Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2 supplement, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2 supplement, 2013
September 2013, 13 (2), 166-172

ANTHROPOMETRIC MEASUREMENTS, SOMATOTYPES AND PHYSICAL ABILITIES AS A FUNCTION TO PREDICT THE SELECTION OF TALENTS JUNIOR WEIGHTLIFTERS

EBADA KHALED[1]

ABSTRACT

Purpose. The aim of this study is to investigate the contribution ratios of anthropometric measurements and somatotypes and physical abilities as a function to predict the selection of talented junior weightlifters. The study was carried out on a sample of (205) individual schools and youth centers across the governorates of Egypt, and the average age (11.11 ± 1.06 years), height (143.50 ± 11.09 cm) and weight (42.53 ± 10.74 kg).

Methods. Tests were conducted in the period from 1/7/2009 to 31/04/2010-selected individuals underwent the following tests and measurements (textures and test it to make sure they are free from the distortions skeleton, anthropometric measurements, physical tests, body composition, and initial medical examination Internists, heart , bones, medical tests), the researcher used the descriptive survey method.

Results. The results showed that the anthropometric measurements and physical patterns, body composition and physical abilities contribute in the selection of talented junior weightlifters. And weightlifters talented players are characterized by two types of somatotypes, mesomorph, balanced mesomorph, and mesomorph endomorph.

Conclusions. These results must be taken into account by the Weightlifting Federation and trainers to be used as a signal for the selection of talented junior weightlifters.

Key Words: weightlifters, anthropometric, somatotypes, physical abilities, talents, junior.

Introduction

Weightlifting is one of the most influential sports activities in the world of sport. Consists of lifting snatch and clean & jerk, these activities generate some of the greatest levels of power weightlifting measured in the sport (Garhammer, 1993). A distinctive combination of muscle strength, Explosive power, endurance and weightlifting technique needed for successful performance in the profile of somatotype (Kraemer, Koziris, 1994, Andrew, et al., 2006).

The selection of talented represents in sports in general and weightlifting, private human wealth discovered, developed, nurtured and preserved, the discovery of talented has been subjected to several techniques either by accident or observation, personal experience, or other methods that may lack setting scientific

The right Select for talented junior weightlifting are initial steps heroic superiority. Therefore the concentration of attention on the determinants, capabilities and preparations eligible for the sport of weightlifting, which achieves the economies principle of effort in sports training. Since the high sporting levels achieved by players with physical qualities and abilities appropriate to the type of sports activity patterns, free physical deformities skeleton as one of the basic requirements for sports superiority and creativity. Mesomorphs may be more appropriated in sports that require strength and endurance for each individual sport requirements anthropometric and physical skill.

Talent identification usually monitor several parameters, once of which is anthropometry. There are a variety of anthropometric techniques that are used in talent identification. With respect to youth sport performance, the use of techniques to assist with talent identification and performance within the junior from 10–12 years for boy's phase of growth as competitive sport is not a regular occurrence in children. Using evidence from a variety of study, information has been provided about how sports have used anthropometry and somatotype and physical abilities for talent identification. The weight classified sport weightlifting by a combination of body composition and body size traits which are believed to influence the chance of success in weightlifters sport. Therefore it is suggested that the measurement of anthropometry and somatotype is a crucial tool in the search for information to assist coaches and athletes in the quest for success at the highest level in weightlifting (Sánchez-Muñoz, et al., 2012)

Contrary to common perception, success in weightlifting is not determined by strength alone. A number of additional factors significantly affect the ability of an individual to become a champion weightlifter. A unique profile that combines muscular strength, muscular power, flexibility and lifting

[1] Assistance Prof. Dr., Department of theory and applications Compats and individual sports, Faculty of Physical Education in Port Said University, EGYPT
E-mail: Kebada@phyd.psu.edu.eg

technique is necessary for successful performances (Kraemer, Koziris, 1994), which must be accompanied by somatotype, physical patterns, body composition and physical abilities to maximize athletic potential. The basic importance of muscular strength, however, cannot be overstated. Among men of international caliber, weight lifted in the Snatch often exceeds twice body mass and, for a very few exceptional athletes, has equaled or exceeded triple body mass in the clean and jerk (Musser, 2010).

