young Slovenian handball players. The sample was divided into 68 male players (mean age: 16.85±1.72) and 56 female players (mean age: 15.36±1.20). Based on their playing position, the male group (n=68) included: Back player (n=34), Goalkeeper (n=12), Pivot (n=12), Wing (n=10). The female group (n=56) included: Back player (n=29), Wing (n=15), Goalkeeper (n=7), and Pivot (n=5). The experimental procedures did not require separate ethics committee approval, as the data were obtained from standard athlete monitoring practices. The study was conducted in accordance with the ethical principles outlined in the revised Declaration of Helsinki. All participants, or their legal guardians, were fully informed about the purpose and procedures of the anthropometric assessments and provided written informed consent voluntarily.

Procedures

Constitution, i.e., the somatotype, was determined by the Heath-Carter method, which requires a set of anthropometric measurements and included the following 23 variables recorded in the database: body height (cm), body mass (kg), nine skinfolds (mm) (triceps, biceps, forearm, chest, back (subscapular), abdomen, suprailiac, thigh and calf), six girths (arm - relaxed and flexed, forearm, thigh, mid-thigh and calf) and six breadths (cm) (shoulder (biacromial), pelvis (biiliac), elbow (biepicondylar humerus), wrist, knee (biepicondylar femur), and ankle. All skinfold measurements were taken on the right side of the body using a Gima skinfold caliper. All of the measurements were taken by the same accredited investigator in optimal conditions, with the participants wearing minimal clothing, and according to the methods proposed by the International Society for the Advancement of Kinanthropometry (ISAK). Body height was measured to the nearest 0.1 cm using a stadiometer (GPM, Model 101, Zurich, Switzerland), while body mass was assessed to the nearest 0.05 kg using a multifrequency bioelectrical impedance analyzer (InBody 720, Biospace). BMI was determined according to the standard formula (Kg/m2). Each measure was taken in duplicate. If the difference between the two measurements was greater than 5%, a third measurement was taken, and the median value was used. According to the theory, human physiques can be sorted into three fundamental types: endomorph, mesomorph, and ectomorph. Endomorphs typically have a soft, round appearance due to greater fat storage. In contrast, mesomorphs are defined by their well-developed muscles and athletic build. Ectomorphs, meanwhile, are recognized for their long, lean, and somewhat fragile-looking frames (Carter & Heath, 1990). The somatotype components were calculated according to the methodology of Heath-Carter (Carter & Heath, 1990), using the appropriate computer software for somatotype analysis.

Statistical analysis

The statistical analyses were conducted with the SPSS statistical software (version 29, IBM, USA). All of the data were presented as mean ± SD and 95% of confidence intervals. The normality of data distribution was confirmed by using the Kolmogorov–Smirnov test. or comparisons between groups, a two-way ANOVA was employed to examine the main effects and interactions of the independent variables. In cases where the data did not meet the assumptions for parametric testing, the Kruskal–Wallis test was used as a non-parametric alternative. The statistical significance at the present study was set to value $p<0.05$.

Results

The research results are the following:

Table 1 presents the descriptive statistics for the selected anthropometric variables, including the mean and standard deviation. Additionally, the results of the Kolmogorov–Smirnov test are provided to indicate the normality of the data distribution.

