Physical Characteristics of Malaysian Netball Players in Relation to Playing Skill
馬來西亞投球選手的身體特徵與技術

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Abstract

This study sought to document the physical characteristics of top Malaysian netball players by their playing skill. The variables measured were age, height, body mass, body fat and somototype. Thirty-two national players (mean age 18.19 ± 3.86 years) were assessed, divided into three groups by their playing skill (senior/elite, junior and reserve). The body fat content was determined by the skinfold method and their somatotype using the Heath Carter Somatotyping method. There were no significant differences in the physical characteristics between the players by playing skill. The players were predominantly ecto-endomorphic with a mean somatotype of 6.12±1.42 - 2.38±1.05 - 2.71±1.38. Their height and body mass were 170.80±4.61 cm and 64.44±7.46 kg, respectively. Female national Australian and English netball players had a body fat of 28.90±3.50% (Wither & Roberts, 1981) and 24.50±3.90% (Bale & Hunt, 1986) respectively, while the Malaysian players in this study 24.50 ± 5.13%.

Key Words: Physical characteristics, body fat, somatotype, netball players, playing skill.

摘　要

本文旨在探討馬來西亞女子投球選手的身體特徵與技術，並與同類研究進行比較及分析.

Introduction

Netball is a unique contact team sport. The fast pace of the game requires the players to have multivarious skills such as jumping, throwing, blocking, shooting, defending, leg-movement, ball control and sharp eye-sight. These skills were also mentioned by Leigh (1999), Shakespear (1997) and Ten (1995) as the requisites for a good player. Although netball is the oldest and most widely played game among women in Malaysia (Ten, 1995), there has hardly been any research on the game, especially on the physical characteristics of the players by their playing skill. Most of the work done so far has rather focused on the differences by playing position and

age (Soh, 2005). Hence, this study was carried out to fill the void – to determine the physical characteristics of Malaysian national netball players by their playing skill (senior/elite, junior and reserve). The physical characteristics considered were height, body mass, body fat and somatotype.

Methods and Procedures

Subjects

Thirty-two Malaysian national netball players were studied (mean age 18.19 ± 3.86 years) - 12 senior/elite (21.08 ± 4.14 years), 9 junior (18.56 ± 1.88 years) and 11 reserves (14.73 ± 1.10 years). The senior and junior

players had had 5.67 ± 3.11 and 3.00 ± 2.40 years' experience representing the country, but not any of the reserves. Besides their skill level, the players were also divided into their playing positions of forward, centre and defence. The numbers of players in the skill and position categories are shown in Table 1.

Table 1. Numbers of Players by Their Skill Level and Playing Position.

Skill level	Playing Position			Total
	Forward	Centre	Defence	
Elite	5	4	3	12
Junior	3	4	2	9
Reserve	3	6	2	11
Total	11	14	7	32

Procedure and Instrumentation

The study was carried out in the Olympic Council of Malaysia (Wisma OSM) building and Bukit Jalil Sports School, both in Kuala Lumpur. The measurements were taken in the morning before training by trained Physical Education students from University Putra Malaysia. To minimize inter-tester error in the measurements, each variable was measured by the same tester throughout the study. According to Tothill and Stewart (2002), measurements taken by trained personnel should be fairly reliable. The instruments used were a Harpenden caliper, Spreading caliper, measuring tape, ruler, SOEHNLE weighing scale and a black marker.

Measurement Protocol

The body fat content was determined by skinfold measurement, the calculation of which was by the formula of Pollock, Schmidt, & Jackson (1980). Seven locations were pinched - chest, mid-axilla, subscapular, triceps,

suprailiac, navel and thigh – as the more locations taken the more accurate the results (Johnson & Nelson, 1986). The somatotype test was done using the Heath and Carter Somatotyping method (Fox, Bowers, & Foss, 1993). The measurements taken were height, body mass, skinfold thickness over the triceps and calf, biceps and calf girths, and humerus and femur widths. All the procedures for the tests were from the Anthropometric Standard Reference Manual (Lohman, Roche, & Martorell, 1991). Two consistent readings were required for each body measurement (Maud & Foster, 1995). Two readings were first taken, rounded up to the nearest mm, cm or kg. Only if the two readings were within one mm, cm or kg of each other were they accepted. If not, a third measurement was taken and the two closest readings within the error range accepted.

