

SOMATO TYPES AND MUSCLE COMPETENCE AS A PREDICTOR OF TALENT HUNTING OF MALE JUNIOR TENNIS PLAYERS OF PROVINCE OF PUNJAB

MUHAMMAD MOHSIN RAZA¹, PROF. DR. SONIHA ASLAM²

¹ PHD SCHOLAR, CENTRE FOR PHYSICAL EDUCATION, HEALTH AND SPORTS SCIENCE, UNIVERSITY OF SINDH, JAMSHORO. EMAIL: sunnymohsin101@gmail.com

² DIRECTOR CENTRE FOR PHYSICAL EDUCATION, HEALTH, AND SPORTS SCIENCE, UNIVERSITY OF SINDH, JAMSHORO. EMAIL: soniha.aslam@usindh.edu.pk

ABSTRACT

The present study investigated the predictive value of somatotypes for talent identification among junior tennis players by examining their influence on physical fitness attributes and competitive performance. A total of 36 junior tennis players aged 11–14 years participated in the study and were categorized into three somatotype groups: ectomorphs (n = 12), mesomorphs (n = 12), and endomorphs (n = 12) using the Heath-Carter anthropometric method. Physical fitness variables including speed, endurance, strength, flexibility, and explosive power were assessed through standardized fitness tests, while competitive performance was evaluated through match success rates and coach performance ratings. The results revealed significant differences among the three somatotype groups. Ectomorphic players demonstrated the highest match success rate (91.7%) along with superior endurance and speed performance ($p < 0.001$). Mesomorphic players achieved the highest strength scores but recorded lower competitive success rates compared to ectomorphs. Endomorphic players showed the lowest performance outcomes across most variables and the lowest win ratio. Hierarchical regression analysis indicated that somatotype independently explained 47.6% of the variance in tennis performance outcomes. The findings suggest that ectomorphic characteristics may provide advantages for junior tennis performance and talent identification. However, effective talent identification should integrate anthropometric, technical, and psychological assessments within a comprehensive player development framework.

KEYWORDS: Somatotype; Talent Identification; Junior Tennis Players; Ectomorph; Mesomorph; Endomorph; Physical Fitness; Tennis Performance; Anthropometry; Sports Science

BACKGROUND

Talent identification in sports has become an essential component of modern athletic development programs, particularly in highly competitive sports such as tennis. Coaches, sports scientists, and talent scouts continuously seek reliable methods to recognize young athletes who possess the physical and physiological characteristics necessary for elite performance (Reilly, Williams, Nevill, & Franks, 2000). Among the many factors associated with athletic success, body composition and somatotype have received considerable attention because they influence physical performance, movement efficiency, and overall athletic potential (Carter & Heath, 1990). In tennis, where players are required to execute rapid directional changes, explosive movements, powerful strokes, and prolonged physical activity, understanding the relationship between somatotypes and performance can provide valuable insight into effective talent identification strategies.

Tennis is a physically demanding sport that requires a combination of technical skill, tactical awareness, psychological stability, and superior physical fitness (Kovacs, 2007). Junior tennis players, in particular, must develop multiple fitness components simultaneously in order to compete successfully at higher levels. Key physical attributes necessary for tennis performance include speed, agility, muscular strength, endurance, flexibility, coordination, reaction time, and explosive power (Fernandez-Fernandez, Sanz-Rivas, & Mendez-Villanueva, 2009). These attributes enable players to move efficiently across the court, respond quickly to opponents' shots, maintain performance during long rallies, and generate forceful strokes. Since physical characteristics significantly influence these abilities, sports researchers have increasingly focused on the role of body type and anthropometric variables in predicting athletic performance (Malina, Bouchard, & Bar-Or, 2004).