Table 1. Descriptive statistics of all parameters

Variable	$\bar{x}$ (male)	s (male)	pK-S	$\bar{x}$ (female)	s (female)	pK-S
Body Height (cm)	188.19	7.49	0.410	172.37	5.95	0.609
Body Mass (kg)	84.85	11.85	0.072	64.25	8.95	0.015
BMI (kg/m²)	23.91	2.66	0.586	21.52	2.55	0.015
Arm Girth Relaxed (cm)	31.51	2.49	0.833	26.9	2.25	0.736
Arm Girth Flexed (cm)	34.92	2.64	0.520	28.91	2.33	0.740
Forearm Girth (cm)	28.99	1.78	0.304	24.59	1.47	0.994
Thigh Girth (cm)	61.77	4.90	0.110	58.75	4.84	0.167
Mid-Thigh Girth (cm)	57.11	4.25	0.804	52.28	4.46	0.134
Calf Girth (cm)	40.39	2.77	0.574	37.16	2.51	0.043
Shoulder Breadth (cm)	42.42	1.97	0.065	37.45	1.57	0.156
Pelvis Breadth (cm)	29.10	1.60	0.028	27.33	1.52	0.497
Elbow Diameter (cm)	7.42	0.45	0.119	6.30	0.33	0.085
Wrist Diameter (cm)	6.06	0.33	0.021	5.20	0.32	0.002
Knee Diameter (cm)	10.17	0.38	0.669	8.98	0.43	0.531
Ankle Diameter (cm)	8.14	0.61	<0.001	6.92	0.36	0.032
Skinfold Back (mm)	11.75	4.46	<0.001	10.99	4.80	<0.001
Skinfold Triceps (mm)	13.62	5.95	<0.001	18.24	6.49	0.785
Skinfold Biceps (mm)	7.45	4.50	<0.001	10.44	5.47	<0.001
Skinfold Forearm (mm)	8.76	3.55	<0.001	9.89	3.49	0.001
Skinfold Abdomen (mm)	17.15	8.70	<0.001	16.57	8.86	0.007
Skinfold Chest (mm)	8.17	3.18	<0.001	9.04	5.56	<0.001
Skinfold Suprailiac (mm)	11.05	6.52	<0.001	12.90	7.38	<0.001
Skinfold Thigh (mm)	15.74	7.18	0.002	17.52	11.22	<0.001
Skinfold Calf (mm)	10.66	5.96	<0.001	13.74	7.64	0.001
Body Fat % (Avg. Ind.)	14.52	5.41	<0.001	24.24	6.12	0.782
Body Fat % (Matiegka)	17.70	5.73	<0.001	25.52	6.31	0.443
Body Fat % (J&P)	11.42	5.16	<0.001	22.94	6.19	0.476
Muscle Mass (Matiegka, kg)	43.49	6.02	0.857	28.99	3.80	0.013
Bone Mass (Matiegka, kg)	14.26	1.56	0.151	9.75	1.08	0.002
Endomorph Component	3.57	1.12	<0.001	4.05	1.14	0.156
Mesomorph Component	4.32	1.14	0.942	3.14	1.03	0.025
Ectomorph Component	2.86	1.22	0.570	3.07	1.26	0.200

Notes: $\bar{x}$ – average values, s – standard deviations, pK-S – significance of the Kolmogorov-Smirnov test, p: satistical significance

Table 2 presents the anthropometric characteristics and positional differences among male handball players. Statistically significant differences were observed in Body Height ($p = 0.016$), Body Mass ($p < 0.001$), and BMI ($p = 0.020$). Pivots were significantly taller than Wings ($p = 0.031$) and maintained a substantially higher Body Mass compared to both Wings and Back players ($p < 0.001$). Correspondingly, the BMI of Pivots was significantly higher than that of Wings ($p = 0.018$) and Back players ($p = 0.041$). Arm Girth (Relaxed) ($p = 0.017$), Forearm Girth ($p = 0.048$), and Thigh Girth ($p = 0.007$) were significantly greater in Pivots compared to Wings ($p = 0.012$, $p = 0.040$, and $p = 0.008$, respectively). Furthermore, Pivots displayed a significantly wider Pelvis Breadth ($p = 0.001$) than Wings ($p = 0.002$) and Back players ($p = 0.006$). Elbow Diameter ($p = 0.003$), Wrist Diameter ($p = 0.031$), and Knee Diameter ($p < 0.001$) all reached statistical significance. Pivots possessed larger skeletal diameters than all other positions, specifically showing significant differences against Goalkeepers, Wings, and Back players in Elbow diameter ($p = 0.005$, 0.009, and 0.033, respectively) and against Wings and Back players in Knee diameter ($p = 0.002$ and $p < 0.001$). While several skinfold sites showed non-significant results, Biceps skinfold ($p = 0.016$) and Suprailiac skinfold ($p = 0.031$) showed significant positional effects. Post-hoc analysis for the Biceps skinfold revealed that Pivots had significantly higher values than Goalkeepers ($p = 0.015$).

Table 3 presents the anthropometric characteristics and positional differences among female handball players. Statistically significant differences were observed in Body Height ($p = 0.013$) and Body Mass ($p = 0.015$). Post-hoc analysis indicated that Back players were significantly taller than Wings ($p = 0.008$). Similarly, Wings exhibited significantly lower Body Mass compared to Back players ($p = 0.025$). Significant positional disparities were identified in lower-body circumferences. Thigh Girth ($p = 0.044$) and Mid-Thigh Girth ($p = 0.027$) showed significant variations, with Goalkeepers possessing significantly larger dimensions than Wings ($p = 0.032$ and $p = 0.017$, respectively).

