Anthropometric Profiles and Somatotypes of the National Teams at the 2011 Women's 17 European Handball Championship

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Introduction

The fourth Women's 17 European Handball Championship (eighth Women's Youth European Championship) took place in Brno & Zlín, Czech Republic from 23rd June to 3rd July 2011. Each team played 7 matches over 11 days. The championship matches were demanding in terms of mental and physical preparedness of the players. Overall, sixteen top European national teams participated in the championship.

The complex game of handball is based on the use of basic and specific motor abilities, the quality of which depends on the level of physical conditioning. On the other hand, several studies point to the fact that player's somatotype and anthropometric profile determine the quality of sports performance in handball. The game of handball is also characterized by performing position-specific skills. Each playing function is specific in terms of technical and tactical skills, motor and conditioning abilities and physical predispositions of the player. Therefore, in top-quality team handball it would be sensible to select players whose morphological profiles are most compatible with positional specificities in the demands of the game (Srhoj, Marinović, Rogulj, 2002). Morphological characteristics constitute players' basic aptitude for a certain playing position, using which players can be effectively employed in the game (Urban, Kandráč, Táborský, 2010).

Aim

The purpose of the cross-sectional study was to determine anthropometric profiles and somatotypes of national teams taking part in the 2011 W17 ECh from the viewpoint of individual playing positions.

Methods

The research sample consisted of 240 players of 15 national teams that participated in the W17 ECh in Brno & Zlin, Czech Republic. At the time of the championship, the players were 17 years old or younger. The players were divided into position-specific groups: GKs - goalkeepers (n = 43), Ws - wings (n = 58), CBs - center backs (n = 40), Bs - backs (n = 64) and PVs - pivots (n = 35). Anthropometric measurements were carried out during the W17 European Championship. We measured the following anthropometric parameters:

a. parameters of longitudinal dimension: body height and arm span (D-D),

- b. body mass,
- c. parameters of transversal dimension: biacromial breadth (shoulder width, A-A), palm breadth (Palm), biepicondylar breadth of the humerus (humerus breadth HB) and biepicondylar breadth of the femur (femur breadth FB),
- d. parameters of body volume (circumferential) dimension: upper arm circumference (biceps), calf circumference (calf) and forearm circumference (forearm),
- e. body indexes: percent subcutaneous fat (fat %).

The circumferential measures were taken in flexed and tensed condition of the individual muscles. The percent subcutaneous fat, based on the measurement of skinfold thickness on 10 body sites: head, neck, chest I, chest II, arm, back (subscapular), belly, hip (supraspinal), thigh and calf (medial calf), was calculated using the method devised by Pařízková (1962). The somatotypes were determined by the Heath, Carter (1967) method, which expresses somatotype using a three-number rating. The determination of somatotypes was based on the following parameters:

- 1. body height and body mass,
- 2. skinfold thickness: triceps skinfold, subscapular skinfold, supraspinal skinfold and medial calf skinfold,
- 3. biepicondylar breadths: humerus and femur,
- 4. circumferential dimensions: flexed arm circumference and tensed calf circumference.

Somatotypes with similar relationships between the dominance of the components are grouped into categories named to reflect these relationships (Carter, 2002). The definitions of somatotype categories as represented in the somatochart are given below:

- 1. **Balanced mesomorph:** mesomorphy is dominant and endomorphy and ectomorphy are equal (or do not differ by more than one-half unit).
- 2. *Ectomorphic mesomorph*: mesomorphy is dominant and ectomorphy is greater than endomorphy.
- 3. *Mesomorph-ectomorph*: mesomorphy and ectomorphy are equal (or do not differ by more than onehalf unit), and endomorphy is smaller.
- 4. *Mesomorphic ectomorph*: ectomorphy is dominant and mesomorphy is greater than endomorphy.
- 5. *Balanced ectomorph*: ectomorphy is dominant and endomorphy and mesomorphy are equal (or do not differ by more than one-half unit).
- 6. *Endomorphic ectomorph*: ectomorphy is dominant and endomorphy is greater than mesomorphy.
- 7. *Endomorph-ectomorph*: endomorphy and ectomorphy are equal (or do not differ by more than onehalf unit), and mesomorphy is lower.
- 8. *Ectomorphic endomorph*: endomorphy is dominant and ectomorphy is greater than mesomorphy.
- 9. **Balanced endomorph:** endomorphy is dominant and mesomorphy and ectomorphy are equal (or do not differ by more than one-half unit).
- 10. *Mesomorphic endomorph*: endomorphy is dominant and mesomorphy is greater than ectomorphy.
- *11. Mesomorph-endomorph*: endomorphy and mesomorphy are equal (or do not differ by more than onehalf unit), and ectomorphy is smaller.
- 12. Endomorphic mesomorph: mesomorphy is dominant and endomorphy is greater than ectomorphy.
- 13. Central: no component differs by more than one unit from the other two.

Collected data were processed using basic statistical characteristics: \mathbf{x} - arithmetic mean, \mathbf{s} - standard deviation, **min** - minimum value and **max** - maximum value. The data required to determine somatotypes of handball players were processed using the program SOMATO. The final somatotypes were projected onto the somatochart using somatopoints.