It was important to characterization somatotypes players different ways so that including the method Carter - Hath as this characterization contributes to the development signs correlation between the type of somatotype and configurations contribute to this characterization and development of motor skills and skill for juniors in ages (10-12) years in order to installed and development vital to the efficiency of a comprehensive fitness elements of public. Private activity practitioner skill and proficiency, technical and tactical associated with the somatotype of players, which could have an impacted in making the heroic level and influence in reducing the rate of infection associated with sports activity (Fiesel 2000, Gaines, 2001, Shaban, et al., 2006).

The selection process is built on the basis of predictive guided physical standards whether anthropometric or body composition function somatotypes along with some physical abilities and motor signs Level and skill of the players with a heroic level global, international and Olympic. Allowing interaction of these factors in the predictive equations can guide in the selection talent junior weightlifter, which could achieve the economies principle of human effort in the field of sports training (Suchomel, 2001).

While there are some countries which do not bother selection process for children and youth Weightlifter such as Egypt, but children come to the club to practice weightlifting by their desires, and on the contrary, there is a selection of the types of other sports such as swimming, wrestling (Shaban, et al., 2006, Lewandowska, et al., 2011, Ebada, 2012).

In recent years, offering the level of performance of the Weightlifter until they reached the athletic levels was improved Make gold medals and win championships world have achieved Egypt gold medal at the Olympics last Beijing 2008, London 2012 and today it has become hard to beat competition only through selection and good planning for talented junior weightlifters. This planning and the rapid development of sport today is due to the experts in the sport of weightlifting to solve new problems in the training and selection process good weightlifters, you must specify the somatic patterns and anthropometric measurements, body composition and physical abilities to talented junior weightlifter (Yordan, 1975, Ebada, 2012).

They noted the research through its expertise in the field of Weightlifting and brief him on the studies and scientific research and specialized reference that there is a dearth of scientific studies in the field of selection talented junior weightlifters, promoting the researcher to conduct this study to determine ratios contribution anthropometric measurements, somatotypes and physical abilities as a function to predict the selection of talents junior weightlifters (Musser, 2010).

Method

The study was carried out on a sample of (205) individual schools and youth centers across the governorates of Egypt, and the average age (11.11 ± 1.06 years), height (143.50 ± 11.09 cm) and weight (42.53 ± 10.74 kg).

Tests were conducted in the period from 1/7/2009 to 31/04/2010-selected individuals underwent the following tests and measurements (textures and test it to make sure they are free from the distortions skeleton, anthropometric measurements, physical tests, body composition, and initial medical examination Internists, heart , bones, medical tests), the researcher used the descriptive survey method.

The age of each subject was calculated from the date of birth as recorded in his institute. The height of the subjects was measured with anthropometric rod to the nearest 0.5 cm (Gaurav, et al., 2010).

Tools and devices used are as follows: a Body Composition Analyzer available by a factor of college to analyze body composition (Weight .BMI, FAT%, Fat mass, FFM, TBW,), Skinfold caliper measurement (Triceps, Subscapular, Supraspinale) and tape flexible to measure girths (Arm, Calf), a Skeletal Anthropometric to measure lengths for (Upper trunk, Arm's, Leg, Foot , Desist) and Femur breadth (Ebada, 2003) , tests and physical measurements speed (60 m Sprints test), Ability (standing long jump test), strength (Throwing Medicine Balls test),and endurance (800 m running test) (Shaban, et al., 2006) , Laptop, how to determine Somatotype (Stepnicka, 1986), method of determining individual games (Ross, et. al., 1989). Way to determine Somatotype to (Carter, Heath, 1990) mathematical equations, is determined Somatotypes were calculated by the following formulae: endomorph = - 0.7182 + 0.1451 (X) - 0.00068 (X2) + 0.0000014 (X3). where X = (sum of triceps, subscapular and supraspinale skinfolds) multiplied by (170.18/height in cm). This is called height-corrected endomorph and is the preferred method for calculating endomorph. The equation to calculate mesomorph is: mesomorph = 0.858 x humerus breadth + 0.601 x femur breadth + 0.188 x corrected arm girth + 0.161 x corrected calf girth – height 0.131 + 4.5. Three different equations are used to calculate ectomorph according to the height-weight ratio: If HWR is greater than or equal to 40.75 then. ectomorph = 0.732 HWR - 28.58 If HWR

