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Characteristics of Body Length Proportion of Gymnast Champions in Olympic Games

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Abstract

Body length of gymnasts is important in the selection of movement and satisfaction in artistic gymnastics. The data show that the average champion gymnast has a moderate height and tends toward the short. This study was carried out to determine and identify the ideal body length proportion variable in the artistic world gymnast. This descriptive study of image analysis focuses on the coarse size of the body length proportion of the world gymnasts, including height, shelf, tread length, thigh length, calf length, upper arm length, and bottom to know and identify ideal proportion, data collection done with the technique of browsing and found as many as 75 world champions all around Olympiad. Image analysis postures of Olympic artistic gymnasts were defined using UNG software "Ukuran Nyata Gambar". This study answers the question of the ideal length for the champions of gymnasts which are; 1) Profile Olympians Champion / all-around Olympiad men and women vary but fall into the category of small and low body mass, with the body type of dominance ectomesomorphy. This is a physiological adaptation to master movement on all apparatus, 2. Standard height and ideal body length proportion of MOG (Men Olympic Gymnastic) champion range of height between 162 to 169 cm with a ratio of 41.3% -43.7% upper body length, 55 - 56.2% lower body length, while WOG (Women Olympic Gymnastic) champion is high between 151 to 161 cm with a length ratio between upper body of 40-45% and 55 - 56.2% lower body length.

Keywords: Artistic Gymnastics, body length proportion, gymnast champion all around

Introduction

Theoretically, the most successful athletes are those who have a specific physical criterion structure appropriate to perform their performances and athletes of the Olympic or world championship represent the optimal combination of influences genetics and the environment to produce the maximum work (Bacciotti, 2017). Scientists studied the body size of both length, body mass and body fat% are very influential on the appearance of motion (Laing, 2002, Hausenblas, 2001; Okada 2011). Characteristics of motion dominant appearance in each sport are different, for example for bicycle racing, very dominant run of lower muscles supporting its performance, golf, weight lifting required upper body contraction. Some sports require balance and coordination of motion in the appearance of gymnastics, diving, dancing and so forth. The importance of motion appearance during diverse sports demands a balance of ideal posture characteristics as an athlete's physiological adaptation. Basketball athletes, volleyball require high posture for the effectiveness of their best performers, while the maketlethoki, futsal require moderate posture to support agility and mobility of motion. An ideal posture will support performance maximum performance, which relates the balance of dynamic motion, power and explosive power (Boraczyński, 2017; Horak, 2006; Bacciotti, 2017). Artistic gymnastics is a sport that requires the coordination of motion, the power of the explosive power of agility and precision in motion. This, of course, requires certain physical characteristics in the selection of athletes.

Numerous studies investigate the take-off requirements for performing acrobatic skills such as twice overturning, with or without laps, take off speed, linear momentum and angular moment. The biomechanist's view is that body position and body segment contribution to kinematic characteristics can determine the main factors affecting performance. Building and controlling body configuration changes is a comparison between techniques actually used by gymnasts and computer simulations. This analysis shows the body's orientation improves performance, and what segment movements might be adjusted and controlled during rotation hovering (Yeadon and King, 2007). The data show that the gymnast is shorter in body size than the average size should be at the chronological age. However, although the gymnast is slower the development of maturity the effect of gymnastics exercises aimed at the increase of linear growth (Malina, 2013; Baxter, 2002; Caine, 2001; Georgopoulos, 2004)

Currently, there is no precise and definitive definition of what is an elite athlete available. This is due to the diversity of sports requirements (Coutinho, 2016),

This study was carried out to find answers to the following questions;

1. How are the body length proportion of Champion Champion's all-rounder / all around the Olympiade of men and women?

2. What are the standard average body height and ideal proportion of the gymnast's body length all around the Olympiads of MOG and WOG ?

In this paper, the authors aimed to provide a systematic review that concentrates on the features of somatotypes, body length proportion, and the effect of body proportion on the performance of the athletes. In particular, this paper contributes to the literature by critically examining the available reports that characterize the physical body of elite gymnasts, identify possible gaps and provide suggestions for further research.