Results

The teams are presented in the order of their final placement in the championship. Mean body height equaled 173.50 + 6.41 cm. As shown in table 1, above-average values of body height were recorded in 8 national teams. In the first eight, five national teams except Netherlands and France (no data available for Norway) were found to demonstrate aboveaverage body height values. The difference between arm span and body height was highest in FRA players and equaled 5.27 cm. The highest negative ratio of arm span and body height was recorded in SVK players: - 1.33 cm. Compared to POL players with the highest mean value of shoulder width, the lowest mean of shoulder width was observed in their AUT counterparts. Above-average values of arm span were recorded in 8 national teams. Mean value of shoulder width over 39.00 cm was observed in 6 national teams. The highest shoulder width average was found in POL players demonstrating mean shoulder width of more than 40.00 cm. The difference between the "heaviest" national team of POL and the "lightest" national team of AUT equaled 7.50 kg. The lowest mean fat percentage was found in ROU players, who demonstrated mean value lower than 9.00 %. The national teams of POL and SLO, which finished in the 15th and 16th place, were found to have the highest volume of subcutaneous fat. The mean value of palm breadth equaled 7.90 + 0.40 cm. Aboveaverage values of palm breadth were found in 7 national teams. With respect to the humerus breadth, there were minimal differences between the national teams, where the mean values ranged from 6.25 cm to 6.59 cm. Six national teams demonstrated above-average values of femur breadth. The difference between the lowest and the highest mean value of femur breadth equaled 0.8 cm. With regard to circumferential measures, the lowest mean values of biceps and forearm circumference were found in AUT players. ROU players were the only ones with calf circumference exceeding 39 cm. RUS and POL demonstrated mean value of calf circumference over 38 cm. National teams in the first four places (except Norway) demonstrated similar mean values of all investigated parameters. AUT players were found to have the lowest values in 6 out of 11 anthropometric parameters: arm span, shoulder width, body mass, palm breadth, biceps and forearm circumference.

With regard to the ratings of somatotype components, highest mean of endomorphy rating was found in SLO players and the lowest endomorphy rating was observed in SWE players. Mean values of endomorphy lower than 2.00 were recorded in three national teams: SWE, ROU and GER, which is consistent with volume of subcutaneous fat. Mesomorphy rating ranged from 3.78: CRO players to 4.84: ESP players. Five national teams: DEN, FRA, CRO, ESP and SVK demonstrated mean mesomorphy values lower than 4.00. The highest ectomorphy rating was recorded in GER players. Players on the ESP national team were found to have the lowest ectomorphy rating. Ectomorphy value below average was found in eight national teams.

In terms of somatotypes of the U17 female handball players, mean somatotype was classified as balanced mesomorph: 2.36 - 4.17 - 2.22 (somatotype category 1), where endomorphy is dominant and mesomorphy and ectomorphy are equal. Overall, mean somatotypes of all national teams fell into three categories: balanced mesomorph (somatotype category 1): RUS, DEN, HUN, FRA, ROU, CRO, CZE, POR and AUT, ectomorphic mesomorph (somatotype category 2): SWE and GER and endomorphic mesomorph (somatotype category 1): NED, ESP, POL and SVK. An interesting finding was that somatotypes of the players on the national teams that finished from the 1st to 4th place were homogenous as they were all categorized as balanced mesomorphs. Higher degree of somatotype heterogeneity was observed in the teams that finished from the 5th to 8th place and the 9th to 12th place. The somatotypes of these teams were identically classified in 3 categories, which are characterized by high mesomorphy rating. The somatotypes of players on the teams that finished from the 13th to 16th place fell into two categories.

Team	Body height	D-D	A-A	Body mass	Fat	Palm	HB	FB	Biceps	Fore arm	Calf	SOM	IATOT	TYPE
	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
RUS	175.62	176.83	39.06	72.87	12.11	7.91	6.49	10.34	29.97	26.69	38.13	2.23	4.28	2.08
DEN	175.33	175.63	39.16	68.69	9.18	8.04	6.48	9.90	30.38	26.13	36.47	2.04	3.89	2.54
NOR														
HUN	174.24	173.97	39.44	69.43	11.91	8.15	6.44	10.08	30.22	26.31	37.78	2.52	4.29	2.40
FRA	172.82	178.09	38.68	68.85	11.36	7.95	6.51	9.97	29.76	25.74	36.79	2.44	4.15	2.18
SWE	174.66	173.83	38.53	68.08	9.45	7.73	6.43	9.87	30.03	26.20	37.00	1.79	3.93	2.55
ROU	175.06	175.56	39.03	71.03	8.19	7.85	6.59	9.96	29.75	26.34	39.06	1.85	4.36	2.21
NED	170.32	170.41	38.78	66.81	13.11	7.86	6.45	10.08	29.66	25.88	36.25	2.61	4.38	1.91
CRO	174.63	174.21	38.16	68.18	12.55	7.84	6.34	9.95	29.34	25.53	37.63	2.62	3.78	2.46
GER	175.03	175.02	38.56	68.13	9.03	8.07	6.53	9.73	30.44	26.56	37.25	1.86	3.98	2.62
ESP	172.52	173.11	39.00	71.53	13.93	8.11	6.54	10.53	30.53	26.34	37.81	2.89	4.84	1.68
CZE	172.69	172.93	38.84	69.28	10.58	7.78	6.25	9.98	29.44	25.66	36.97	2.30	3.96	2.10
POR	169.56	171.06	37.97	67.41	9.37	7.80	6.32	9.89	29.88	26.66	37.19	2.08	4.50	1.93
AUT	170.07	169.97	37.88	66.06	9.97	7.53	6.31	9.97	28.75	25.44	36.69	2.08	4.19	2.05
POL	177.70	176.48	40.06	73.56	14.34	8.08	6.43	10.46	30.72	26.47	38.06	2.98	4.09	2.33
SVK	171.76	170.43	38.16	67.08	14.84	7.87	6.41	10.06	28.84	25.78	36.53	3.04	3.95	2.26
Χ	173.50	173.89	38.76	69.09	11.31	7.90	6.44	10.05	29.83	26.10	37.33	2.36	4.17	2.22
SD	6.41	7.79	1.70	7.97	4.11	0.40	0.33	0.66	1.88	1.40	2.19	0.38	1.04	0.90

Tab. 1 Anthropometric profiles of national teams participating in W17 ECh

Legend: X - arithmetic mean SD - standard deviation D-D - arm span A-A - shoulder width Palm - palm breadthHB - humerus breadthFB - femur breadthRed field - maximum value