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2 supplement, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

is less than 40.75 but greater than 38.25 then. ectomorph = 0.463 HWR - 17.63. If HWR is equal to or less than 38.25 then. ectomorph = 0.1 (Carter, Heath, 1990)

Statistical analysis: SPSS was used to apply formulas statistical by calculating: average, standard deviation, correlation, stepwise regression.

Results

Table 1. Shows the arithmetic mean and standard deviation of some Anthropometric characteristics, body composition and physical abilities and different types of talented junior weightlifters, where the average lengths between (16.55 ± 1.71 cm - 71.86 ± 5.56 cm). As average breadths between (6.88 ± 0.84 cm - 10.10 ± 1.06 cm). As the average girths between (21.84 ± 3.61 mm - 28.64 ± 2.89 mm). Also shows the average body composition, where averages ranged from (9.64 ± 5.74 kg - 20.66 ± 3.44 kg/m^2) fat mass and BMI. While the average physical abilities between (4.18 ± 14.63 min - 622.07 ± 154.66 cm). The average Somatotypes of talented junior weightlifters (550.17 ± 200.46) for members of the research sample.

Table 1. Descriptive Statistics for Anthropometric measurements, Body Composition, Physical abilities and Somatotypes of talents junior weightlifters

N=205

Variable		Mean	Std. Deviation	Minimum	Maximum
Anthropometric measurements	Age (years)	11.11	± 1.07	8.00	12.00
	Weight (kg.)	42.53	± 10.75	22.50	79.60
	Height (cm)	143.50	± 11.09	120.00	175.00
	Upper trunk length (cm)	71.86	± 5.56	55.00	86.00
	Arm's length (cm)	63.15	± 6.86	51.00	85.00
	Leg length (cm)	84.87	± 7.89	68.00	101.00
	Foot length (cm)	23.48	± 2.01	18.00	28.00
	Desist length (cm)	16.55	± 1.71	12.50	20.00
	Humerus breadth (cm)	6.88	± 0.84	5.00	9.00
	Femur breadth (cm)	10.14	± 1.06	5.00	12.00
	Arm girth (mm)	21.84	± 3.61	5.00	29.00
	Calf girth (mm)	28.94	± 2.89	19.00	36.00
	Triceps skinfold (mm)	9.89	± 3.93	3.00	25.00
	Subscapular skinfold (mm)	8.57	± 3.91	3.00	25.00
	Supraspinale skinfold (mm)	10.54	± 5.12	2.00	30.00
Body Composition	BMI (kg/m^2)	20.66	± 3.44	14.90	36.30
	FAT %	19.79	± 8.89	1.40	52.80
	Fat mass (kg.)	9.64	± 5.74	.30	28.00
	FFM (kg.)	33.94	± 6.91	20.00	47.30
	TBW (kg.)	25.36	± 5.58	14.00	43.60
Physical abilities	Speed (sec.)	9.96	± 1.02	8.02	14.00
	Endurance (min)	4.18	± 14.63	1.36	151.00
	Ability (cm.)	159.25	± 30.98	1.75	211.00
	Strength (cm)	622.07	± 154.66	250.00	1006.00
Somatotypes	Ectomorph	2.46	± 1.41	1	7
	Mesomorph (cm)	6.77	± 1.02	4	9
	Endomorph (mm)	4.81	± 1.96	1	9
	Somatotype	550.17	± 200.46	153	981