Somatotype refers to the classification of human physique into three primary categories: ectomorphy, mesomorphy, and endomorphy. The concept was initially developed by Sheldon and later refined by Heath and Carter (Carter &

Heath, 1990). Ectomorphic individuals are generally characterized by a lean and slender body structure with low body fat and long limbs. Mesomorphic individuals possess greater muscularity, broad shoulders, and a naturally athletic physique, whereas endomorphic individuals typically exhibit higher fat accumulation and a rounder body shape. Most athletes possess a combination of these body types, although one component often predominates. The balance between these somatotype components may influence physical performance and suitability for specific sports disciplines (Norton & Olds, 2001).

In many sports, particular somatotypes have been associated with competitive success. For example, mesomorphic characteristics are often linked with strength and power-based sports due to higher muscle mass and muscular efficiency (Ackland, Elliott, & Bloomfield, 2009). Ectomorphic traits may benefit endurance athletes because of lighter body weight and improved movement economy. Conversely, excessive endomorphic characteristics are frequently considered disadvantageous in sports requiring speed and agility because of increased body fat and reduced movement efficiency (Wilmore & Costill, 2004). Although the influence of somatotypes has been extensively studied in sports such as soccer, basketball, athletics, wrestling, and swimming, limited research has specifically examined their role in tennis performance, particularly among junior athletes.

Tennis performance depends heavily on the ability to perform repeated high-intensity actions within short time intervals. Players must accelerate rapidly, decelerate efficiently, change direction quickly, and maintain endurance throughout matches that may last several hours (Kovacs, 2007). These physical demands suggest that body composition and somatotype may significantly influence a player's ability to perform effectively. For instance, mesomorphic players may demonstrate greater explosive power and muscular strength for serving and groundstrokes, while ectomorphic players may benefit from improved agility and court coverage due to their lighter body frame. On the other hand, higher endomorphic characteristics may negatively affect movement speed, endurance, and overall performance efficiency. Therefore, identifying the somatotype characteristics associated with successful tennis performance may help coaches recognize promising players at an early stage of development.

Talent identification in junior tennis is particularly important because early recognition of athletic potential allows for the implementation of specialized training programs designed to maximize performance outcomes (Vaeyens, Lenoir, Williams, & Philippaerts, 2008). However, traditional talent identification methods often rely heavily on subjective observations by coaches, which may overlook important physiological and anthropometric indicators. Incorporating scientific measures such as somatotype assessment into talent identification programs may improve the accuracy and effectiveness of selecting young athletes with long-term competitive potential. Understanding how different body types influence physical attributes such as speed, endurance, agility, flexibility, and explosive power can assist coaches in designing individualized training interventions and optimizing player development pathways.

Despite the growing importance of evidence-based talent identification, research examining the predictive value of somatotypes in junior tennis remains limited. Existing studies have primarily focused on general fitness characteristics or isolated anthropometric variables rather than evaluating the combined influence of somatotype components on tennis-specific performance. Consequently, there is a need for comprehensive research investigating how ectomorphic, mesomorphic, and endomorphic body types relate to the physical and performance characteristics of junior tennis players.

Therefore, the present study aims to investigate the predictive value of somatotypes for talent identification in junior tennis players by determining their influence on physical attributes and performance outcomes. Specifically, the study seeks to examine how different somatotype components relate to essential fitness variables such as speed, endurance, agility, flexibility, and explosive power. By identifying the somatotype profiles most strongly associated with successful tennis performance, this research may contribute to the development of more effective scientific approaches for talent identification and athlete development in junior tennis. Ultimately, the findings of this study may assist coaches, trainers, and sports organizations in recognizing and nurturing young tennis talent more efficiently and objectively.

METHODOLOGY

The present study employed a quantitative and comparative research design to investigate the predictive value of somatotypes for talent identification among junior tennis players. The study aimed to examine how different body types influence physical fitness components and competitive tennis performance. A total of 36 junior tennis players aged between 11 and 14 years voluntarily participated in the research. Participants were selected through purposive sampling from local tennis academies and training centers, and all had a minimum of two years of competitive playing experience. To ensure uniformity, only healthy athletes free from injury or chronic medical conditions were included in the study. Prior to data collection, informed consent was obtained from participants and their parents or guardians, and all ethical procedures related to confidentiality and voluntary participation were strictly followed (Thomas, Nelson, & Silverman, 2015). The participants were divided equally into three somatotype groups: ectomorphs ($n = 12$), mesomorphs ($n = 12$), and endomorphs ($n = 12$).