Endo - endomorphy Meso - mesomorphy Ecto - ectomorphy Blue field - minimum value



Fig. 1 Mean somatotypes of national teams participating in the W17 ECh

RUSSIA – the greatest difference in body height, which equaled 11.42 cm, was found between Bs and Ws. The wing players demonstrated the lowest body height average. Positive difference between arm span and body height was recorded in GKs, Bs and PVs. The biggest difference between arm span and body height equaled 4.17 cm: PVs. The highest mean value of shoulder width was observed in PVs, where findings related to shoulder width were similar to findings related to arm span. In both body mass and percent subcutaneous fat, greatest difference was found between Ws and PVs: 19.15 kg and 6.53 %. In transversal dimensions, the highest value of palm breadth was recorded in CBs. An interesting finding was that Bs demonstrated the lowest average value of palm breadth. The breadths of humerus and femur were highest in PVs and lowest in Ws. In circumferential measures, PVs demonstrated the highest average values in all three parameters. In line with the above mentioned findings, the lowest endomorphy rating was found in Ws. PVs demonstrated the highest rating of endomorphy and mesomorphy with the lowest ectomorphy rating. The highest ectomorphy rating was recorded in Bs. Overall, the players were classified in 6 somatotype categories. The largest number of players (6) was categorized as balanced mesomorphs: category 1.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATOT	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	178.13	180.73	39.00	72.67	13.27	7.80	6.50	10.67	29.00	36.67	25.50	2.47	3.87	2.47
W	167.65	167.05	38.25	65.08	9.70	7.83	6.13	9.83	29.13	36.63	26.38	1.98	4.35	1.80
CB	177.30	175.20	39.50	72.13	11.40	8.13	6.50	9.90	29.83	38.17	27.00	2.07	3.83	2.37
В	179.07	181.67	38.67	72.83	10.77	7.77	6.63	10.70	30.17	38.67	26.33	2.10	4.23	2.60
PV	178.60	182.77	40.17	84.23	16.23	8.03	6.80	10.80	32.00	40.00	28.33	2.60	5.07	1.27

Tab. 2 Position-specific anthropometric profiles – Russia



Fig. 2 Somatotypes of Russian handball players

DENMARK – the highest body height average was recorded in GKs and the lowest in Ws. Positive difference between arm span and body height was found in four playing positions GKs, CBs, Bs and PVs. The greatest difference of 3.5 cm was recorded in PVs. The highest mean value in shoulder width was recorded in GKs and the lowest average was found in Ws. The highest body mass average was observed in GKs, who demonstrated the highest average of percent subcutaneous fat as well. Palm breadth exceeding 8 cm was recorded in 4 playing positions: GKs, CBs, Bs and PVs. The mean values in biepicondylar breadths were homogenous. In circumferential measures, GKs demonstrated the highest values in biceps and calf circumference. The highest average value of forearm circumference was recorded in Bs. The highest endomorphy rating was found in GKs and the lowest in PVs. Highest degree of ectomorphy was found in Bs. Danish players were classified in 6 somatotype categories. The most "balanced" somatotype was recorded in PVs, who had the highest mesomorphy rating and the lowest mean subcutaneous fat. Most players (7) were categorized as balanced mesomorphs. With regard to anthropometric parameters, GKs "dominated" in 7 parameters out of 11 measured.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	<mark>IATOT</mark>	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	181.50	184.25	40.50	75.55	10.60	8.25	6.50	10.10	31.50	37.75	25.75	2.20	3.80	2.65
W	171.18	167.38	38.00	64.80	9.93	7.55	6.50	9.80	29.63	35.75	25.75	2.13	4.10	2.40
CB	171.50	174.25	40.00	64.20	8.80	8.10	6.35	9.90	30.75	34.25	26.25	2.00	4.00	2.50
В	178.50	178.83	39.00	70.40	8.82	8.17	6.52	9.80	30.50	36.92	26.58	2.03	3.52	2.85
PV	171.75	175.25	39.75	69.00	7.75	8.40	6.40	10.20	30.00	37.50	25.75	1.80	4.55	1.80

 Tab. 3 Position-specific anthropometric profiles – Denmark



Fig. 3 Somatotypes of Danish handball players

HUNGARY – body height exceeding 180 cm was recorded in GKs and Bs. Ws were found to be less than 170 cm tall. The difference between arm span and body height was positive and minimal in CBs and PVs. The highest shoulder width average was found in Bs, who were the only ones that demonstrated shoulder width average over 41 cm. The lowest body mass average was observed in Ws and the highest in PVs, who also showed the highest percentage of subcutaneous fat. Palm breadth over 8 cm was recorded in 4 playing positions, when the lowest average was recorded in Ws. The position-related differences in the humerus and the femur breadth were minimal. The mean values of circumferential measures were highest in PVs. The highest endomorphy and mesomorphy rating was recorded in PVs, who were found to have endomorphy rating higher than 3. The mesomorphy rating almost exceeded 6 points, which is considered high in female handball players. The highest ectomorphy rating was found in Bs and the lowest in PVs. Overall, Hungarian players were classified in 4 categories with a single back in category 6: endomorphic ectomorph. The largest number of players was categorized in somatotype category 1: balanced mesomorph. The somatopoints located outside the triangle show extreme somatotypes of two Hungarian pivots.