Table 2. Indicates to a number (190) correlation coefficient number (150) positive correlation coefficient increased by 78.94%, and the number (50) negative correlation coefficient increased by 21.06%. There are (140) transactions positive statistically significant at the level of significance (0.01) by 73.68%. There are (10) transactions positive statistically significant at the significance level (0.05) by 5.26%. There are a number (20) a positive correlation coefficient is statistically significant rate of 10.52%. And that there are positive relationships between anthropometric measurements, body composition, physical abilities and Somatotypes (Mesomorph - Endomorph), and Somatotype of talented junior weightlifters.

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2 supplement, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Table 2. Correlation between Anthropometric measurements, Body Composition, Physical abilities, and Somatotypes for the selection of talents junior weightlifters

(N=205)

Variable	Age (yare)	Weight (kg.)	Height (cm)	Upper trunk length (cm)	Arm's length(cm)	Leg length (cm)	Foot length (cm)	Desist length(cm)	BMI (kg/m2)	FAT %	Fat mass (kg.)	FFM (kg.)	TBW (kg.)	Speed (s.)	Endurance (min)	Ability (cm.)	Strength (cm)	Mesomorphy (cm)	Endomorphy (mm)	Somatotype
Age (yare)																				
Weight (kg.)	.571**																			
Height (cm)	.630**	.902**																		
Upper trunk length (cm)	.536**	.738**	.781**																	
Arm's length(cm)	.484**	.646**	.691**	.591**																
Leg length (cm)	.582**	.750**	.791**	.658**	.505**															
Foot length (cm)	.564**	.675**	.720**	.640**	.557**	.685**														
Desist length(cm)	.752**	.564**	.597**	.484**	.533**	.517**	.644**													
BMI (kg/m^2)	.265**	.680**	.482**	.504**	.350**	.564**	.541**	.354**												
FAT %	.092	.252**	.141*	.142*	.109	.261**	.255**	.130	.575**											
Fat mass (kg.)	.330**	.674**	.532**	.507**	.405**	.548**	.473**	.383**	.769**	.757**										
FFM (kg.)	.484**	.551**	.606**	.516**	.552**	.487**	.488**	.475**	.169*	-.068	.221**									
TBW (kg.)	.513**	.720**	.741**	.629**	.642**	.595**	.550**	.530**	.299**	-.172*	.339**	.854**								
Speed (sec.)	-.549**	-.398**	-.401**	-.341**	-.250**	-.432**	-.517**	-.386**	-.302**	-.264**	-.282**	-.308**	-.306**							
Endurance (min)	.082	-.047	-.051	-.035	-.117	-.016	-.071	-.030	-.136	.048	-.020	-.075	-.078	-.139*						
Ability (cm.)	.328**	.192**	.272**	.202**	.201**	.221**	.299**	.257**	.004	.101	.053	.353**	.313**	-.463**	.014					
Strength (cm)	.575**	.347**	.342**	.218**	.199**	.327**	.380**	.490**	.086	.083	.185**	.210**	.266**	-.474**	.139*	.336**				
Mesomorph (cm)	-.143*	.092	-.014	-.005	-.023	.000	.049	-.056	.226**	.112	.097	.007	-.034	.057	-.073	-.217**	-.135			
Endomorph (mm)	.158*	.490**	.315**	.331**	.203**	.332**	.186**	.169*	.509**	.249**	.499**	.185**	.279**	-.057	-.038	-.186**	.131	.391**		
Somatotype	.154*	.491**	.315**	.332**	.207**	.331**	.189**	.174*	.516**	.252**	.497**	.191**	.280**	-.053	-.041	-.192**	.112	.444**	.993**	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2 Supplement, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Table 3
Thecontribution percentage for Anthropometric measurements, Body Composition, Physical abilities, and Somatotypes as a function to predict the selection of talents junior weightlifters