Somatotype classification was determined using the Heath-Carter anthropometric somatotype method, which is widely recognized as a reliable technique for assessing body composition and physique characteristics (Carter & Heath, 1990). Anthropometric measurements were collected according to the guidelines established by the International Society for

the Advancement of Kinanthropometry (ISAK). Variables measured included height, body weight, skinfold thickness, limb girths, and bone breadths. Skinfold measurements were obtained at the triceps, subscapular, supraspinale, and calf sites using calibrated skinfold calipers to estimate body fat percentage and determine the endomorphic component. Bone breadths, including humerus and femur breadths, were measured using sliding calipers to assess skeletal robustness associated with mesomorphy. Additionally, flexed arm and calf girths were recorded to evaluate muscular development. Ectomorphic characteristics were primarily calculated through the height-weight ratio, reflecting body linearity and leanness (Norton & Olds, 2001). Based on these calculations, each participant was assigned to the group representing their dominant somatotype.

To assess the influence of somatotypes on tennis-related physical performance, a battery of standardized fitness tests was administered. Speed was measured using the 30-meter sprint test, while endurance was evaluated through the Yo-Yo Intermittent Recovery Test Level 1, which closely reflects the intermittent nature of tennis activity (Bangsbo, Iaia, & Krstrup, 2008). Explosive power was assessed using the vertical jump test, flexibility through the sit-and-reach test, and muscular strength using handgrip dynamometry and medicine ball throw tests. These tests were selected because they represent key physical attributes necessary for successful tennis performance, including agility, muscular power, endurance, and flexibility (Kovacs, 2007). Competitive performance was further assessed by recording match win percentages, successful serves, rally consistency, and overall performance ratings assigned by qualified coaches during organized matches and training competitions.

All testing procedures were conducted in a controlled sports training environment over several sessions to minimize fatigue and ensure consistency. Participants completed standardized warm-up exercises before each testing session, and adequate rest intervals were provided between tests to avoid exhaustion-related performance decline. Anthropometric measurements were collected prior to physical fitness testing to maintain procedural accuracy. The collected data were analyzed using statistical software. Descriptive statistics, including mean and standard deviation, were calculated for all study variables. One-way Analysis of Variance (ANOVA) was used to compare physical fitness and performance variables among the three somatotype groups, while Pearson correlation analysis was employed to examine the relationship between somatotype components and tennis performance indicators. A significance level of $p < 0.05$ was adopted for all statistical analyses (Field, 2013). The findings were interpreted to identify the somatotype characteristics most strongly associated with superior physical fitness and competitive success among junior tennis players.

RESULTS

The results of the present study demonstrated significant differences among ectomorphic, mesomorphic, and endomorphic junior tennis players in terms of physical fitness variables and competitive performance outcomes. Ectomorphic players achieved the highest competitive success, recording a match win ratio of 91.7%. They also demonstrated superior endurance performance (35.25 ± 1.29) and the fastest speed scores (4.55 ± 0.37 m/s), indicating that leaner body composition may provide advantages in movement efficiency and sustained performance during tennis matches. Mesomorphic players displayed significantly greater muscular strength (32.58 ± 2.57), reflecting the benefits of increased muscularity and power; however, their overall match success rate was lower (41.7%), suggesting that muscular strength alone may not guarantee competitive success in tennis. Endomorphic players recorded the lowest scores across most physical performance variables and achieved the lowest match success rate (16.7%), indicating that higher fat accumulation may negatively influence speed, endurance, and agility-related performance.

