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Relationships between anthropometric profiles and physical abilities of handball players at the 2023 national phase of the university games of Benin

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Abstract

Background: The development of university sports represents a long-term lever for athletic performance in Benin, yet data on the morphological and physical characteristics of young athletes in this context remain scarce. Handball requires specific physical attributes to reach high-performance levels.

Objective: This study aims to examine the relationships between anthropometric profiles and physical capacities among male and female handball players participating in the 2023 national phase of the Benin University Games.

Methods: A comparative cross-sectional study was conducted among 44 men and 45 women from nine teams. Anthropometric measurements included body mass, height, wingspan, and hand span. Physical capacities were assessed using the Sargent jump test, the medicine-ball throw, the 20-m sprint, and the T-test agility.

Results: Among women, the T-test agility showed a moderate correlation with hand span (r = 0.328). Among men, height was strongly correlated with medicine-ball throw performance (r = 0.676) and moderately correlated with the Sargent jump test (r = 0.368).

Conclusion: Height and hand span influence vertical jump ability, throwing strength, and agility, particularly among men. These findings provide essential reference data for technical staff to optimize talent identification and training strategies in Benin.

Keywords: Athletes, athletic performance, physical fitness, body composition, handball

1. Introduction

Sport is a form of physical activity in which participants adhere to a common set of rules and pursue a clearly defined objective, most often related to performance [1]. Its practice therefore requires the presence of certain morphological, physical, and physiological qualities that enable individuals to achieve high performance. According to Castagna *et al.* [2], a well-developed physical condition is necessary to reach elite performance levels. A study by Gil *et al.* [3], reported that observing and characterizing several anthropometric parameters (height, body mass, body fat percentage), as well as physiological and physical attributes (maximal oxygen consumption, sprint performance, vertical jump performance, etc.), makes it possible to distinguish elite from non-elite players.

In handball, the teams that dominate international competitions are those that meet the diverse demands of the sport, which involve an interaction between anthropometric, physical, physiological, technical-tactical, and psychological factors [4]. Physical qualities, in particular, are key determinants of performance in handball [5]. Some of these physical qualities even serve as relevant criteria for differentiating players of varying competitive levels [5]. Understanding the circumstances and conditions under which sports performance is executed can therefore be of great value to athletes, coaches, sports event organizers, and sports federations [6].

University sport refers to sport practiced within the framework of higher education at a university or equivalent institution [7]. In Benin, the Beninese Office of School and University

Sport (OBSSU) is responsible for organizing the University Games of Benin (JUB). The zonal phase of the 10th edition of the University Games was held nationwide from June 14 to July 2, 2023. However, the teams that qualified for the next stage of the competition exhibited specific anthropometric and physical profiles that enabled them to outperform their opponents and meet new performance challenges at the national level. As such, the national phase of the University Games represents a major sporting event in the Beninese university sports landscape. Recognizing the importance of developing school and university sports for achieving long-term athletic performance, the Beninese government has mobilized and invested significant resources [8] Given the scarcity of data on the morphological, physical, and physiological characteristics of young teams in Africa in general—and particularly in school and university sports—it is essential to conduct investigations that provide new knowledge to guide technical staff in talent identification and selection, and to support informed decision-making.

2. Matrials et methods
Study Design and Setting
This was a comparative cross-sectional study conducted during the 2023 National Phase of the Benin University Games, organized in Grand-Popo by the Benin Office of School and University Sports (OBSSU) from November 5 to 11, 2023. A comprehensive survey allowed contact with all handball teams participating in the 2023 national phase. Of the 12 teams present in Grand-Popo, 9 participated in the collection of anthropometric data and physical tests, including four male teams and five female teams. This involved 44 male players (mean age: 22.34±2.10 years) and 45 female players (mean age: 20.53±2.14 years). Inclusion criteria were: registration in a team qualified for the national phase, possession of a valid sports license, and signing of an informed consent form.