n=205

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Contribution Rate %	Sum Contribution Rate %
		B	Std. Error	Beta				
Somatotype (Constant)		-69.704	66.251		-1.052	.294		
Anthropometric measurements	Age (yare)	2.523	3.367	.012	.749	.455	42.44	
	Weight (kg.)	.153	.556	.008	.275	.784		
	Height (cm)	-.103	.517	-.006	-.199	.842		
	Upper trunk length (cm)	.378	.520	.011	.727	.468		
	Arm's length(cm)	-.003	.365	.000	-.008	.994		
	Leg length (cm)	.011	.399	.000	.027	.979		
	Foot length (cm)	-1.634	1.503	-.016	-1.087	.278		
	Desist length(cm)	1.820	1.820	.015	1.000	.319		
Body Composition	BMI (kg/m2)	.362	1.061	.006	.342	.733	5.60	98.91
	FAT %	.547	.604	.025	.906	.367		
	Fat mass (kg.)	-.821	.988	-.024	-.831	.407		
	FFM (kg.)	-.238	.599	-.008	-.396	.692		
	TBW (kg.)	.954	1.151	.027	.829	.408		
Physical abilities	Speed (sec.)	.810	2.388	.004	.339	.735	7.03	
	Endurance (min)	.045	.117	.003	.384	.702		
	Ability (cm.)	-.025	.071	-.004	-.353	.724		
	Strength (cm)	-.025	.017	-.017	-1.507	.134		
Somatotypes	Mesomorph (cm)	97.934	1.304	.958	75.098	.000	43.50	
	Endomorph (mm)	13.916	1.955	.068	7.119	.000	0.34	

Table (3) Shows that the height is the first contribution Somatotypes (Mesomorph, Endomorph) with the contribution percentage 43.84% and Mesomorph with the contribution percentage 43.50%, the second contribution is the Anthropometric measurements with contribution percentage was 42.44%, while the Physical abilities was the third contributor with contribution percentage 7.03%, while the Body Composition was the fourth contributor with contribution percentage 7.03%. for that the predictive formula to predict the selection of talented junior weightlifters by indicating somatotypes, anthropometric measurements and physical abilities and Body Composition = -69.704 + Mesomorph (97.934) + Endomorph (13.916) + Age (2.523) + Weight (.153) + Height (-.103) + Upper trunk length (.378) + Arm's length (-.003) + Leg length (.011) +Foot length (-1.634) + Desist length (1.820) + Speed (.810) + Endurance (.045) + Ability (-.025) + Strength (-.025) + BMI (.362) + FAT % (.547) + Fat mass (-.821) + FFM (-.238) +TBW (.954).

Discussion

This study reached to characteristics Anthropometric of lengths, breadths, girths, skinfold and body composition of the stage year from 11-12 years for use when selecting talented weightlifting beginners and average body mass of the sample search is 20.66 kg / m 2, a guide suits cm on weight for individuals and comparing rate body mass at this stage year ranging between 16.5 - 22 kg/m^2 and indicates that there is an inconsistency between the height and weight of the search-selected sample. This is consistent with what (Kromeyer, et al., 2001).

The results also showed that the physical ability of the age group of 10 - 12 years the average speed (9.96 ± 1.02 sec.), average endurance (4.18 ± 14.63 min), average ability(159.25± 30.98 cm) and average strength (622.07± 154.66 cm), as well as the average. This indicates the presence of physical abilities at this stage Sunni and you need to develop speed and ability, strength and endurance through the development of training programs for individuals-selected and prepare them physically and skill to reach levels high and sports achieve Olympic medals. (Carter, Heath, 1990), the high sporting levels achieved by players with physical qualities and capabilities suitable for the type of physical activity is the most important somatotypes.

The results of the study indicate a positive relationship between the muscular style, style, fat and physical patterns of talented junior weightlifting. This means that the more mesomorph - endomorph greater predict somatotypes to select talented junior weightlifting (Ebada, 2006, Abbas, Mohsen, 2006) that the greater the size and weight of the body, the more the level of performance of the weightlifting players.