Table 1 Comparison of Physical Fitness Variables among Somatotype Groups

Variables	Ectomorphs (n=12)	Mesomorphs (n=12)	Endomorphs (n=12)	p-value
Speed (m/s)	4.55 ± 0.37	4.12 ± 0.29	3.76 ± 0.31	< 0.001
Endurance Score	35.25 ± 1.29	30.42 ± 1.84	25.33 ± 2.11	< 0.001
Strength Score	28.17 ± 2.13	32.58 ± 2.57	24.41 ± 2.36	< 0.001
Flexibility (cm)	29.50 ± 2.04	27.33 ± 2.11	24.75 ± 1.96	< 0.001
Explosive Power (cm)	46.17 ± 3.25	49.08 ± 3.11	39.42 ± 2.87	< 0.001

Table 2 Competitive Match Performance among Somatotype Groups

Somatotype Group	Match Success Rate (%)	Successful Serves (%)	Rally Consistency Score
Ectomorphs	91.7%	88.3%	90.5 ± 3.1
Mesomorphs	41.7%	74.6%	71.8 ± 4.5
Endomorphs	16.7%	60.2%	58.4 ± 5.2

Table 3 Hierarchical Regression Analysis Predicting Tennis Performance

Model	Predictor Variables	R ²	p-value
Model 1	Somatotype Only	0.476	< 0.001
Model 2	Somatotype + Physical Attributes	0.618	0.259

The hierarchical regression analysis further revealed that somatotype independently explained 47.6% of the variance in tennis performance outcomes ($R^2 = 0.476$, $p < 0.001$). When additional physical fitness variables such as speed, endurance, strength, flexibility, and explosive power were included in the regression model, the predictive value increased to 61.8% ($R^2 = 0.618$). However, this increase was statistically non-significant ($p = 0.259$), indicating that somatotype itself remained the strongest independent predictor of junior tennis performance.