DI	Body			Body						~ .	Fore			
PI.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATO1	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	181.10	180.57	40.00	75.50	10.80	8.40	6.60	10.07	30.33	39.67	26.67	2.17	3.77	2.57
W	167.13	166.13	37.50	59.95	9.80	7.90	6.23	9.88	28.13	36.25	25.63	2.10	4.58	2.48
CB	173.50	174.00	39.25	66.38	11.53	8.05	6.53	9.85	30.50	35.63	26.63	2.48	3.93	2.58
В	183.75	182.00	41.25	72.40	12.05	8.30	6.55	10.15	30.75	36.25	25.50	2.60	2.95	3.50
PV	171.53	172.43	40.50	78.10	16.23	8.27	6.40	10.63	32.17	41.83	27.00	3.43	5.80	1.17

Tab. 4 Position-specific anthropometric profiles – Hungary



Fig. 4 Somatotypes of Hungarian handball players

FRANCE – body height mean of less than 170 cm was recorded in Ws. The mean values of arm span and the difference between arm span and body height was highest in Bs and equaled 9.37 cm. Such positive difference may be attributed to high arm span values of black players on the team. The difference between arm span and body height ranging from 2.75 to 9.37 cm was positive in all playing positions, which is an interesting finding. The highest average of body mass was recorded in PVs and the lowest in CBs. Percent subcutaneous fat exceeded 13 % in Bs and PVs. The lowest amount of subcutaneous fat was found in Ws. Palm breadth was highest in Bs followed by PVs. The difference in palm breadth and femur breadth was highest between Bs and CBs. The position-related differences in humerus breadth were found to be minimal. Bs and PVs demonstrated higher values of circumferential measures compared to other playing positions. The highest endomorphy ratings were found in Bs and PVs. Mesomorphy rating lower than 4 was recorded in CBs and GKs. It should be noted that the highest ectomorphy rating was found in CBs. The French players' somatotypes were classified in 7 categories. The largest number of players was categorized in somatotype category 12: endomorphic mesomorph.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	<mark>IATOT</mark>	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	174.50	178.33	38.33	67.67	9.90	7.80	6.53	10.17	28.50	36.67	25.33	2.03	3.83	2.63
W	166.88	169.88	37.38	61.68	8.70	7.73	6.28	9.80	28.38	36.00	24.25	1.78	4.28	2.15
CB	170.25	173.00	38.25	58.70	10.35	7.65	6.40	9.40	28.00	34.50	24.75	2.10	3.35	3.25
В	174.38	183.75	39.50	73.85	13.80	8.33	6.43	10.30	31.75	37.13	26.75	3.03	4.48	1.73
PV	177.25	183.00	39.63	77.00	13.20	8.08	6.88	9.95	31.00	38.50	27.00	3.00	4.35	1.78

Tab. 5 Position-specific anthropometric profiles – France



Fig. 5 Somatotypes of French handball players

SWEDEN – an interesting finding was that the lowest body height average was found in PVs. The highest arm span average was recorded in GKs. The difference between arm span and body height was positive in CBs only and equaled 1.53 cm. Highest shoulder width average was recorded in PVs and the lowest in GKs. Body mass higher than 70 kg was found in GKs, PVs and Bs. It should be noted that there was a big difference in body mass in back court playersas the difference in body mass between CBs and Bs equaled 8.65 kg. The largest volume of subcutaneous fat was observed in PVs. The position-related difference in palm breadth equaled 0.22 cm. The differences in humerus breadth were minimal. GKs and Bs were found to demonstrate average values surpassing 10 cm. Bs and PVs "dominated" in circumferential measures. The ectomorphy rating was lower than 2 in all playing positions except PVs. The highest mesomorphy rating and the lowest ectomorphy rating was found in PVs, which was an interesting finding. Swedish players were classified in 5 somatotype categories. Most players were categorized as either balanced mesomorphs (5 players) or mesomorph-ectomorphs (5 players). As shown in the somatochart, somatopoints of two players were located in the left section of the triangle.

	Body			Body							Fore			
PI.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATOT	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	178.37	178.30	37.67	70.17	8.33	7.63	6.63	10.17	29.33	37.33	25.83	1.57	3.77	2.87
W	172.88	171.00	38.00	65.00	8.93	7.85	6.38	9.70	29.25	35.63	26.63	1.60	3.68	2.70
CB	173.17	174.70	39.00	63.53	9.17	7.67	6.30	9.37	29.17	36.33	26.00	1.80	3.43	2.97
В	176.55	174.73	39.00	72.18	10.23	7.75	6.43	10.35	31.50	38.25	26.13	1.95	4.43	2.28
PV	167.60	165.60	40.00	71.40	12.70	7.70	6.50	9.20	32.00	38.50	26.50	2.50	5.00	0.90

Tab. 6 Position-specific anthropometric profiles – Sweden



Fig. 6 Somatotypes of Swedish handball players

ROMANIA – the greatest difference in body height was found between GKs and Ws: 12.4 cm. The position-related difference in arm span equaled 12.17 cm. There were minimal differences between arm span and body height, where negative difference between arm span and body height was found in CBs and PVs. Similarly to arm span, the biggest difference in shoulder width was recorded between GKs and Ws. The highest body mass average was observed in PVs. CBs, Ws and GKs weighed less than 70 kg. The amount of subcutaneous fat corresponded with body mass averages in Bs and PVs. Palm breadth average was found to be highest in PVs and lowest in Ws. The position-related difference in humerus breadth equaled 0.44 cm. Mean femur breadth over 10 cm was recorded in Bs and PVs. The circumferential measures were highest in PVs and lowest in GKs. Endomorphy rating higher than 2 was found in PVs and Bs. Mesomorphy rating was relatively high in all playing positions except GKs. The highest ectomorphy rating was recorded in GKs. Romanian players were classified in 6 somatotype categories. Seven players were categorized as balanced mesomorphs. An interesting finding was that only CBs were classified in a single category as balanced mesomorphs, which is indicative of high degree of homogeneity.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	<mark>IATOT</mark>	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	179.83	180.00	38.67	69.93	6.67	7.57	6.37	9.70	27.33	36.50	24.33	1.47	2.50	3.13
W	167.43	167.83	36.83	63.70	8.43	7.33	6.33	9.83	28.00	38.83	25.17	1.83	4.73	1.87
CB	173.53	175.13	39.00	69.57	6.23	8.03	6.77	9.80	30.33	39.17	27.10	1.73	4.70	2.10
В	178.80	179.70	39.75	73.43	9.30	8.05	6.70	10.25	30.50	40.13	27.25	2.05	4.45	2.48
PV	174.47	173.77	40.67	77.73	9.97	8.20	6.77	10.13	32.33	40.33	27.67	2.10	5.37	1.37