Table 2. Positional differences in anthropometric characteristics among male handball players

Variable	Goalkeeper	Wing	Back	Pivot	p
Body Height (cm)	190.50	184.21	186.62	192.83	0.016
Body Mass (kg)	86.62	77.02	82.19	96.44	<0.001
BMI (kg/m2)	23.88	22.64	23.61	25.89	0.020
Arm Girth Relaxed (cm)	31.15	30.14	31.43	33.32	0.017
Arm Girth Flexed (cm)	34.40	33.80	34.87	36.56	0.068
Forearm Girth (cm)	28.67	28.13	28.93	30.13	0.048
Thigh Girth (cm)	62.92	58.82	61.01	65.28	0.007
Mid-Thigh Girth (cm)	57.28	54.86	56.66	60.15	0.020
Calf Girth (cm)	40.80	38.95	40.00	42.27	0.022
Shoulder Breadth (cm)	42.64	42.31	42.09	43.29	0.323
Pelvis Breadth (cm)	29.59	28.20	28.75	30.32	0.001*
Elbow Diameter (cm)	7.20	7.21	7.41	7.81	0.003
Wrist Diameter (cm)	6.03	5.86	6.04	6.28	0.031*
Knee Diameter (cm)	10.21	9.98	10.08	10.54	<0.001
Ankle Diameter (cm)	8.08	8.14	8.06	8.35	0.104*
Skinfold Back (mm)	11.08	9.78	10.99	16.18	0.061*
Skinfold Triceps (mm)	13.52	10.70	13.46	17.23	0.076*
Skinfold Biceps (mm)	5.57	6.36	7.23	11.02	0.016*
Skinfold Forearm (mm)	7.15	7.48	9.30	9.95	0.075*
Skinfold Abdomen (mm)	15.62	14.94	16.24	23.65	0.119*
Skinfold Chest (mm)	8.58	7.22	8.04	9.02	0.250*
Skinfold Suprailiac (mm)	9.53	8.72	9.90	17.88	0.031*
Skinfold Thigh (mm)	16.17	13.02	15.33	19.47	0.162*
Skinfold Calf (mm)	9.40	10.08	10.27	13.98	0.220*

Note. *: Kruskal–Wallis test, p: statistical significance

Table 3. Positional differences in anthropometric characteristics among female handball players

Variable	Goalkeeper	Wing	Back	Pivot	p
Body Height (cm)	170.65	168.27	174.33	173.10	0.013
Body Mass (kg)	67.41	58.38	65.52	66.78	0.015*
BMI (kg/m2)	23.22	20.27	21.54	22.20	0.054*
Arm Girth Relaxed (cm)	28.04	25.93	27.13	27.42	0.165
Arm Girth Flexed (cm)	29.72	27.75	29.12	29.52	0.166
Forearm Girth (cm)	24.71	23.66	24.88	24.96	0.066
Thigh Girth (cm)	62.20	56.08	58.82	59.70	0.044
Mid-Thigh Girth (cm)	56.00	50.05	52.15	53.36	0.027
Calf Girth (cm)	38.24	35.90	37.21	38.30	0.231*
Shoulder Breadth (cm)	37.88	37.34	37.39	37.28	0.879
Pelvis Breadth (cm)	27.80	26.97	27.38	27.18	0.676
Elbow Diameter (cm)	6.30	6.16	6.35	6.30	0.376
Wrist Diameter (cm)	5.07	5.13	5.24	5.28	0.525*
Knee Diameter (cm)	9.01	8.83	8.99	9.16	0.477
Ankle Diameter (cm)	6.92	6.78	6.95	7.14	0.368*
Skinfold Back (mm)	13.57	9.06	11.35	10.44	0.125*
Skinfold Triceps (mm)	17.80	17.80	18.08	18.56	0.996
Skinfold Biceps (mm)	10.80	9.50	10.10	13.92	0.909*

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Table 3. Positional differences in anthropometric characteristics among female handball players

Variable	Goalkeeper	Wing	Back	Pivot	p
Skinfold Forearm (mm)	10.14	9.00	9.86	11.20	0.987*
Skinfold Abdomen (mm)	17.80	14.60	17.42	14.76	0.724*
Skinfold Chest (mm)	13.41	10.21	8.15	9.56	0.261*
Skinfold Suprailiac (mm)	18.58	12.46	11.88	13.08	0.150*
Skinfold Thigh (mm)	23.90	14.54	17.20	17.56	0.668*
Skinfold Calf (mm)	16.27	13.24	12.75	15.80	0.431*

Note. *: Kruskal–Wallis test, p: statistical significance, p: satistical significance