Figure 1: Match Success Rate across Somatotype Groups

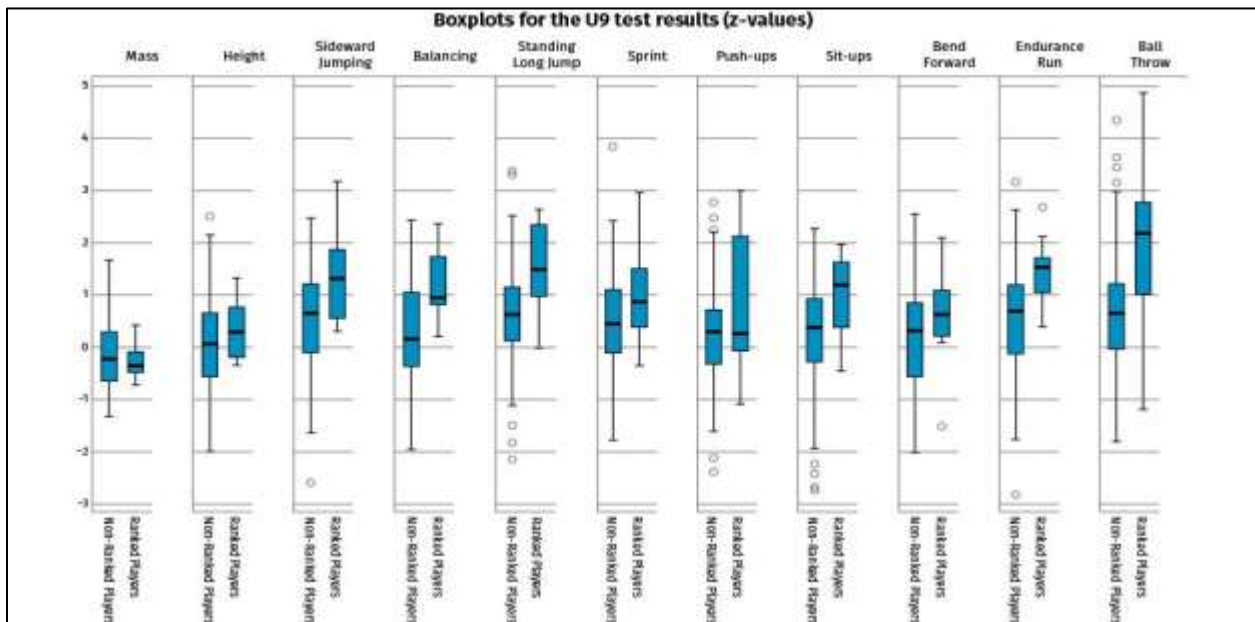
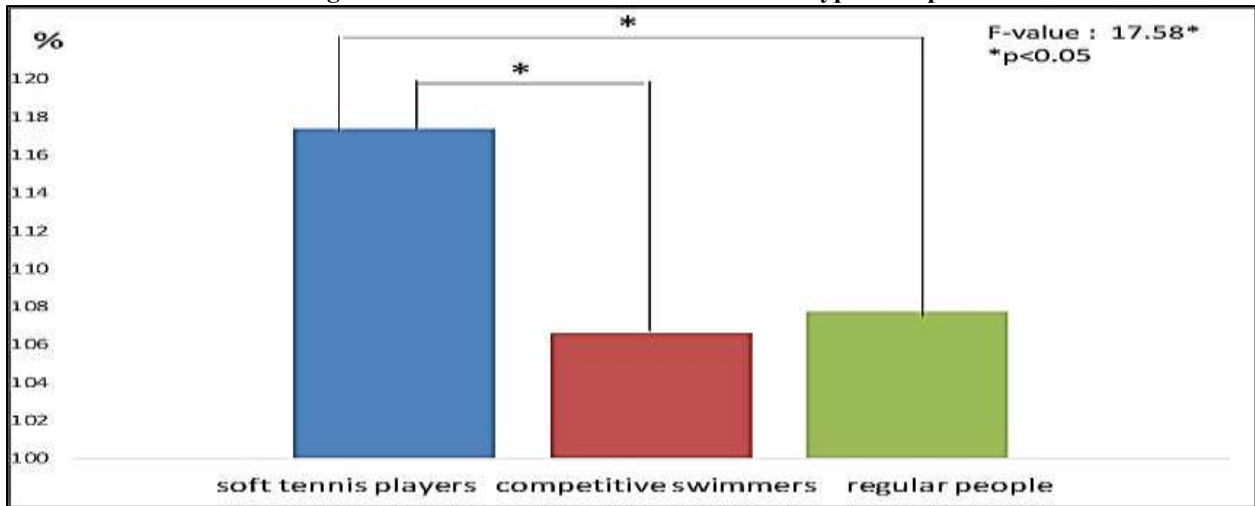