Method

This study is a descriptive cross-sectional study in which data are sourced from an online search of the gymnast's profile of All Around Olympiad champions from 1952 to 2016. Online searches using the Scopus database, Web of Knowledge, Pubmed, Ebsco Sportdiscus and Wikipedia were conducted between November 2017 and January 2018. Data were used to find studies: artistic gymnastics, anthropometric gymnast characteristics and body proportion, and competitive performance, and a combination of both. No specially specified dates are considered in our search. The inclusion criteria are as follows: (1) international academic texts investigating artistic exercises written in English, Portuguese and / or Spanish, excluding literature review, intervention / training, and longitudinal studies on growth and maturation, gymnastics training loads, and nutritional disorders; (2) has purposive samples consisting of 30 sons champion All around Olympiad and 35 champions All around daughter (3) have anthropometry and body proportion data. In addition, the following filtering steps have been performed: (1) the title of the article and the abstract read to verify inclusion criteria are met; (2) if so, and then the whole paper is read in its entirety to retrieve information about the country, author, and publication year, sample size, measurement instrument, and main descriptive results. Processing flowchart and item selection (Moher, 2009).

Analysis of World Gymnastics Image using UNG Software "Ukuran Nyata Gambar" which can predict the size of the image scale by body size.

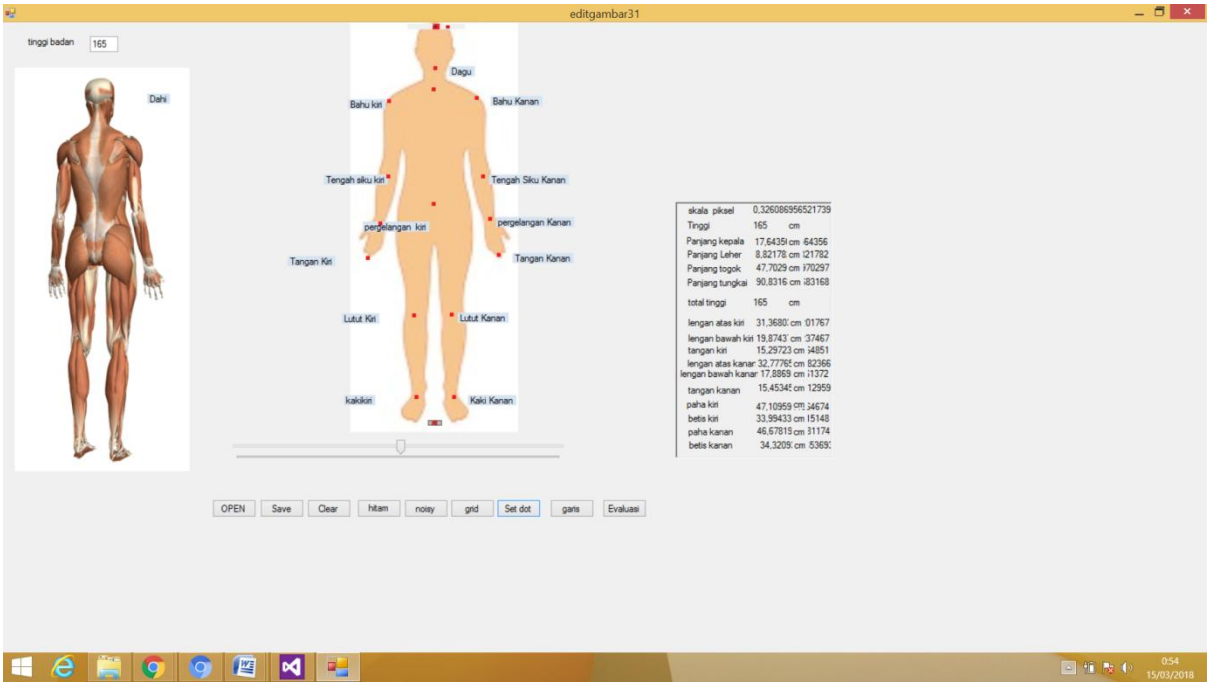

Figure 1. UNG Software "Ukuran Nyata Gambar", Analysis of Long Body Members' length image

Results

In this paper, two steps are presented. First, we discussed the available data analysis based on. Second, the main data reviewed, namely body size and other body dimensions, the proportion of length.

