Anthropometrical Measurement, Physiological and Biomotorical Testing in Identifying Young Talented Volleyball Athletes

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Abstract

The purpose of this research was to get equation model of talent identification for volleyball athletes. The data obtained from purposive samples with the total numbers of 202 students, aged 11-13 years. Data was taken from anthropometrical measurement, physiological and biomotorical testing. Data was analysed by using factor analyses and discriminant analyses.

The result of this study found that the equation model was identified: D = -48,522 + (0,139 height)+ (0,223 sitting height)– (0,075 body mass) + (0,058 arm spam)– (0,020 standing reach)+ (0,084 leg length)- (0,065 throw and catch tennis ball) + (0.093 flexibility) – (0,072 shuttle run 5m) – (0,181 multistage fitness test) + (0,029 vertical jump 2 legs) + (0,056 vertical jump 1 leg).

In conclusion, the equation model can be applied for identifying young talented volleyball athlete.

Key Words: test and measurement, anthropometrical, physiological, biomotorical, talented, volleyball

A. Introduction

In Indonesia, talent identification model have already developed but it needs to be done intensively and continuously. Talent identification program is necessary in order to get young talented athletes especially in volleyball. Some of studies showed that talent identification have been done in some countries including Australia, China, Japan, Scotland, and Germany (Aussie Sports [4]; Yuan [17]; JISS, [11]; Abbott and Collins, [1]; Cooke, et al. [7]. In addition, some studies has focused at specific sport such as soccer, basketball, kabbadi, track and field, lawn tennis, and volleyball (Hoare and Warr, [10]; Reilly, et al, [12], [13]; William and Reilly, [16];

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Hoare, [9]; Thakur, [14]; Thumm, [15]; Ackland, et al. [2]; Ballard, [5]; Aouadi, et al. [3]. The purpose of this study was to get equation model of talent identification in volleyball

B. Methods

This research was conducted into 2 stages: stage 1 composing the Selected Intrument Test Planning (SITP), stage 2 implemented field testing for Selected Instrument Test (SIT).

Populations of this study were students of elementary school grade 6 in West Surabaya with total number 596 students. Samples were taken by using purposive sampling technique (at least 145 cm height, active in physical education, and age between 11 – 13 years old). Totals of the samples were 202 students (100 girls, 102 boys). Data was taken from anthropometrical measurement (height, body mass, sitting height, arm spam, length leg, and standing reach; physiological testing (40m sprint, 18m sprint, 5m shuttle run, 9m shuttle run, basketball throwing, vertical jump 1 leg, vertical jump 2 legs, standing broad jump, and multistage fitness test; biomotorical testing (push up, sit up, flexibility, and throw and catch tennis ball). Data was analyzed using factor analysis and discriminant.

C. Results and Discussion

The result of this study for the first stage was found that 19 instruments: anthropometrical measurement (height, body mass, sitting height, arm spam, length leg, and standing reach; physiological testing (40m sprint, 18m sprint, 5m shuttle run, 9m shuttle run, basketball throwing, vertical jump 1 leg, vertical jump 2 legs, standing broad jump, and multistage fitness test; biomotorical testing (push up, sit up, flexibility, and throw and catch tennis ball) that called the Selected Intrument Test Planning (SITP).

For the second stage, the SITP was applied to the samples. It showed that score MSA was 0.848, chi-square was 2226.945 with degrees of freedom was 171. Because of MSA more than 0.5 and probability Bartlett's Test of Sphericity less than 0.05, it can be said that those variable can be analyzed further using factor analysis. There were 5 factors which had total varian or eigenvalues more than 1.0.

Those factors were the first factor 7.193, the second factor 2.405, the third factor 1.385, the fourth factor 1.188, and the fifth 1.167. There were contribution varian each factor to tatal varian were 37.858% for the first factor, 12.659% for the second factor, 7.287% for the third factor, 6.252% for the fourth factor, and 6.140% for the fifth factor therefore it had cumulative 70.195%. Because of more than 60%, those factors was qualified.

After analyzing, there were 16 instruments that qualified, while 3 instruments were not qualified because it had loading factor less than 0.60. Those three factors were vertical jump 2 legs (the second factor = 0.510), sprint 18m (the third factor = 0.593), throwing basketball (the fourth factor = -0.459). It means that those factors must be eliminated. Based on the result of group, the name of those factors were 1) anthropometrical and cardiovascular endurance, 2) explosive power and strength, 3) agility and speed, 4) hand-eye coordination, and 5) flexibility.

There were 5 instruments that could not be used to identify young talented volleyball players (standing broad jump, sprint 40m, sit up, push up, and shuttle run 9m because p-value (Sig.) < 0,05 significant level therefore Ha1 was not accepted and Ho was accepted. It means that those 4 instruments can not be used to identify young talented volleyball players, therefore the total of instruments were 11 instruments. Based on surrogate variable approach, literature reviews, and expert judgement, vertical jump 2 legs was selected as one of the instruments. The reason why it was selected because volleyball players need to have ability in vertical jump 2 legs in order to support smash, block, and jump serve.

After recalculating, it was found Cannonical correlation score 0.607 or 60.7%. In means that identification in young talented volleyball player can be explained by variables anthropometrical, physiological, and biomotorical (height, sitting height, body mass, arm spam, standing reach, leg length, sprint 5m, vertical jump 2 legs, vertical jump 1 leg, multistage fitness test, throw and catch tennis ball and flexibility, then those were

called Selected Instrument Test (SIT).

Table (1)
Canonical Discriminant Function Coefficients

Variables	Function
	1
Height	.139
Sitting height	.223
Body mass	-.075
Arm spam	.058
Standing reach	-.020
Leg length	.084
Throw and catch tennis ball	-.065
Flexibility	.093
Shuttle Run 5 m	-.072
Multistage Fitness Test	-.181
Vertical Jump 2 legs	.029
Vertical Jump 1 leg	.056
(Constant)	-48.522

Unstandardized coefficients

From Table 1 above, it can be made a formula of equlization discriminant as:

D = -48,522 + (0,139 H) + (0,223 SH) – (0,075 BM) + (0,058 SA) – (0,020 SR) + (0,084 LL) - (0,065 TCTB) + (0.093 Flex) – (0,072 SR5M) – (0,181 MFT) + (0,029 VJ2L) + (0,056 VJ1L)

Based on that equalization, the sitting height was the most dominant variable in predicting the differences between volleyball group and non volleyball, while multistage fitness test variable was the lowest variable. Students with age 11 – 13 years old can be identified as young talented volleyball player if they got score ≥ 0,97296 for boys and ≥ 0,84202 for girls. If they got less score, it can be said that those students had talent in non volleyball.

Volleyball games using height of net, therefore players need to have a height of standing reach in order to do some techniques in volleyball such as smash and block. Athletes who have height standing reach will be superior in attacking or defending ball above net. Gabbett and Georgieff, [8] reported that standing reach of volleyball players was significant different between level of competition.

Volleyball games as intermittent sport need higher predominant anaerobic energy system. Volleyball players often doing some jumping activities not only vertically but also horizontally with quick especially in smashing, blocking, and jumping serve. Beside that, volleyball players must have a good agility, because they have to move to right or left, to front or back in order to catch the ball.

Bloomfield [6] said that volleyball games was agility sport parcially depend on jumping ability. Doing the best techniques in this sport, players must have a good agility and jumping ability. These players must be height, have long upper limbs, lower limbs, and trunk as well as a high index crural, for example player who has long lower limbs will have leg length too.

Conclusion, the equalization model can be used to identify young talented athlete for volleyball.

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