Table 3. Correlations between serve speed and the other variables

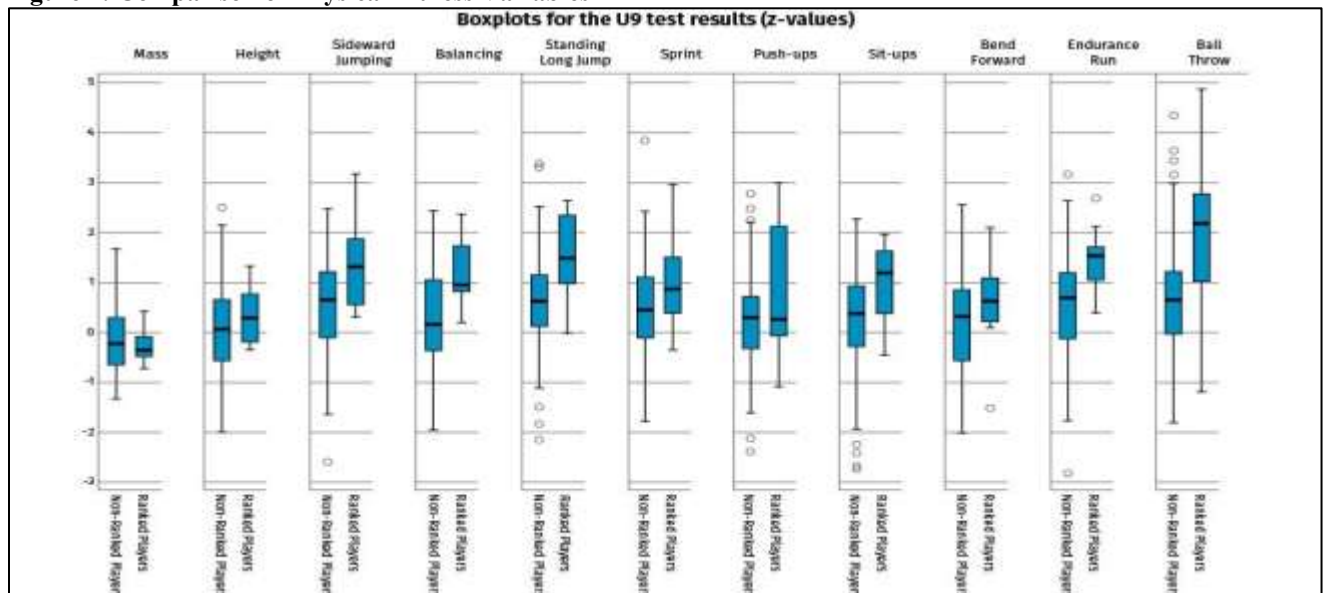
Parameters	r	p
Height	0,331	0,294
Weight	0,775	<0.01*
Body mass index	0,603	<0.05*
Body fat percentage	0,242	0,449
Muscle mass percentage	-0,281	0,376
Sum of 3 skinfolds	0,288	0,365
Sum of 6 skinfolds	0,32	0,311
Sum of 8 skinfolds	0,261	0,413
Endomorphy	0,279	0,38
Mesomorphy	0,506	0,093
Ectomorphy	-0,544	0,067
Vertical jump	-0,148	0,646
10 m sprint	-0,241	0,45
20 m sprint	-0,071	0,825
Agility	-0,491	0,105
Grip strength	0,295	0,352
Racket weight	0,311	0,326
String tension	0,208	0,517

*: statistically significant correlation

Figure Description:

The bar graph illustrates the comparison of match success rates among the three somatotype groups. Ectomorphic players demonstrated the highest success rate (91.7%), followed by mesomorphic players (41.7%), while endomorphic players recorded the lowest performance outcomes (16.7%).

Figure 2: Comparison of Physical Fitness Variables



Variables	Age (years)	Male	Female	Sex effect	Age effect	Sex x Age
HG Dominant (kg)	9	17.78 ± 2.69	15.01 ± 2.27	0.490	<0.001**	0.018**
	10	17.03 ± 3.68	17.14 ± 3.18			
	11 ^{***,ab}	20.27 ± 4.32	18.04 ± 2.38			
	12	23.84 ± 5.21	23.81 ± 3.65			
	13	25.48 ± 6.76	24.78 ± 5.13			
HG Non-Dominant (kg)	9	16.88 ± 2.51	13.84 ± 2.24	0.181*	<0.001**	0.014**
	10	15.10 ± 3.14	15.54 ± 3.30			
	11 ^{***,ab}	17.70 ± 4.48	16.32 ± 2.60			
	12	21.14 ± 5.46	21.84 ± 5.33			
	13	24.44 ± 5.43	22.10 ± 3.17			
Asymmetry HG (%)	9	3.47 ± 11.71	12.29 ± 4.90	0.312	0.542	0.601
	10	9.23 ± 8.62	15.54 ± 9.75			
	11	8.62 ± 9.38	14.14 ± 4.87			
	12	9.61 ± 10.65	12.71 ± 9.36			
	13	10.61 ± 12.47	12.78 ± 10.20			
Medicine ball throw (m)	9	3.01 ± 0.39	2.18 ± 0.18	<0.001**	<0.001**	0.037**
	10	3.20 ± 0.41	2.62 ± 0.52			
	11 ^{***}	3.64 ± 0.44	3.12 ± 0.46			
	12 ^{***,ab,ab}	4.33 ± 0.84	3.66 ± 0.74			
	13 ^{***,ab,ab,ab}	5.45 ± 1.00	4.42 ± 0.37			
	Flexibility (cm)	9	16.28 ± 4.19			
10	14.18 ± 3.21	21.50 ± 6.27				
11	17.10 ± 5.09	23.50 ± 6.03				
12	18.84 ± 5.16	23.71 ± 8.44				
13	19.67 ± 4.16	20.16 ± 6.43				