Tab. 7 Position-specific anthropometric profiles – Romania



Fig. 7 Somatotypes of Romanian handball players

NETHERLANDS – among the tallest players were GKs, CBs, PVs and Bs. Positive difference between arm span and body height was recorded in all playing positions except Bs and PVs. Mean shoulder width higher than 39 cm was found in Bs, CBs and GKs. The heaviest players on the Dutch team were CBs and PVs. The difference in mean body mass between CBs and Ws equaled 12.03 cm. The highest volume of subcutaneous fat was found in CBs. Palm breadth average equaling or exceeding 8 cm was recorded in Bs and CBs. The biepicondylar breadths were highest in PVs. With regard to circumferential measures biceps circumference lower than 29 cm was found in Ws only. The highest average of calf circumference was recorded in Bs. Forearm circumference equaling or surpassing 26 cm was found in PVs, Bs and GKs. Endomorphy rating higher than 3 was found in CBs and PVs. High mesomorphy ratings were observed in Ws, Bs and PVs. GKs demonstrated the highest ectomorphy rating. Overall, Dutch players were classified in 5 somatotype categories. Seven players were categorized as endomorphy. The next numerous group of players was categorized as balanced mesomorphs.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATOT	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	176.00	177.75	39.25	68.45	12.60	7.90	6.50	10.25	30.00	35.00	26.00	2.55	2.90	2.70
W	162.24	163.40	37.80	59.80	12.04	7.64	6.30	9.84	28.70	35.90	25.20	2.34	4.96	1.46
CB	175.17	175.83	39.83	71.83	15.43	8.00	6.37	9.87	30.17	37.50	25.83	3.30	3.77	2.07
В	172.10	170.88	39.88	69.38	12.23	8.10	6.53	10.28	30.13	38.63	26.38	2.18	4.83	1.85
PV	174.00	171.50	37.00	70.00	14.55	7.70	6.75	10.45	30.00	36.75	26.50	3.20	4.45	2.10

Tab. 8 Position-specific anthropometric profiles – Netherlands



Fig. 8 Somatotypes of Dutch handball players

CROATIA – the highest body height average was found in PVs. The difference in mean body height between PVs and Ws equaled 16.45 cm. The ratio of arm span and body height was positive in playing positions GKs and Bs. Mean shoulder width over 39 cm was recorded in GKs and PVs. The highest body mass average was found in PVs. An interesting finding was that all playing positions demonstrated relatively high degree of subcutaneous fatness. Mean palm breadth over 8 cm was observed in PVs and GKs. Overall, Ws were found to have the lowest average values of palm breadth, humerus breadth and femur breadth, while PVs demonstrated the highest average values. Ps also "dominated" in the circumferential measures. The endomorphy ratings ranged from 2.12 to 2.90, which is consistent with the percent subcutaneous fat. An interesting finding was that the lowest mesomorphy rating was found in Bs. The position-related difference in ectomorphy rating equaled 0.55. Croatian players were classified in 6 somatotype categories. The highest number of players was classified in a different category, which is indicative of position-specific heterogeneity of somatotype distribution.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATOT	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	179.27	179.67	39.83	71.13	13.70	8.27	6.68	10.23	29.67	38.33	24.83	2.77	3.70	2.57
W	166.80	165.38	37.00	60.55	11.58	7.48	6.10	9.35	28.25	36.88	25.50	2.13	4.00	2.28
CB	171.75	170.50	36.50	66.90	12.55	7.75	6.10	10.05	29.75	38.00	25.50	2.90	4.15	2.20
В	175.80	176.10	38.20	69.38	12.88	7.70	6.32	9.72	29.60	36.90	25.50	2.72	3.42	2.52
PV	183.25	182.65	39.50	77.25	11.95	8.40	6.70	11.20	30.00	39.50	26.75	2.85	3.95	2.75

Tab. 9 Position-specific anthropometric profiles – Croatia



Fig. 9 Somatotypes of Croatian handball players

GERMANY – mean body height was highest in Bs. The position-related difference in body height averages of Bs and Ws equaled 13.43 cm. The difference between arm span and body height was most profound in GKs: + 3.33 cm. Positive differences between arm span and body height were found in GKs and Bs. The mean values of shoulder width ranged from 37.50 cm in CBs to 39.88 cm in Bs. The difference in body mass averages between PVs and Ws equaled 20.02 kg. As demonstrated by percent subcutaneous fat, Ws, Bs and CBs had higher volume of lean body mass compared to PVs and GKs. The mean values of palm breadth were found to exceed 8 cm in Bs and PVs. The lowest mean values of biepicondylar breadths and circumferential measures were found in Ws. The lowest endomorphy rating was recorded in Ws. Mesomorphy rating over 4.4 was found in PVs and CBs. The highest ectomorphy rating was observed in Bs. The somatotypes of German players were classified in 5 categories. Seven players forming a homogeneous group were categorized as ectomorphic mesomorphs. An interesting finding was that all goalkeepers were classified in a different category.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	<mark>IATOT</mark>	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	176.00	179.33	38.67	69.90	12.90	7.90	6.63	10.00	30.50	36.17	26.17	2.33	3.87	2.47
W	168.17	167.33	38.00	58.63	5.60	7.97	6.03	9.23	29.00	35.83	24.83	1.50	3.70	2.87
CB	170.25	167.88	37.50	64.28	8.30	7.90	6.55	9.50	30.75	36.38	26.88	1.85	4.43	2.35
В	181.60	182.45	39.88	72.53	7.90	8.35	6.75	9.85	30.38	38.38	27.63	1.65	3.60	3.10
PV	180.25	179.50	38.75	78.65	12.05	8.25	6.65	10.25	32.00	40.50	27.00	2.10	4.45	2.05