Available data on Olympiad Athlete gymnasts are shown in table 1 below.

Table 1. Body Artistic Size Calculations WOG (Woman Olympic Gymnastic) Champion All-Around Olympiade (in Cm)

Statistics

		kepala	leher	togok	tungkai	lenanakiri	lengnbkiri	tangankiri	pahakanan	betiskanan	tinggi
N	Valid	34	34	34	34	34	34	34	34	34	34
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		20.7647	9.0000	36.5000	89.4706	24.5882	19.8918	13.8618	46.4694	34.4147	1.5665E2
Std. Error of Mean		.39394	.46824	.56683	.98132	.71540	.71177	.48437	.93731	.85398	1.12489
Median		2.075E1[a]	9.4545[a]	3.640E1[a]	8.971E1[a]	25.3636[a]	19.8571[a]	14.2727[a]	46.0000[a]	34.3750[a]	1.584E2[a]
Mode		19.00	10.00[b]	35.00[b]	90.00	26.00	19.00[b]	15.00	48.00	33.00[b]	160.00
Std. Deviation		2.29702	2.73030	3.30518	5.72202	4.17146	4.15030	2.82435	5.46540	4.97954	6.55921
Variance		5.276	7.455	10.924	32.742	17.401	17.225	7.977	29.871	24.796	43.023
Range		9.00	11.00	18.00	19.00	16.00	14.00	11.00	24.00	28.90	24.00
Minimum		16.00	4.00	27.00	80.00	15.00	13.00	8.00	35.00	20.00	142.00
Maximum		25.00	15.00	45.00	99.00	31.00	27.00	19.00	59.00	48.90	166.00
Sum		706.00	306.00	1241.00	3042.00	836.00	676.32	471.30	1579.96	1170.10	5326.00
Percentiles	25	1.908E1[c]	6.8571[c]	3.436E1[c]	8.383E1[c]	22.4000[c]	17.5000[c]	12.1500[c]	43.2000[c]	32.6667[c]	1.513E2[c]
	50	20.7500	9.4545	36.4000	89.7143	25.3636	19.8571	14.2727	46.0000	34.3750	1.5844E2
	75	22.4444	10.9167	38.5556	95.1667	27.2500	23.1429	15.6923	49.4600	36.6667	1.6150E2

a. Calculated from grouped data.

b. Multiple modes exist. The smallest value is shown

c. Percentiles are calculated from grouped data.

Artistic Gymnastics Athletes WOG Olympiad champion height between 151 to 161 cm with a ratio of length between the upper body of 40-45% of height and 54-59% lower body limb total height.

At MOG Artistic Gymnastics Athletes champion Olympiad span height between 162 to 169 cm with a ratio of 41.3% -43.7% upper body length of body height and 55 - 56.2% lower body length of overall height. Here's an overall data analysis of the size of the body length in table 2.

Table 2. Calculation of Body Artist's Long Body Size Sixth Allround Olympic Champion (in Cm)