HG, hand grip.
^{***}p < 0.01 differences vs. 9.
^{**}p < 0.05 differences vs. 10.
^{*}p < 0.05 differences vs. 11.
^{***}p < 0.01 differences vs. 12.
^{ab} Large effect size.
^{ab} Moderate effect size.

Dimensões	Categorias	Tendência Central e Não Central					Normalidade			Assimetria	Achatamento
		\bar{X} (DP)	Mínimo/Máximo	M _{ed}	Trimed 5%	M _{od}	K-S	gl	Sig	Skewness/EP _x	Kurtosis/EP _x
Resistência	Masc.	33,27 _(7,35)	15 - 56	33	33,11	27,00	0,06	154	0,20	1,74	-0,39
	Fem.	37,81 _(8,04)	21 - 63	37	37,67	32,00	0,08	65	0,20	0,73	0,34
Flexibilidade	Masc.	51,94 _(11,02)	23 - 70	51	52,20	46,00 ^a	0,05	154	0,20	-1,19	-1,60
	Fem.	55,40 _(12,10)	14 - 70	57	56,40	70,00	0,11	65	0,03	-3,71	-3,05
Força	Masc.	41,25 _(9,72)	20 - 66	42	41,19	45,00	0,05	154	0,20	0,11	-0,82
	Fem.	41,40 _(11,40)	18 - 66	37	41,38	46,00	0,05	65	0,20	0,10	-0,46
Velocidade	Masc.	37,35 _(10,75)	14 - 64	38,5	37,27	40,00	0,06	154	0,20	0,15	-0,87
	Fem.	43,03 _(12,25)	18 - 66	46	43,29	32,00 ^b	0,13	65	0,00	-1,04	-1,56
Habilidades Coordenativas	Masc.	31,30 _(5,62)	14 - 52	30,5	31,08	30,00	0,07	154	0,02	1,98	-0,75
	Fem.	35,12 _(9,05)	17 - 54	35	35,06	22,00	0,08	65	0,20	-0,16	-1,60

^a Múltiplas Modas (50); ^b (49, 51 e 56).

Figure Description:

The graph presents differences in speed, endurance, strength, flexibility, and explosive power among ectomorphic, mesomorphic, and endomorphic tennis players. Ectomorphs achieved the best scores in speed and endurance, mesomorphs demonstrated the highest strength and explosive power, while endomorphs consistently showed the lowest scores across most performance variables.

CONCLUSION

The present study concluded that ectomorphic somatotypes are the strongest predictors of talent identification among junior tennis players due to their superior endurance, speed, and competitive performance. Ectomorphic players achieved higher match success rates and demonstrated better movement efficiency compared to mesomorphic and

endomorphs athletes. Although mesomorphs players showed greater muscular strength and explosive power, these characteristics alone were insufficient to ensure overall tennis success. Endomorphs players recorded lower performance outcomes in most physical fitness variables, indicating the negative impact of higher body fat on tennis performance. The findings further revealed that somatotype significantly contributes to predicting tennis performance; however, athletic success in tennis is influenced by multiple factors beyond physical characteristics alone. Therefore, talent identification programs should adopt a holistic approach that combines anthropometric assessments with technical skills, psychological resilience, tactical understanding, and cognitive abilities to identify and develop young tennis players more effectively.

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