Evaluation
All measurements were collected following standardized procedures: body mass and height were measured using a scale and a stadiometer, respectively. A graduated ruler was used to measure arm span [9], and hand span was measured as the distance between the tips of the thumb and little finger in maximal extension [10].
Lower limb strength was assessed using the Sargent jump test [11], while upper limb strength was measured using the medicine ball throw [12]. Speed was evaluated using a 20-meter sprint test to assess maximal running velocity [13]. Agility was assessed using the T-Agility test, which measures speed and the ability to change direction [14]. Standardized protocols were followed for all tests.
Variables were grouped into three categories: anthropometric (height, body mass, arm span, hand span), physical (strength, speed, agility), and playing positions. The same evaluators were used to ensure measurement reliability.

Ethical Considerations
The study protocol adhered to the ethical principles of the Declaration of Helsinki. Participants were informed of the objectives, procedures, and potential risks associated with the study. Participation was voluntary and conditioned upon signing an informed consent form.

Analyse statistique
Statistical analyses were performed using SPSS (version 27).

Quantitative descriptive variables were expressed as mean±standard deviation. Normality and homogeneity of variance were checked. Relationships between anthropometric profiles (height, body mass, arm span, hand span) and physical capacities (speed, strength, agility) were analyzed using Pearson's correlation coefficient. In addition, comparisons between anthropometric profiles and physical capacities with respect to playing positions and university teams were conducted using one-way analysis of variance (ANOVA). Post hoc pairwise comparisons were performed using Bonferroni correction. For all tests, statistical significance was set at $p < 0.05$.

3. Results
Anthropometric profils Handball players
The mean age observed in female players was 20.53±2.14 years, with an average body mass of 60.49±5.94 kg, showing significant variability across age groups (p = 0.01). Significant variability was also observed in height, arm span, and hand span (p = 0.00).
Among male players, the mean age (22.34±2.10 years) did not show significant variability across groups. Players presented similar characteristics, with significant variability observed for height and BMI (p = 0.00) (Table I).
In females, no significant variability was noted according to playing position. Among males, a similar trend was observed for all anthropometric profiles except body mass (p = 0.00, $p < 0.05$). This significant difference was observed between Wings and Pivots (61.69±5.51 vs. 68.71±4.15; p = 0.02), where Wings had a significantly lower mean body mass compared to Pivots (Table II).

Physical Capacities of Handball players
In females, significant variability was observed between institutions in the medicine ball throw test (p = 0.00). A similar trend was observed among male players. INJEPS players performed significantly lower in the throw test compared to ESST_Lokossa and SAPIENTIA_Parakou players (Table III).
No significant variability was found between test performances and playing positions among females. The same pattern was observed among males. Players of both sexes showed similar performances that tended to converge (Table IV).

Relationship between Anthropometric Profile and Physical Abilities
Among males, moderate correlations were observed between the Sargent jump test and height (r = 0.368) and hand span (r = 0.443). A strong correlation was observed between throw performance and height (r = 0.676). The T-Agility test showed a moderate correlation with hand span in females (r = 0.328) and a moderate negative correlation with height in males (r = -0.329) (Table V).

Discussion
This study aimed to compare the anthropometric and physical profiles of students participating in the 2023 National Phase of the Benin University Games.
Anthropometric parameters refer to human body dimensions such as height, arm span, and hand span, which may positively or negatively influence an athlete's future sports performance [15]. Depending on the sport, anthropometric factors may be among the main determinants of performance [15]. Therefore, it is important to consider and properly weigh

them during talent selection [15]. Physical capacity is defined by intrinsic muscular power and the body's ability to adapt, particularly the respiratory and cardiovascular systems, to various types of physical effort under different conditions [16]. It is characterized by physical parameters such as cardiorespiratory endurance, muscular endurance and strength, flexibility, agility, balance, and reaction time [17]. Monitoring these parameters can track training progress or establish differences between professional and athletic populations [16]. In this context, an athlete's physical characteristics are important predictors of their ability to reach the highest level in their chosen sport [18].

Population Characteristics and Anthropometric Profiles

The mean age was 20.53±2.14 years for females and 22.34±2.10 years for males, indicating that the players were young and belonged to the senior category [19]. According to the literature, individuals aged 15-24 tend to engage more in fitness activities, gymnastics, and team sports [20]. n elite sports, ages of participation and peak performance often coincide [21].