In this study talented junior weightlifters had a similar mean somatotype profile; Ectomorph- Mesomorph-Endomorph (2.46–6.77–4.81) as elite weightlifters

(1.38–5.47–3.23) in (Imran, et al., 2011) but they had a higher level of mesomorph.

The study found that there are four factors that influence the selection of talented weightlifting beginners and are somatotype (Mesomorph - Endomorph) contribute by (43.84%), Characteristics Anthropometric age, height, weight, height, of the trunk - arm's length - leg length - foot length, Desist length, and Upper trunk length) and contribute by (42.44%) and body components contribute by (5.60%) special and physical abilities explosive power, strength and endurance and contribute by (7.03%) (F. Andrew, at el, 2006**)**. And predict selection of talented junior weightlifters through the following formula = -69.704 + Mesomorph (97.934) + Endomorph (13.916) + Age (2.523) + Weight (.153) + Height (-.103) + Upper trunk length (.378) + Arm's length (-.003) + Leg length (.011) +Foot length (-1.634) + Desist length (1.820) + Speed (.810) + Endurance (.045) + Ability (-.025) + Strength (-.025) + BMI (.362) + FAT % (.547) + Fat mass (-.821) + FFM (-.238) +TBW (.954). The results of this study agree with what was said (Ross at el. 1989, J. Carter, H. Heath, 1990, and reached the results of some study both (Fiesel 2000, Gaines, 2001, Suchomel, 2001, Stewart, et al., 2003). Where it has proven that it can predict the type of sports activity and athletic levels high through somatotypes free of distortions skeleton and interest elements promising and prepared physically and skill development training programs appropriate stages year's and reach to athletic levels high for gold medals at the Olympics.

It should be noted, however, that none of the anthropometric measures were significant discriminators in the present study. Success in many different sporting activities would most likely be dependent on part on muscular strength and power and on Somatotype and composition. As a consequence, those responsible for talent identification for other sports might also be interested in these characteristics. However, the inclusion of measures specific to weightlifting in the regression equation, such as anthropometric weight , height, BMI, somatotypes, performance for snatch and clean & jerk makes the resulting test battery unique to this sport. (Andrew, et al., 2006, Ebada 2006**)**.

Conclusion

Anthropometric measurements and somatotypes, physical abilities, and body composition influential factors to predict the selection of talented junior weightlifters and predictable significance from the following formula= -69.704 + Mesomorph (97.934) + Endomorph (13.916) + Age (2.523) + Weight (.153) + Height (-.103) + Upper trunk length (.378) + Arm's length (-.003) + Leg length (.011) +Foot length (-1.634) + Desist length (1.820) + Speed (.810) + Endurance (.045) + Ability (-.025) + Strength (-.025) + BMI (.362) + FAT % (.547) + Fat mass (-.821) + FFM (-.238) +TBW (.954).

These results must be taken into account by the Weightlifting Federation and trainers to be used as a signal for the selection of talented junior weightlifters.

References

Abbas, B., Mohsen, S., 2006, A Comparative and Correlational Study of the Body-Image in Active and Inactive Adults and with Body Composition and Somatotype, J of Applied Science, 11(6); 2456-2460.

Andrew, F. Et Al., 2006**,** Anthropometric and performance variables discriminating elite American junior men weightlifters, Journal of Strength and Conditioning Research,;20(4): 861–866.

Carter J., 2002**,** The heath-carter anthropometric somatotype - instruction manual, San Diego State University, U.S.A.

Carter, J., Heath, H., 1990**,** Somatotyping- development and application, Cambridge University Press.

Ebada K.H., 2006**,** Growth rates as a function of predict the results of the Olympic players in the sport of weightlifting, First Scientific Conference "college sports in the Arab countries in the period from 6-7 February 2006. Faculty of Physical Education, Mansoura University, Egypt.