Table 4 presents the comparison of somatotype components (endomorphy, mesomorphy, and ectomorphy) between young male and female handball players across different playing positions (goalkeeper, pivot, wing, and back players). A significant effect of playing position on endomorphy was observed in both males ($p = 0.006$) and females ($p = 0.032$). In the male cohort, pivots exhibited the highest endomorphic values, while wings showed the lowest. Among females, goalkeepers were characterized by the highest relative adiposity. While the initial Two-way ANOVA indicated a highly significant interaction ($p < 0.001$), the subsequent post-hoc analysis yielded a value of $p = 0.095$. This result is interpreted as marginally significant, suggesting a strong trend toward gender-based positional differences that does not meet the strict 0.05 threshold, likely due to the inherent variability within the female subgroups.

Table 4. Comparison of somatotype components by gender and playing position among handball players

Somatotype componente	Gender	Goalkeeper	Pivot	Wing	Back players	p (within group)	p (between group)
Endomorph Component	Male	3.69±1.02	4.58±1.49*	2.82±0.83*	3.41±0.84	0.006*	<0.001**
	Female	5.04±0.95	4.04±1.55	3.50±0.81	4.05±1.15	0.032	
Mesomorph Component	Male	3.87±1.31	4.82±0.88	4.14±0.96	4.35±1.17	0.218	0.318**
	Female	3.62±1.28	3.46±1.82	3.00±0.64	3.03±0.96	0.468	
Ectomorph Component	Male	3.04±1.52	2.25±1.17	3.15±0.85	2.93±1.19	0.278	0.285**
	Female	2.14±1.13	2.86±1.90	3.42±0.86	3.17±1.27	0.156	

Note. X: average values, s: standard deviations, *: Kruskal–Wallis test, **: Two-way ANOVA, p: satistical significance

Discussion

This study focused on young Slovenian handball players. Specifically, we examined how morphological characteristics and somatotype profiles differ between playing positions and between male and female handball players. The results largely confirm the established paradigm of position-specific morphological specialization in team handball, while also revealing nuanced, sex-dependent patterns in somatotype distribution that contribute to a more refined anthropometric model for the sport (Gabrys et al., 2020; Leuciuc et al., 2022). The most significant finding is the robust anthropometric profile of pivots (Body Height: 192.83 cm; Body Mass: 96.44 kg; BMI: 25.89 kg/m²). They were significantly taller than wings (184.21 cm; $p = 0.031$) and maintained a substantially higher body mass compared to both wings (77.02 kg) and back players (82.19 kg; $p < 0.001$). Correspondingly, their BMI was significantly greater than that of both wings (22.64 kg/m²; $p = 0.018$) and back players (23.61 kg/m²; $p = 0.041$). This aligns perfectly with the established literature, where pivots are consistently identified as the most robust players, requiring greater mass and strength to withstand physical confrontations in the 6-meter area and secure positioning (Mohorič, Abazović & Paravlic, 2022; Šibila & Pori, 2009). The significantly larger limb girths (Arm Girth Relaxed: 33.32 cm; Forearm Girth: 30.13 cm; Thigh Girth: 65.28 cm) and skeletal breadths (Pelvis Breadth: 30.32 cm; Elbow Diameter: 7.81 cm; Knee Diameter: 10.54 cm) observed in pivots further delineate this profile. These measurements are indicative of greater muscular development and skeletal robustness, characteristics synonymous with the mesomorphic-endomorphic somatotype commonly reported for this position in both senior and junior players [Bon, Pori & Šibila, 2015; Vuleta et al., 2020). Wings were the lightest (77.02 kg), with the lowest BMI (22.64 kg/m²) among field players and the smallest skeletal diameters (Wrist: 5.86 cm; Knee: 9.98 cm), consistent with a large body of research identifying wings as the smallest and most linear players (Nikolaidis et al., 2015; Šibila & Pori, 2009; Zapartidis et al., 2011). This morphology is biomechanically advantageous for the positional demands of high-speed linear running, rapid changes of direction, and aerial jumps from the wing position, where a lower body mass enhances acceleration and agility. Their significantly smaller skeletal diameters and limb girths further emphasize a leaner, less robust build optimized for speed and endurance rather than static power. Back players (Body Height: 186.62 cm; Body Mass: 82.19 kg) and goalkeepers (Body Height: 190.50 cm; Body Mass: 86.62 kg) exhibited intermediate and less differentiated anthropometric profiles in this adolescent sample. While backs were not significantly different from pivots in height, they were substantially lighter and had a lower BMI, resulting in a more ectomorphic profile suited for the dual demands of long-range shooting and defensive mobility. The lack of extreme anthropometric values in backs may reflect the versatile physical requirements of the position, which necessitates a balance of power, agility, and endurance (Matthys et al., 2013). Some studies on younger adolescents have found minimal or less consistent morphological differentiation (Ingebrigtsen, Jeffreys & Rodahl, 2013), often attributed to ongoing growth and selection processes. The pronounced differences found here, in players with a mean age of 16.85 years, suggest that the specialisation process is advanced. This aligns with longitudinal data from Slovenian male players, which indicates that significant morphological differentiation is evident by the U17-U19 age categories (Mohorič, Abazović & Paravlic, 2022). The anthropometric differentiation among female players was less pronounced than in males, particularly in circumferential and skeletal measures, aligning with studies suggesting morphological specialization may be subtler or develop later in females (Vuleta et al., 2020). However, key positional trends emerged. Backs were the tallest (174.33 cm), followed by pivots and goalkeepers, with wings being the shortest (168.27 cm). Wings were also the lightest (58.38 kg) with the lowest BMI (20.27 kg/m²), mirroring the male trend of a lighter build for perimeter players. The results confirm the expected sexual dimorphism, with males being taller, heavier, more muscular, and leaner than females. Specifically, males exhibited substantially greater muscle mass (43.49 kg vs. 28.99 kg) and a lower percentage of body fat (14.5% vs. 24.2%), reflecting a higher proportion of fat-free mass and sport-specific physiological adaptations. The somatotype classification of the entire male sample (3.57–4.32–2.86) indicates a balanced mesomorph, whereas the female sample (4.05–3.14–3.07) is characterized as a mesomorphic endomorph. These somatotype profiles are consistent with those reported for youth elite players from other European populations (Mohorič, Abazović & Paravlic, 2022; Moss et al., 2015).