Among females, mean body mass was 60.49±5.94 kg and mean height 1.69±0.06 m, with anthropometric characteristics largely consistent across playing positions. Among males, mean body mass was 64.84±4.94 kg and height 1.78±0.06 m. A similar trend was observed for playing positions, except for body mass (p = 0.00). In comparison, a Senegalese study on 19 female handball players reported a mean height of 1.70±6.34 m and body mass of 63.89±10.38 kg [4]. closely aligning with the current findings. For males, the observed mean height (1.78±0.06 m) does not significantly differ from professional levels. An Algerian study comparing two handball teams of different competitive levels (elite vs. third division) showed significant differences in stature (1.83 m vs. 1.78 m) and forearm mass, with elite players having higher upper limb mass (1.64 vs. 1.43) [22]. Gorostiaga et al. [23] indicate that height and weight alone do not differentiate handball players of varying expertise levels. The female BMI was 21.12±1.96 kg/m², while males presented a similar BMI of 20.40±1.68 kg/m² with a body mass of 64.84±4.94 kg. In comparison, first- and second-division Algerian male players have body masses of 82.85±11.72 kg and 86.56±9.91 kg, respectively [22]. These values suggest that participants in the 2023 national phase were generally healthy but not optimally built for elite competition.

Female arm span (1.70±0.06 m) was relatively low compared to the Senegalese average of 1.73±0.72 m [4]. which may limit shooting power, as a longer arm segment allows greater range of motion and higher ball acceleration [4]. Arm spans ≤1.69 m are considered low in handball, 1.70-1.79 m as average, and 1.80-1.83 m as good [24]. A larger arm span benefits offensive and defensive actions and goalkeepers' coverage [25].

Conversely, a good hand span facilitates ball handling, as a larger span improves grip, precision, and throwing force [24]. Talent identification criteria in some federations are based on height and hand span, which characterize elite handball players [26].

Physical Capacities of Handball players

Sports performance is an interaction of technical, tactical, psychological, physical, and morphological qualities [27]. In females, mean Sargent jump height was 31.53±4.32 cm, medicine ball throw 4.39±0.44 m, 20 m sprint 3.50±0.31 s, and T-Agility test 12.83±0.85 s. Significant variability was observed between institutions in the throw test (p = 0.00), but

no significant differences were found according to playing position. According to literature, a Sargent jump of 31-40 cm is average, while 41-50 cm is above average [28]. The 20 m sprint (3.50±0.31 s) is average, and T-Agility test (12.83±0.85 s) is low. Sprint times of 3.5-3.9 s are considered average, while 3.0-3.4 s correspond to elite female sprinters [29-33]. The classification of female players in the average category for the 20 m sprint could represent a real disadvantage for the team [4], as speed is crucial for elite handball performance [23]. Moreover, Bayer [24] states that a handball player must be fast, possessing "very high" execution speed, whereas the players in this study are classified as "average." This may limit rapid mobility, which is often required in game situations depending on tactical demands [24]. Similarly, an agility test performance between 11.5 and 12.5 seconds is considered average. Therefore, the female players in the 2023 national phase of the University Games displayed low agility, having performed slightly above the average time. Upper limb strength measured by the medicine ball throw (4.39±0.44 m) indicates that female players have weak strength, as a throw of 4.90 m would be considered average [34,35]. Weakness in strength may negatively affect team performance, as it often leads to missed shots [4].