Statistical Analysis

The height, body mass, body fat and somatotype differences between the skill level and playing positions were identified using one-way analysis of variance (ANOVA). If the result was significant, a post hoc analysis was carried out using Scheffe's test (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975; Pallant, 2001).

Results

Table 2 shows the results for height, body mass, body fat and somatotype by playing skill. No significant differences were found for all the physical characteristics. The senior/elite players were the tallest and heaviest, and also had the highest body fat. The junior and reserve players had about the same body fat (23.69%) although the former were more muscular. The reserves were the tallest and skinniest.

Table 2. Height, Body Mass, Body Fat and Somatotype by Playing Skill.

Playing Skill	Height	Body Mass	Body Fat	Somatotype		
				Endomorphic	Mesomorphic	Ectomorphic
	(cm)	(kg)	(%)			
Elite (N=12)	171.75	66.73	25.84	6.39	2.33	2.52
S.D.	4.22	8.52	4.59	1.18	0.94	1.29
Junior (N=9)	168.50	61.87	23.69	6.01	2.63	2.69
S.D.	5.72	5.12	6.72	1.95	1.28	1.80
Reserve (N=11)	171.64	64.05	23.69	5.93	2.23	2.92
S.D.	3.67	7.71	4.36	1.25	1.04	1.19
Mean (N=32)	170.80	64.44	24.50	6.12	2.38	2.71
S.D.	4.61	7.46	5.13	1.42	1.05	1.38
Significance	F=1.62	F=1.12	F=0.64	F=0.33	F=0.35	F=0.24
	P>0.22	P>0.34	P>0.53	P>0.73	P>0.71	P>0.79

Discussion

The best, or elite, netball players in Malaysia were the tallest and heaviest. Since netball is a contact game in which height is required to excel, the taller players are better endowed for catching high balls, scoring and rebounding. The results are inline with Hopper et al. (1995) who also found Australian elite (A1) netball players to be taller and heavier than the players of lesser skills (A2-A6). The more intensive training by the elite players might be the cause of their heavier weight over the others – the extra training would have developed more muscles (Telford et al., 1985). As the muscle added is heavier than the fat lost (Fox et al., 1989), they would also have become more compact and solid.

All the players in this study had ecto-endomorphic (fat) bodies. However, most Australian and English national players had meso-endomorphic bodies (Hopper et al., 1995; Bale & Hunt, 1986). The meso-endomorphic somatotype were found to be more stable and tough. Therefore, to be a good netball players, the meso-endomorphic body is preferable. A recent study by Hopper et al. (1995) also found that Australian 15- to 18-year old players had endo-mesomorphic bodies - more muscular. As the main factors in netball play - strength, speed, power and flexibility – are more in abundance with mesomorphy, the Malaysian players lacked the proper body for netball. Although the netball players in this study were found to have similar (ecto-endomorphic) somatotype as compared to the Malaysian netball players in the year 1998, the reported endomorph values were found to be higher as compared to the study done in 1998 which reported 4.71-2.97-2.98 (Soh, 2005).

The junior players were the most muscular, and had a balance endomorph somatotype (Eston & Reilly, 2001). On the other hand, the reserves had the highest ectomorph component and were found to have ectomorphic endomorph somatotype – they were tall and thin (Eston & Reilly, 2001; Carter, 1984; Sheldon, 1949).

Their overall body fat was 24.50±5.13% were reported to be lower as compared to 28.90±3.90% found by Withers and Roberts (1981) in Australian national netball players. The range body fat between 11-34% was reported among the netball players in this study. Meanwhile, range body fat between 25.2-33.2% was reported in the study by Withers and Roberts (1981).

The small difference in body fat range in the study by Withers and Roberts (1981) might result from smaller sample size. Body fat of 24.0±4.40% and 25.2±3.00% were also found by Bale and Hunt (1986) in elite and senior English netball players, respectively. The Malaysians therefore had about similar body fat with netball players in England although exceeding the ideal of 12% to 16% suggested by Wilmore and Costill (1994) for high performance athletes. Besides that, the Malaysian netball players were also reported to have higher body fat percentage as compared to the netball players in the year 1998 who reported to have 21.06±5.22% (Soh, 2005).