Statistics

		tungkai	togok	kepala	leher	lenanakiri	lengnbkiri	tangankiri	pahakiri	betiskiri	tinggi
N	Valid	30	30	30	30	30	30	30	30	30	30
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		91.6667	43.6333	21.0333	9.7333	22.0667	22.1000	14.8333	50.1333	36.0667	1.6577E2
Median		93.0000	43.0000	21.0000	9.5000	22.0000	22.0000	15.0000	51.5000	36.5000	1.6600E2
Mode		93.00	43.00	20.00	9.00	22.00	22.00	15.00	53.00	33.00[a]	160.00[a]
Std. Deviation		4.38126	4.37456	1.35146	1.25762	1.46059	2.02314	.87428	4.04060	2.76597	4.00589
Variance		19.195	19.137	1.826	1.582	2.133	4.093	.764	16.326	7.651	16.047
Range		15.00	22.00	4.00	5.00	6.00	9.00	3.00	14.00	11.00	13.00
Minimum		82.00	34.00	19.00	7.00	20.00	19.00	13.00	42.00	31.00	160.00
Maximum		97.00	56.00	23.00	12.00	26.00	28.00	16.00	56.00	42.00	173.00
Sum		2750.00	1309.00	631.00	292.00	662.00	663.00	445.00	1504.00	1082.00	4973.00
Percentiles	25	90.0000	40.7500	20.0000	9.0000	21.0000	21.0000	14.0000	47.7500	33.7500	1.6200E2
	50	93.0000	43.0000	21.0000	9.5000	22.0000	22.0000	15.0000	51.5000	36.5000	1.6600E2
	75	95.0000	45.2500	22.0000	11.0000	23.0000	23.0000	15.2500	53.0000	38.2500	1.6925E2

a. Multiple modes exist. The smallest value is shown

Discussion

Each gymnastics competition organized by the all-around gymnastics, gymnast is required to display the movement of all the Apparatus to the MOG of the floor appliance, the jump table,

the single bar, the parallel bars, Rings and the Pommel horse while the WOG is obliged to display movements on floor appliance, beam balances and multilevel bars. The movements shown are movements with difficulty levels that have been set by FIG (Federation International Gymnastic) and recorded on the Code of Point as guidance for its assessment. Each movement on a particular tool should be subject to specific conditions in each category of movement that exist in the tool. Sixths try to adjust their body length, especially on the upper and lower body to control the movement when floating and landing (Greene, 2009). The trainers are more understanding and always learn about biomechanics in developing movement skills in this artistic gymnastics (Irwin, 2004; Prassas, 2006).

The amount of movement and the level of difficulty that the gymnast has to master at all around numbers demands strenuous training and physiological adaptation to the movement. Body size is crucial in appearance in artistic gymnastics (Arazi, 2013).

The biomechanical theoretical review that the distance of the center of gravity (COG) body center with gravity will affect the balance. but on the other hand, mentioned that the length and skeletal muscle mass will affect the amount of force and explosive power when contracting. In accordance with the above two theories are related to the physiological needs of motion characteristics in artistic exercises that require balance, flexibility, the speed of explosive power and strength, it takes certain physical character proportions to support the performance and appearance of the athlete. The gymnast with a specialization of the jumping table is a bit different physiologically physical character with the Gymnast specialization single bar apparatus and also the gymnast who champions the All-around apparatus. One of the characteristics of the physical character of this body length proportion we studied especially on this All Around gymnast. The size of a small body will make the gymnast easy to stabilize themselves in various movements and landings. this is in accordance with Baccioti et al.'s opinion that physical characteristics (small size and low body mass), body type (dominance ekto-mesomorphy), body proportion (low-fat mass), and late skeletal maturity and late age-at-menarche strongly supports Artistic Gymnastics Athlete for optimal achievement (Bacciotti, 2017).

The results of this study indicate that the height range of the gymnast is ideal to be able to adapt to all around numbers can be known. This shows that the optimal movements of artistic gymnastics that require balance, power. Strengths of various tools can be done according to the maximum body length range 68 for sons and 61 for daughters.

Conclusion

This study answers the question of the ideal length for the gymnastics champions. The all-around champion's champion MOG and WOG vary but fall into the category of small and low body mass, with the body type of dominance ecto mesomorphy. This is a physiological adaptation to master the movement of all instruments. Standard height and ideal body length proportion of men champion gymnast Olympic champion range of height between 162 to 169 cm with a ratio of 41.3% -43.7% upper body length, 55-56, 2% lower body length. While Woman Olympic champion is high between 151 to 161 cm with a length ratio between upper body of 40-45% and 55 - 56.2% lower body length. The author recommends that trainers and observers of artistic gymnastics in selecting athletes in talent scouting pay attention to the ideal proportion of body length for sustainability of performance and artistic gymnastics skills to the top of achievement.

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Conflict of Interest

The authors have not declared any conflicts of interest.

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