In male players, mean performance was 52.82±7.61 cm in the Sargent jump test; 5.63±0.58 m in the medicine ball throw; 3.23±0.25 s in the 20 m sprint; and 10.65±0.58 s in the T-Agility test. Significant variability was observed between institutions in the throw test for upper limb strength (p = 0.00), while no significant differences were found across playing positions. Male Sargent jump performance (52.82±7.61 cm) is considered good, as literature defines 51-60 cm as good and 61-70 cm as very good [28]. Mean 20 m sprint (3.23±0.25 s) and agility test performance (10.65±0.58 s) are considered average. Sprint times between 3.2 and 3.6 s are average [29-33]. and T-Agility times of 10.5-11.5 s are also average [36]. Upper limb strength in males (6.25±0.82 m) is considered good (6.20-7 m = good) [34,35]. Comparing two teams of different competitive levels (elite vs. amateur), studies show that more muscular and powerful players have an advantage in handball [23]. In elite teams, higher handball throw velocity (23.8±1.9 m/s vs. 21.8±1.6 m/s, p < 0.05) is associated with greater upper and lower limb power, while this relationship may differ in amateur teams [23]. These physical qualities allow players to sustain strong muscle contractions during game actions (blocking, pushing, holding, etc.) and to exert greater power during frequent physical contacts with opponents [37].

Relationship between Anthropometric Profile and Physical Abilities

In females, lower limb power (Sargent jump) strongly correlated with body mass (r = 0.869) and BMI (r = 0.619). Height moderately correlated with lower limb power (r = 0.379). Agility moderately correlated with hand span (r = 0.328).

In males, moderate correlations were found between Sargent jump performance and height (r = 0.368) and hand span (r = 0.443). Lower limb power strongly correlated with body mass (r = 0.666) and height (r = 0.516). Upper limb strength (throw) moderately correlated with body mass (r = 0.358) and hand span (r = 0.343), and moderately negatively with BMI (r = -0.298), while strongly correlating with height (r = 0.676). Lucas oliveira et al [38] reported moderate correlations between body fat percentage and performance in T-test, squat jump, and countermovement jump, which aligns with our T-

test findings. However, correlations between BMI and Sargent jump were weak and nonsignificant. Massuca *et al* [39] identified a negative correlation between BMI and vertical jump (r = -0.42) and a positive correlation with shuttle run time (r = 0.61). These findings indicate that anthropometric variables influence motor performance, though the effect may depend on the test used [38].

Table 1: Characteristics and Anthropometric Profiles (Mean ± SD) of Handball Players at the 2023 National Phase of the University Games of Benin

		Age	BM (Kg)	Height (m)	BMI (Kg/m²)	Wigspan (m)	Handspan (Cm)
Women	ESM-Lokossa (09)	20.22±2.10	60.78±4.60	1.68±0.05	21.30±1.28	1.66±0.04 #	22.67±1.32 ǂ
	FLASH-UP (12)	19.25±1.35 ⚹	61.33±5.86	1.73±0.05 β	20.44±1.75	1.76±0.06 # φ	22.33±0.49 ‡
	INJEPS (07)	21.86±1.06	61.57±4.42	1.73±0.08 γ	20.61±1.87	1.71±0.08	21.57±0.97 *
	LCS-Bohicon (08)	20±2.33	57.50±9.38	1.61±0.04 β γ	22.01±3.21	1.69±0.06	19±1.30 ǂ‡*θ
	SAPIENTIA-Parakou (09)	22±2.44 ⚹	60.89±4.78	1.68±0.04	21.47±1.35	1.67±0.01 φ	21.89±1.26 θ
	Players (N=45)	20.53±2.14	60.49±5.94	1.69±0.06	21.12±1.96	1.70±0.06	21.60±1.64
	pValue (ANOVA)	0.01	0.65	0.00	0.43	0.00	0.00
Men	ESST-Lokossa (09)	22.78±1.92	65.89±1.45	1.81±0.06 q	20.04±1.25	1.79±0.27	23.22±1.39
	INJEPS (14)	22.86±2.21	65.43±6.50	1.73±0.06 q þ	21.62±1.84 †	1.85±0.09	22.57±0.93
	INSTI-Lokossa (12)	21.50±2.06	63.33±6.18	1.77±0.04	19.99±1.34	1.88±0.05	22.08±1.73
	SAPIENTIA-Parakou (09)	22.22±2.10	64.89±1.61	1.83±0.06 þ	19.40±1.26 †	1.86±0.07	23.22±1.09
	Players (N=44)	22.34±2.10	64.84±4.94	1.78±0.06	20.40±1.68	1.85±0.13	22.70±1.35
	pValue *(ANOVA)*	0.84	0.64	0.00	0.00	0.49	0.15