Conclusions

Recent netball players in Malaysian were reported to be taller and heavier as compared to the netball players in the year 1998. They were also reported to have higher body fat percentage and this had contributed to higher endomorph component among the recent netball players. In addition, the elite netball players in Malaysia were found to have better physical attributes than the lesser players. To be good in netball, the player has to be tall and have an endo-mosomorphic body. In addition, a lower body fat will increase the muscle-to-fat ratio, allowing for better movement and play, the better with which to excel in the game.

References

Bale, P., & Hunt, S. (1986). The physique, body composition and training variables of elite and good netball players in relation to playing position. *The Australian Journal of Science and Medicine in Sport, 18*(4), 16-19.

Carter, J. E. L. (1984). *Physical structure of Olympic athletes* part II : Kinanthropometry of Olympic athletes. Switzerland: Werner Druck AG Publishers.

Eston, R., & Reilly, T. (2001). *Kinanthropometry and exercise physiology laboratory manual : Volume 1 - Anthropometry* (2nd ed.). London and New York: Routledge.

Fox, E. L., Bowers, R. W., & Foss, M. L. (1989). *The physiological basis of athletics* (4th ed.). Dubuque: Wm. C. Brown Publishers.

Fox, E. L., Bowers, R. W., & Foss, M. L. (1993). *The physiological basis for exercise and sport* (5th ed.). Dubuque: Brown and Benchmark.

Hooper, D. M., Hooper, J. L., & Elliott, B. C. (1995). Do selected kinanthropometric and performance variables predict injuries in female netball players? *Journal of Sports Sciences, 13,* 213-222.

Johnson, B. L., & Nelson, J. K. (1986). *Practical measurement for evaluation in physical education (4th ed.).* Edina: Burgess Publishing.

Leigh, R. (1999). Tracking a netballer's movement and skill. *On video education*. Australia: Bendigo.

Lohman, T. G., Roche, A. F., & Martorell, R. (1991). *Anthropometric standardization reference manual (Abridged ed.).* Champaign, IL: Human Kinetics.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. (1975). *SPSS statistical package for the social sciences (2nd ed.)*. New York: McGraw-Hill.

Maud, P. J., & Foster, C. (1995). *Physiological assessment of human fitness*. Champaign, IL: Human Kinetics.

Pallant, S. (2001). *SPSS survival manual : A step by step guide to data analysis using SPSS (version 10)*. IL: Allen and Unwin.

Pollock, M. L., Schmidt, H. D., & Jackson, A. S. (1980). Measurement of cardiorespiratory fitness and body composition in the clinical setting. *Comprehensive Therapy, 6*(9), 12-27.

Shakespear, W. (1997). *Netball : Step to success*. Champaign, IL: Human Kinetics.

Sheldon, W. H. (1949). *Varieties of delinquent youth : An introduction to constitutional psychiatry*. New York: Harper and Brothers Publishers.

Soh, K. G. (2005). Anthropometric profile among Malaysian netball players. African *Journal for Physical, Health Education, Recreation and Dance (AJPHPER). 11*(4), 464-471.

Telford, R., Barnes, J., Tumilty, D., & Hahn, A. G. (1985). Body fat measures in athletes with a special reference to female basketballers and netballers. *Sports Coach, 9*(1), 32-37

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Ten, H. (1995). *Panduan mengajar bola jaring (Method to teach netball)*. Selangor Darul Ehsan: Penerbitan Fajar Bakti Sdn. Bhd.

Tothill, P., & Stewart, A. (2002). Estimation of thigh muscle and adipose tissue volume using magnetic resonance imaging and anthropometry. *Journal of Sport Sciences, 20*(7), 563-576.

Wilmore, J. H., & Costill, D. L. (1994). *Physiology of sports and exercise*. Champaign, IL: Human Kinetics.

Withers, R. T., & Roberts, R. G. D. (1981). Physiological profiles of representative women softball, hockey and netball players. *Ergonomics, 24*(8), 583-591.

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