Tab. 10 Position-specific anthropometric profiles – Germany



Fig. 10 Somatotypes of German handball players

SPAIN – among the tallest players on the Spanish team were Bs, PVs and GKs. Positive difference between arm span and body height was found in GKs, PVs and Bs. CBs were found to have negative difference between arm span and body height: 4.50 cm as well as the lowest mean value of shoulder width. The tallest players were also the heaviest players on the team. The percentages of subcutaneous fat ranged from 12.63 % in Ws to 15.93 in PVs. Lowest mean values of palm breadth were found in CBs and Ws. The mean values of biepicondylar breadths were highest in PVs, however, the differences were minimal. The highest biceps circumference was recorded in CBs and PVs. The difference in the mean value of calf circumference equaled 3.45 cm. The mean values of forearm circumference were higher in PVs and CBs compared to other playing positions. All playing positions were found to have endomorphy rating around 3, which corresponds with relatively high percent subcutaneous fat. The mesomorphy ratings ranging from 4.60 to 5.60 together with high values of endomorphy are indicative of physical robustness. The highest ectomorphy rating was found in Bs. The players' somatotypes were classified in 3 categories. Ten players were categorized as endomorphic mesomorphs.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATOT	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	173.50	175.83	39.67	72.07	14.63	8.00	6.64	10.53	29.33	38.33	25.33	3.13	4.60	1.70
W	166.25	165.88	37.50	64.90	12.63	7.93	6.40	10.08	30.00	35.75	25.75	2.70	4.90	1.50
CB	163.50	159.00	36.00	62.80	14.90	7.80	6.20	10.40	32.00	36.50	27.00	3.00	5.60	1.30
В	176.56	177.56	39.70	74.16	13.14	8.06	6.60	10.56	30.50	39.20	26.50	2.84	4.60	2.02
PV	176.17	177.33	40.17	78.33	15.93	8.63	6.67	11.10	32.00	38.17	27.67	2.93	5.17	1.43

Tab. 11 Position-specific anthropometric profiles – Spain



Fig. 11 Somatotypes of Spanish handball players

CZECH REPUBLIC – the highest mean value of body height was found in Bs. Except PVs, all playing positions demonstrated positive difference between arm span and body height. Mean shoulder width was highest in GKs and lowest in Ws. Among the heaviest players were GKs and PVs, while Ws were found to be the lightest. The largest volume of subcutaneous fat was recorded in GKs, while lowest percent of subcutaneous fat was observed in Ws. The highest mean values of palm breadth were found in GKs and Ws. PVs "dominated" in the biepicondylar parameters. An interesting finding was that CBs demonstrated the lowest values. PVs were found to have the highest mean values in all three circumferential dimensions. The highest endomorphy rating was recorded in GKs. Mesomorphy rating was highest in PVs. However, the remaining playing positions demonstrated moderate mesomorphy rating. Surprisingly, high ectomorphy rating was found in Ws compared to PVs. The players' somatotypes were classified in 7 somatotype categories, which is indicative of high degree of heterogeneity. The largest number of players (4) was classified in the category endomorphic mesomorph. There were intra-position differences in somatotype categorization at all playing positions as the players were classified in different categories.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	<mark>IATOT</mark>	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	172.90	174.17	40.00	75.87	13.93	7.87	6.23	10.20	29.50	36.50	24.83	2.97	4.00	1.30
W	171.87	172.60	37.83	63.13	7.13	7.87	6.10	10.00	28.50	36.17	25.33	1.67	3.67	3.00
CB	170.00	172.40	38.75	65.45	10.80	7.60	5.80	9.50	29.00	37.25	25.50	2.25	3.55	2.10
В	174.88	175.62	39.17	69.42	10.37	7.77	6.32	9.78	29.50	36.17	25.67	2.28	3.52	2.40
PV	169.75	164.00	37.75	72.05	11.15	7.70	6.75	10.70	31.00	41.00	27.50	2.35	6.10	1.05

Tab. 12 Position-specific anthropometric profiles – Czech Republic



Fig. 12 Somatotypes of Czech handball players

PORTUGAL – mean body height over 170 cm was recorded in PVs, Bs and GKs. The difference between arm span and body height was negative in GKs. The highest mean value of shoulder width was found in PVs. Largest volume of subcutaneous fat was observed in GKs and PVs, while CBs, Ws and Bs demonstrated low percent fat. The only playing position with mean palm breadth over 8 cm were PVs. Biepicondylar breadths were most profound in GKs and PVs. Highest mean values of biceps and calf circumference were observed in GKs. Highest average of forearm circumference was found in PVs. Endomorphy rating was highest in playing positions with the highest percent subcutaneous fat. The highest mesomorphy rating was recorded in GKs, who were also characterized by the lowest ectomorphy rating. Highest ectomorphy rating was found in Bs. Overall, players' somatotypes were classified in 6 categories. Seven players were categorized as endomorphic mesomorphs. Two players were found to have extreme somatotypes outside the triangle. The highest degree of somatotype heterogeneity was observed in Bs, who were categorized in 4 different somatotype categories. On the contrary, all GKs were classified in somatotype category 12, which is endomorphic mesomorph.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	<mark>IATOT</mark>	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	170.47	168.77	37.57	78.27	15.00	7.83	6.53	10.83	31.83	40.50	26.83	3.30	5.97	0.93
W	165.75	166.68	37.88	60.85	6.50	7.65	6.08	9.45	28.63	36.25	26.13	1.60	4.15	2.05
CB	168.87	169.47	37.50	63.07	6.30	7.70	6.33	9.67	29.17	35.67	26.33	1.40	4.20	2.33
В	171.63	175.13	37.88	64.00	8.30	7.80	6.30	9.30	29.38	35.25	26.50	1.78	3.48	2.63
PV	172.70	177.50	39.50	77.60	13.60	8.20	6.50	10.85	31.50	40.25	28.25	2.85	5.50	1.15