ESM_Lokossa: Higherr School of Management_Lokossa; **FLASH_UP:** Faculty of Arts, Letters, and Humanities_University of Parakou; **INJEPS:** National Institute of Youth, Physical Education and Sport; **LCS_Bohicon:** The Sonou Cours_Bohicon; **ESST_Lokossa:** Higher School of Sciences and Technologies_Lokossa; **INSTI_Lokossa:** National Higher Institute of Industrial Technology _Lokossa**; BM:** Body Mass; **BMI:** Body Mass Index; **Meam:** aveeraage; **SD:** standard deviation; **N:** sample size; **Kg:** Kilogramme**; m:** metre**; cm:** centimetre, **β:** significant difference between **FLASH_UP** and **LCS_Bohicon;** **γ:** significant difference between **INJEPS** and **LCS_Bohicon;** **#:** significant difference between **ESM_Lokossa** and **FLASH_UP;** **φ:** significant difference between **SAPIENTIA_Parakou** and **FLASH_UP;** **ǂ:** significant difference between **ESM_Lokossa** and **LCS_Bohicon;** **‡:** significant difference between **FLASH_UP** and **LCS_Bohicon;** ***:** significant difference between **INJEPS** and **LCS_Bohicon;** **θ:** significant difference between **SAPIENTIA_Parakou** and **LCS_Bohicon;** **q:** significant difference between **ESST_Lokossa** and **INJEPS;** **þ:** significant difference between **SAPIENTIA_Parakou** and **INJEPS;** **†:** significant difference between **INJEPS** and **SAPIENTIA_Parakou;** **⚹:** significant difference between **SAPIENTIA_Parakou** and **FLASH_UP**

Table 2: Anthropometric Profiles (Mean ± SD) of Handball Players at the 2023 National Phase of the University Games of Benin, According to Playing Position

		BM (Kg)	Height (m)	BMI (Kg/m²)	Wingspan (m)	Handspan (Cm)
Women	Winger (14)	59.71±6.93	1.67±0.06	21.27±2.21	1.68±0.02	21.36±1.39
	Fullback (11)	62.64±3.38	1.69±0.04	21.84±1.17	1.68±0.06	22.09±1.37
	Center forward (2)	58.50±9.19	1.69±0.07	20.27±1.33	1.73±0.04	22.50±0.70
	Center back (2)	55.50±13.43	1.69±0.07	19.16±2.91	1.71±0.04	19±1.41
	Goalkeeper (8)	60.25±5.60	1.68±0.03	21.25±1.94	1.72±0.05	22±1.60
	Pivot (8)	60.88±5.51	1.73±0.12	20.46±2.28	1.75±0.12	21.38±2.20
	Players (N=45)	60.49±5.94	1.69±0.06	21.12±1.96	1.70±0.06	21.60±1.64
	pValue (ANOVA)	0.66	0.65	0.44	0.20	0.18
Men	Winger (13)	61.69±5.51 †	1.76±0.07	19.75±1.69	1.79±0.22	22.46±1.20
	Fullback (11)	66.09±2.50	1.78±0.06	20.87±1.33	1.90±0.07	23±1.67
	Center forward (7)	64.43±1.00	1.78±0.08	20.34±1.88	1.86±0.09	22.29±1.25
	Goalkeeper (6)	65.33±6.97	1.77±0.04	20.67±2.25	1.85±0.05	22.67±1.03
	Pivot (7)	68.71±4.15 †	1.82±0.05	20.71±1.55	1.86±0.06	23.14±1.46
	Players (N=44)	64.84±4.94	1.78±0.06	20.44±1.68	1.85±0.13	22.70±1.35
	pValue (ANOVA)	0.02	0.59	0.54	0.38	0.69

BM: Body Mass; **BMI:** Body Mass Index; **SD:** standard deviation; **N:** sample size; **Kg:** Kilogramme**; m:** metre**; cm:** centimetre;**†:** significant difference between **Winger** and **Pivot**