In our male cohort, pivots displayed the highest endomorphic values (4.58±1.49), consistent with descriptions of elite male pivots as endo-mesomorphic (Leuciuc, Gherghel & Bota, 2022). Conversely, in our female cohort, goalkeepers demonstrated the highest endomorphy (5.04±0.95), a statistically significant positional effect ($p = 0.032$). This pattern indicates that the linkage between positional demands and adiposity may follow different selective or adaptive pathways in male and female athletes. This finding enriches the general observation from Martínez-Mireles, García-García, and Sánchez-López (2025) that female team-sport athletes tend toward a mesomorph-endomorph build. It suggests that within this general female tendency, the distribution of endomorphy is position-specific in a way that differs from males. The presence of significant positional differences in this age group suggests that sport-specific morphological selection or adaptation is already advanced by mid-to-late adolescence. This supports the utility of anthropometric profiling in youth talent identification, as advocated by researchers who highlight body height and power-related variables as key predictors (Mohamed et al., 2009; Mohorič, Abazović & Paravlic, 2022).

Limitations of the study

This study has limitations. The cross-sectional design of the study provides only a single time-point assessment, thereby limiting causal inference regarding the development of position-specific morphological characteristics. The small number of female pivots (n=5) and goalkeepers (n=7) reduces statistical power and constrains the generalizability of findings for these positional subgroups. Furthermore, participants were in mid-to-late adolescence, a developmental stage marked by considerable interindividual variability in biological maturation. Differences in maturation timing and tempo may have influenced anthropometric measures and somatotype components independently of playing position, potentially confounding the observed results.

Recommendations for future research

Future research should adopt longitudinal designs to track athletes from puberty to senior level, clarifying the development of these morphological profiles. Furthermore, integrating detailed anthropometry with objective measures of position-specific performance (e.g., throwing velocity, defensive actions, aerobic power) in youth cohorts is essential to bridge the gap between descriptive morphology and performance prediction. Expanding this paradigm to include biomechanical and physiological metrics would ultimately support the creation of more holistic, position-specific athlete profiles.

Conclusion

In summary, this study on young Slovenian handball players strongly affirms the existence of distinct, position-specific morphological profiles, confirming patterns established in the international literature on elite adult athletes. Its principal novel insight is the identification of a sex-based dichotomy in the distribution of endomorphy, challenging the assumption of uniform positional somatotypes across sexes. These results validate the use of anthropometric assessment as a tool in youth talent identification and positional orientation. Moreover, they provide a refined, sex-differentiated evidence base to guide the development of individualized strength and conditioning regimens, ultimately aiming to optimize the physical preparedness of young handball players for the specific demands of their chosen position.

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