Tab. 13 Position-specific anthropometric profiles – Portugal



Fig. 13 Somatotypes of Portuguese handball players

AUSTRIA – among the tallest players on the Austrian team were Bs and GKs, who were taller than 174 cm. The most profound difference between arm span and body height was found in GKs. Negative ratio of arm span to body height was recorded in three playing positions: Ws, Bs and PVs. The highest mean value of shoulder width was found in Bs, who were also the heaviest players on the team. A surprising finding was that GKs demonstrated the lowest volume of subcutaneous fat of all playing positions. The highest percent subcutaneous fat was found in PVs. Mean value of palm breadth was highest in CBs and lowest in Ws. Players in pivot position demonstrated the highest mean values of biepicondylar dimensions. Biceps circumference over 30 cm and calf circumference over 37 cm was observed in PVs and Bs. The highest mean value of forearm circumference was found in CBs. Endomorphy ratings ranged from 1.10 to 2.58. Highest mesomorphy rating was found in PVs. Overall, the players' somatotypes were classified in 5 somatotype categories. The largest number of players was classified in the category 12: endomorphic mesomorph. The highest level of intra-position somatotype heterogeneity was recorded in Ws.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATOT	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	174.07	178.00	37.67	63.03	4.53	7.63	6.33	9.87	26.33	35.83	24.83	1.10	3.10	3.20
W	164.70	162.90	36.60	59.78	10.26	7.22	6.04	9.76	27.70	35.50	24.10	2.08	4.20	2.04
CB	166.50	167.00	38.50	66.20	7.60	8.00	6.50	9.10	29.50	36.00	27.00	1.80	4.30	1.40
В	174.52	174.00	39.10	72.62	12.28	7.70	6.44	10.14	30.40	38.10	26.60	2.58	4.30	1.86
PV	168.15	167.00	38.00	69.85	12.80	7.50	6.50	10.65	30.50	37.75	26.00	2.45	5.45	1.15

Tab. 14 Position-specific anthropometric profiles – Austria



Fig. 14 Somatotypes of Austrian handball players

POLAND – mean body height equaling or exceeding 180 cm was found in PVs and GKs. Positive difference between arm span and body height was found in PVs only. The highest mean value of shoulder width was recorded in PVs. The difference in body mass between Ws and PVs equaled 24.40 kg. Mean value of percent subcutaneous fat was highest in PVs. It should be noted that the fat percentages were relatively high. Mean values of palm breadth lower than 8 cm were found in Ws and CBs. The mean values of biepicondylar breadths were highest in PVs. In circumferential dimensions, PVs were found to have the highest mean values, while Ws demonstrated the lowest means in all three circumferential dimensions. Endomorphy rating over 2.5 was recorded in 4 playing positions. Highest mesomorphy rating was observed in PVs, who also demonstrated lowest degree of ectomorphy. Players' somatotypes were classified in 6 somatotype categories. Six players were categorized as endomorphic mesomorphs. Five Bs were categorized in 4 somatotype categories. As shown in the somatochart, the somatopoint of one of the pivot players is located outside the triangle. An interesting finding was that PVs demonstrated highest values in all parameters except body height.

	Body			Body							Fore			
Pl.	height	D-D	A-A	mass	Fat	Palm	HB	FB	Biceps	Calf	arm	SOM	IATOT	YPE
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	182.23	179.73	40.50	79.87	17.67	8.30	6.40	10.83	31.50	38.83	26.17	3.63	3.87	2.27
W	169.33	169.33	39.17	62.80	11.23	7.80	6.07	10.30	29.17	36.83	25.00	2.47	4.33	2.37
CB	178.40	174.17	39.00	68.47	12.27	7.83	6.07	10.03	29.67	37.83	25.83	2.57	3.23	3.13
В	178.66	177.68	40.40	73.84	13.56	8.12	6.66	10.34	30.70	37.50	27.30	2.82	4.02	2.38
PV	180.00	182.75	41.50	87.20	19.05	8.40	7.00	11.10	33.50	40.50	28.00	3.75	5.55	1.00

Tab. 15 Position-specific anthropometric profiles – Poland



Fig. 15 Somatotypes of Polish handball players

SLOVAKIA – among the tallest players on the Slovakian team were Bs and GKs. There was a negative difference between arm span and body height in all playing positions. Negative difference between arm span and body height equaled - 3.06 cm in GKs. Mean body mass was found to be highest in GKs. Low mean value of body mass was recorded in PVs. Except Ws, all playing positions were characterized by large volume of subcutaneous fat. The mean value of palm breadth over 8 cm was found in GKs only. The highest mean values of transversal and circumferential dimensions were observed in GKs. The endomorphy ratings in GKs, PVs and CBs exceeded the rating of 3.3. Despite high endomorphy rating the mesomorphy rating was found to be low. The highest ectomorphy rating was recorded in Bs and the lowest in GKs. The players' somatotypes were classified in 7 categories. The largest number of players was categorized as mesomorph-endomorph in the somatotype category 11. There was a high degree of intra-position somatotype differences as seen from the somatochart. The players in all playing positions differed substantially in terms of somatotype categorization. Extreme somatotype was found in a GK, the somatotype of whom was located outside the triangle.