Table 3: Physical Abilities (Mean ± SD) of Handball Players at the 2023 National Phase of the University Games of Benin

		Sargent test (Cm)	Throw (m)	20 m sprint (s)	T-test (s)
Women	ESM-Lokossa (09)	29.59±2.55	4.13±0.29 †	3.41±0.26	12.36±1.19
	FLASH-UP (12)	34.25±5.77	4.72±0.35 † Þ	3.64±0.40	13.20±0.68
	INJEPS (07)	31.43±1.98	4.64±0.47 q	3.34±0.26	12.92±0.50
	LCS-Bohicon (08)	29.63±4.98	4.06±0.30 Þ q	3.44±0.18	12.39±0.93
	SAPIENTIA-Parakou (09)	31.67±2.59	4.33±0.43	3.59±0.28	13.12±0.47
	Players (N=45)	31.53±4.32	4.39±0.44	3.50±0.31	12.83±0.85
	pValue (ANOVA)	0.07	0.00	0.18	0.07
Men	ESST-Lokossa (09)	54.22±4.65	5.98±0.35 ǂ	330±0.33	10.54±0.46
	INJEPS (14)	50.07±11.07	5.21±0.71 ǂ ‡	3.21±0.07	10.88±0.81
	INSTI-Lokossa (12)	53.92±5.83	5.70±0.41	3.23±0.31	10.56±0.41
	SAPIENTIA-Parakou (09)	54.22±4.94	5.86±0.33 ‡	3.19±0.29	10.55±0.45
	Players (N=44)	52.82±7.61	5.63±0.58	3.23±0.25	10.65±0.58
	pValue (ANOVA)	0.45	0.00	0.83	0.38

ESM_Lokossa: Higherr School of Management_Lokossa; **FLASH_UP:** Faculty of Arts, Letters, and Humanities_University of Parakou; **INJEPS:** National Institute of Youth, Physical Education and Sport; **LCS_Bohicon:** The Sonou Cours_Bohicon; **ESST_Lokossa:** Higher School of Sciences and Technologies_Lokossa; **INSTI_Lokossa:** National Higher Institute of Industrial Technology _Lokossa**; BM:** Body Mass; **BMI:** Body Mass Index; **Meam:** aveeraage; **SD:** standard deviation; **N:** sample size; **Kg:** Kilogramme**; m:** metre; **cm:** centimetre, **S-test:** Sargent test; **s: seconde;** † : significant difference between **ESM_Lokossa** and **FLASH_UP;** Þ: significant difference between **LCS_Bohicon** and **FLASH_UP;** q: significant difference between **LCS_Bohicon** and **INJEPS;** ǂ significant difference between **ESST_Lokossa** and **INJEPS;** ‡: significant difference between **INJEPS and SAPIENTIA_Parakou**

Table 4: Physical Abilities (Mean ± SD) of Handball Players at the 2023 National Phase of the University Games of Benin, According to Playing Position

		S-test (Cm)	Throw (m)	20 m sprint (s)	T-test (s)
Women	Winger (14)	33.07±4.04	4.42±0.45	3.61±0.24	12.77±0.91
	Fullback (11)	32.45±4.56	4.50±0.43	3.44±0.32	12.88±0.70
	Center forward (2)	34.50±6.36	4.55±0.91	3.52±0.59	13.27±0.31
	Center back (2)	28±4.24	3.85±0.07	3.21±0.22	11.76±1.16
	Goalkeeper (8)	30.75±3.95	4.34±0.51	3.58±0.29	13.21±0.84
	Pivot (8)	28.50±3.16	4.36±0.33	3.37±0.34	12.64±0.90
	Players (N=45)	31.53±4.32	4.39±0.44	3.50±0.31	12.83±0.85
	pValue (ANOVA)	0.11	0.57	0.32	0.34
Men	Winger (13)	51.08±9,40	5.52±0.68	3.17±0.06	10.93±0.62
	Fullback (11)	52.76±7.81	5.81±0.53	3.29±0.30	10.45±0.71
	Center forward (7)	54.86±6.04	5.70±0.52	3.23±0.34	10.37±0.36
	Goalkeeper (6)	54±8.29	5.40±0.70	3.33±0.42	10.45±0.36
	Pivot (7)	53.14±5.52	5.72±0.41	3.17±0.09	10.93±0.36
	Players (N=44)	52.82±7.61	5.63±0.58	3.23±0.25	10.65±0.58
	pValue (ANOVA)	0.86	0.61	0.65	0.07