Ebada, K.H., 2012**,** Weightlifting for beginners. Elmotaheda , printing, port said, Egyp,:29-36.

Ebada, K.H., 2003**,** Die Probleme des Trainings von Gewichthebern kindes- und Jugendalter, Dissertation, Germany.

Fiesel, R., 2000**,** Somatotypische und Sportmotorische Entwicklungsverläufe von Jungen im Alter von 6 - 16 Jahren unter Einfluss eines dreijährigen Schwimm- und Wasserballtrainings, Dissertation, Germany.

Gaines, R., 2001**,** Comparison of Anthropometric Measures of Competitive Bodybuilders to Judges' Scores and a Comparison of Judges, Dissertation Doctor, the Faculty of the Virginia Polytechnic Institute and State University in partial fulfillment.

Garhammer, J., 1993**,** A review of power output studies of Olympic and powerlifting: Methodology, performance prediction, and evaluation tests, J. Strength Cond. Res.(7):76–89.

Gaurav, V., Singh, M., Singh, S., 2010**,** Anthropometric characteristics, somatotyping and body composition of volleyball and basketball players, J of Physical Education and Sports Management;1(3): 28-32.

Imran, M. Et Al., 2011, A Comparative Study of Body Builders and Weight Lifters on Somatotypes, J of Education and Practice; 2(3):155- 160

Kraemer, J., Koziris, L., 1994**,** Olympic weightlifting and power lifting, In: Perspectives in Exercise Science and Sports Medicine, Physiology and Nutrition for Competitive Sport. D.R. Lamb, H.G. Knuttgen, and R. Murray, eds. Carmel, IN: Cooper,: (7):1–54.

Kromeyer, K., Wabitsch, M. , Kunze, D., U. A. 2001, Perzentile für den Bodymaß-Index für das Kindes- und Jugendalter unter Heranziehung verschiedener deutscher Stichproben, Monatsschrift Kinderheilkunde, 149(8),Germany.

Lewandowska, J. Et Al., 2011**,** Somatotype Variables Related to Muscle Torque and Power in Judoists, J of Human Kinetics ;(30); 21- 28

Musser, J., 2010**,** The effect of anthropometry on barbell trajectory for elite female weightlifters at the 2009 pan American championships, a thesis, Master of Science in Kinesiology ,California State University, Long Beach, U.S.A, 3.

Ross, W., De Rose, E., Ward, R., 1989**,** Anthropometrie in der Sportmedizin, In: DIRIX, A. KNUTTEGEN, H. TITTEL, K.,: Olympia Buch der Sportmedizin, Köln, Germany.

Sánchez-Muñoz, C., Zabala, M., Williams, K., 2012, Anthropometric Variables and Its Usage to Characterise Elite Youth Athletes, Handbook of Anthropometry, Physical Measures of Human Form in Health and Disease Preedy, Victor R. (Ed.), Springer New York,: 1865-1888 .

Shaban, A., Sead, A., Ebada, K.H., 2006**,** Somatotype and physical abilities as a function of selection in the Olympic champion industry (Within the Egyptian national project), J Physical Education Research and Sports Physical Education, Alexandria, Egypt. (69);14-40.

Stepnicka, J., 1986**,** Somatotype in relation to physical performance, sports and body posture, In: REILLY, T.; WATKINS, J.; BORMS, J. Hrsg.: Kinanthropometry III. London.

Stewart, A. Et Al., 2003, Body image perception, satisfaction and somatotype in male and female athletes and non-athletes: results using a novel morphing technique, J of Sports Sciences; 21(10), England.

Suchomel, A., 2001**,** Relations Between Somatic Characteristics and Motor Efficiency (Low and High) In School-Aged Individuals, Technical University, Faculty of Education, Liberec, Gymnasia ; 31 (2), Czech Republic

Yordan, I., 1975**,** Zur Auswahl Jugendlicher Gewichtheber in Bulgarien, leistungssport, Germany, (5);392-396.