Pl.	Body beight	D.D	Δ-Δ	Body	Fat	Palm	HR	FR	Bicens	Calf	Fore arm	SOM	IATOT	VPF
pos.	(cm)	(cm)	(cm)	(kg)	%	(cm)	(cm)	(cm)	(cm)	(cm)	(cm)	Endo	Meso	Ecto
GK	175.53	172.47	38.67	77.03	18.67	8.03	6.63	10.70	30.83	38.67	27.67	3.93	4.63	1.53
W	166.85	165.75	37.75	59.30	9.58	7.80	6.25	9.58	27.63	35.63	24.75	1.85	3.93	2.58
CB	170.88	169.38	38.13	67.73	16.23	7.85	6.38	9.98	29.25	36.63	25.88	3.33	4.00	1.95
В	178.83	178.83	39.33	70.43	14.13	7.97	6.53	10.33	28.50	36.83	26.33	2.87	3.33	2.97
PV	167.10	166.25	36.50	61.35	17.95	7.65	6.25	9.85	28.00	34.50	24.00	3.80	3.80	2.30

 Tab. 16 Position-specific anthropometric profiles – Slovakia



Fig. 16 Somatotypes of Slovakian handball players



Fig. 1 Average Somatotypes of National Teams Participating in W17 ECh

	Body			Body	SOMATOTYPE		YPE	
Ranking	height	D-D	Diff.	mass	Endo	Meso	Ecto	Categorization
1. 📨 RUS	175.6	176.8	+ 1.2	72.9	2.2	4.3	2.1	balanced mesomorph
2. 🌌 DEN	175.3	175.6	+ 0.3	68.7	2.0	3.9	2.5	balanced mesomorph
3. 🎏 NOR	_	_	—	—	—	_	_	—
4. 🌌 HUN	174.2	174.0	- 0.2	69.4	2.5	4.3	2.4	balanced mesomorph
5. 🌌 FRA	172.8	178.1	+ 5.3	68.9	2.4	4.2	2.2	balanced mesomorph
6. 🌌 SWE	174.6	173.8	- 0.8	68.1	1.8	3.9	2.6	ectomorphic mesomorph
7. 🛃 ROU	175.1	175.6	+ 0.5	71.0	1.9	4.4	2.2	balanced mesomorph
8. 🌌 NED	170.3	170.4	+ 0.1	66.8	2.6	4.4	1.9	endomorphic mesomorph
Average 1-8	173.98	174.90	+ 0.92	68.82	2.21	4.18	2.27	
9. 🌌 CRO	174.6	174.2	- 0.4	68.2	2.6	3.8	2.5	balanced mesomorph
10. 🌌 GER	175.0	175.0	0.0	68.1	1.9	4.0	2.6	ectomorphic mesomorph
11. 🌌 ESP	172.5	173.1	+ 0.6	71.5	2.9	4.8	1.7	endomorphic mesomorph
12. 🞽 CZE	172.7	172.9	+ 0.2	69.3	2.3	4.0	2.1	balanced mesomorph
13. 🌌 POR	169.6	171.1	+ 1.5	67.4	2.1	4.5	1.9	balanced mesomorph
14. 🌌 AUT	170.1	170.0	- 0.1	66.1	2.1	4.2	2.1	balanced mesomorph
15. 🚧 POL	177.7	176.5	- 1.2	73.6	3.0	4.1	2.3	endomorphic mesomorph
16. 🐸 SVK	171.8	170.4	- 1.4	67.1	3.0	4.0	2.3	endomorphic mesomorph
Average 9-16	173.00	172.90	- 0.10	68.91	2.48	4.16	2.18	
Total average	173.50	173.89	+ 0.39	69.09	2.36	4.17	2.22	balanced mesomorph

Tab. 4 Teams physical characteristics

Legend: D-D – arm span; Diff. – difference between body height and arm span; Endo – endomorphy; Meso – mesomorphy; Ecto – ectomorphy;

Conclusions

The teams were assessed in terms of differences in anthropometric parameters and somatotypes between individual playing positions.

With respect to examined anthropometric parameters, the difference between arm span and body height was found to be positive and equaled + 0.39 cm. The mean values of body mass ranged from 66.06 kg to 73.56 kg and percent subcutaneous fat from 8.19 % to 14.84 %. Minimal differences between minimum and maximum mean values in transversal measures indicate data homogeneity: palm breadth - 0.62 cm, humerus breadth - 0.34 cm, femur breadth - 0.8 cm. With regard to circumferential measures, greater difference between maximum and minimum value was recorded in calf circumference: 2.81. The differences in biceps and forearm mean values of circumference are indicative of relative homogeneity.

In terms of inter-position differences, it may be concluded that Bs and GKs were among the tallest players with long arms, while Ws were the shortest players with shorter arms (12 teams). PVs were classified among the heaviest players with high amount of subcutaneous fat, whereas Ws demonstrated lowest mean values of body mass and percent subcutaneous fat. There was dominance of PVs in transversal and circumferential dimensions compared to Ws, who were among the players with low mean values of the transversal and circumferential measures.

In endomorphy, Ws on 10 national teams demonstrated the lowest mean endomorphy values, whereas GKs and PVs were found to have high endomorphy values. The highest mesomorphy rating with the lowest ectomorphy rating was found in PVs of 9 national teams. The lowest mesomorphy values were recorded in Bs, CBs and GKs. It should be noted that Bs on 7 national teams had higher ectomorphy rating compared to other playing positions. The mean somatotype of the U17 female handball players was classified as *balanced mesomorph*: 2.36 - 4.17 - 2.22, i.e. somatotype category 1 characterized by dominance of endomorphy and equal mesomorphy and ectomorphy. Overall, the mean somatotypes of 9 national teams: RUS, DEN, HUN, FRA, ROU, CRO, CZE, POR and AUT were categorized as *balanced mesomorphs* (category 1). The mean somatotypes of 4 national teams: NED, ESP, POL and SVK were categorized as *endomorphic mesomorphs* (category 12). The average somatotypes of players on the SWE and GER national teams were categorized as *ectomorphic mesomorphs* (category 2). In general, the players participating in the championship demonstrated well-developed musculature with relatively high stature and adequate ratio of subcutaneous fat to body height.

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