S-test: Sargent test**; SD:** standard deviation; **N:** sample size**; m**: metre; **cm:** centimetre; **s:** second;

Table 5: Relationship between Anthropometric Profiles and Physical Abilities of Basketball Players

		Sargent test (Cm)	Throw (m)	20 m sprint (s)	T-test (s)
Women	BM (Kg)	0.221	0.083	-0.074	0.057
	Height (m)	0.006	0.260	-0.058	0.101
	BMI (Kg/m²)	0.229	-0.125	-0.032	-0.027
	Wingspan (m)	-0.027	0.261	-0.072	0.124
	Handspan (Cm)	0.079	0.243	0.111	0.328*
Men	BM (Kg)	0.175	0.358*	-0.128	-0.297
	Height (m)	0.368*	0.676**	-0.279	-0.329*
	BMI (Kg/m²)	-0.178	-0.298*	0.137	0.037
	Wingspan (m)	0.059	0.280	-0.044	-0.133
	Handspan (Cm)	0.443**	0.343*	-0.033	-0.073

m: metre; **BM:** Body Mass; **cm:** centimetre; **s:** second; **kg:** kilogramme; BMI: Body Mass Index ***:** correlation is significant at the 0.05 level (two-tailed); ****:** correlation is significant at the 0.01 level (two-tailed)

4. Conclusion

The aim of this study was to examine the relationships between anthropometric profiles and physical capacities of Beninese university handball players.

The results confirm that university-level handball in Benin, although supported by young athletes, exhibits anthropometric characteristics (height, arm span) and physical performance (strength, agility) generally lower than those observed at elite levels in international and regional literature. In male players, height is a major predictive factor for throwing strength ($r = 0.676$) and, together with hand span, influences vertical jump power (Sargent test). Hand span is also positively associated with agility in female players. These relationships demonstrate that anthropometry is a key determinant of performance in the context of Beninese

university handball.

These data provide the first reliable reference framework to support decision-making for the Benin Office of School and University Sports (OBSSU). It is essential for OBSSU and technical staff to incorporate standardized physical and physiological tests to refine talent identification processes and guide training programs toward the targeted development of deficient physical qualities (strength and agility).

The main limitation of this cross-sectional study is the absence of physiological data (VO2max) and detailed body composition (body fat percentage). Future studies should include these variables to provide a more comprehensive understanding of performance factors and athlete development.

5. Declarations

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- **Ethical Considerations**
  The study protocol adhered to the ethical principles of the Declaration of Helsinki. Participants were informed of the objectives, procedures, and potential risks associated with the study. Participation was voluntary and conditioned upon signing an informed consent form

- **AI Statement**
  For the preparation of this work, the authors used ChatGPT for English translation.

- **Conflicts of Interest**
  The authors declare no conflicts of interest

- **Author Contributions**
a) FDK organized the data, proposed the methodology, participated in data collection, and drafted the first version of the manuscript.
b) ODA designed the study, organized the data, performed the analyses, proposed the methodology, validated the data, and drafted the first version of the manuscript.
c) GCM designed the study, organized the data, performed the analyses, proposed the methodology, validated the data, and reviewed and edited the manuscript.
d) TA performed the analysis, survey, and first version revision.
e) TB performed the analysis, conducted the survey, and revised the first version of the manuscript.
f) BA supervised, reviewed, and approved the final version.
g) All authors have read and approved the final manuscript and agreed on the order of authors.

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- **Data Availability**
  The anonymized dataset generated and analyzed during this study is available from the corresponding author upon reasonable request.

- **Disclaimer**
  The opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the affiliated institutions or funding organizations.

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