A NOVEL SCIENTIFIC APPROACH IN IDENTIFYING TALENTS AMONG FEMALE ADOLESCENT ATHLETES IN FIELD HOCKEY SPORT BASED ON PHYSICAL FITNESS AND ANTHRO-ENERGY INTAKE

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ABSTRACT

This study determine the most significant physical fitness and anthro-energy intake components in identifying the talents among female adolescent field hockey players. 45 players from Terengganu sport academy were assessed in physical fitness and anthro-energy intake measurements. The first rotated PCAs presented 8 components as the most significant physical fitness components. The second PCAs depicted 7 componenets as the most crucialanthro-energy intake components. HACA classified the players into 3 groups: high, middle and low performance. The precision of classification using standard, forward and backward stepwise mode have yielded 95.56%, 97.78% and 97.78%. Therefore, certain physical fitness and anthro-energy intake components are important to identify the players. Effective modified training should consider the performance related components.

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1. INTRODUCTION

Field hockey can be described as a competitive sport, in which the players attempt to attack the opponents and defence their goal consecutively within 70 minutes. Players carry out various activities such as walking, jogging, sprinting and standing during the game [1]. They also perform other explosive actions such as intermittent sprinting, changing directions frequently, cruising and dribbling [2]. All sorts of low and high intensity activities may place high aerobic demands on players and consume high energy expenditure. Beside the aerobic capacity, the field hockey also requires a significant level of anaerobic capacity, muscular strength and power [3]. Thus, field hockey is classified as endurance, team sport in which physiological, body composition and nutrition demands are considerable [3-5].

Recently, athletes are demanded to maximise their performance as competition gets higher. Therefore, many studies were conducted to identify the important components to improve field hockey performance in male athletes. For example, the previous study was carried out to investigate the significant effects of physical fitness on field hockey performance. The results had shown that muscular endurance, strength, power and cardiovascular fitness were considerable in maximising sports performance [3]. Body composition has received many attentions among the researchers when analysing athletic performance. It becomes the fundamental element in achieving optimal sports performance. For example, a study was conducted to investigate anthropometric and body composition of Malaysian athletes including field hockey players [6]. Studies in nutrition have frequently been conducted to provide nutrition knowledge, healthy dietary habits and food intakes among athletes because they may provide energy for physical activity, assist repairing process in the body, enhancing sports performance in competitions and producing health and well-being [7]. Nutrition acts as important complementary in physical fitness program because proper nutrition may assist in improving sports performance and promoting healthy dietary practices in the long-term [8].

From the viewpoint, physical fitness, anthropometrical and nutritional components have been considered the main elements in field hockey performance. Female players also play field

hockey. Their participations in this sport have increased significantly over the years. However, study on the factors related performance such as anthropometric features of female hockey players so far is less available [9]. There are limited data concerning the significant factors of physical fitness and anthro-energy intake components among female adolescent field hockey players. Thus, the present study aims to determine the most significant physical fitness and anthro-energy intake components in identifying the talents among female adolescent field hockey players.

2. MATERIAL AND METHODS

2.1. Participants

Forty-five female aged 13-19 years old with a mean and standard deviation of (16 ± 2.12) players from Terengganu field hockey academy volunteered to participate in this study. The players who performed the tests were recommended by the coaches. They were not representing the state and had no recent injury or medical problems. Parents signed an informed consent after receiving an explanation about the study, previously approved by the MSNT Ethics Committee with a reference number 05-04/T-01/Jid 2. The players were tested in two different components: physical fitness and anthro-energy intake. They performed a warm-up that consisted of a 5- to 10-min jog and a series of stretches prior to physical testing sessions. All the testing and measuring sessions were taken place at the academy hall and field with the permission of the coaches and managers of the academy.

2.2. Design

An ex-post facto design was used to investigate the significance of physical fitness and anthro-daily energy intake in field hockey performance among adolescent female field hockey players. This design enabled the researcher to assess the players' current conditions concerning physical fitness, anthropometric and nutrition. There was neither intervention nor training program implemented in this study. Therefore, controlling and monitoring the players' progression were not compulsory. The players were assessed on one occasion during their off day training, so their training schedule was not affected. All the testing and measurement sessions were completed in the same day.

2.3. Anthropometric measurements

Anthropometric measurements consisted of height (m), lean body mass (kg), girth circumferences (mm) and skinfolds (mm). All the measurements were taken using standard techniques [10, 11]. For standing height, the players were asked to stand against a standard wall-mounted stadiometer with shoe off. The values were recorded to the nearest 0.1 cm at the highest point of the head. Weight was measured to the nearest 0.1 kg using a calibrated scale (Karada Scan). The circumferences of the middle upper arm, thigh and calf were measured using a standard measuring tape. Then, a 7-site skinfold was used to assess subcutaneous fat of the players. Skinfolds were measured on the right of the body (thigh, calf, triceps, sub-scapular, mid-axillary and suprailiac, abdominal) using a calibrated Harpenden caliper (Baty International Ltd). Skinfold measurement was performed according to the protocols of [11]. Each measurement was taken two times and the average was calculated for internal consistency before further data analysis. All the skinfold measurements were done by the same certified technician from Terengganu Sport Council to standardize the protocol of measurements. Dietary assessment was approached using 3-day dietary record to evaluate the average calorie intake of each player. The players recorded food and drink they consumed for 2 weekdays and 1 weekend day. Prior the food record, all the players were received the overall detailing of the food record procedure. All the records then were calculated to determine the average calorie intake using Nutritionist Pro™-Diet Analysis and Nutrition Food Labeling Software.

2.4. Physical fitness tests

2.4.1. Vertical Jump

Players performed nine physical fitness tests: vertical jump, 40-m speed test, T-test, V-sit and reach test, hand grip test, multistage shuttle run test, push-up and sit-up tests. Vertical jump was used to assess lower limb muscular power. Players stood at the wall and raised the closest arm to the wall above their head. The players then performed jumping action from the starting position. The highest point that they reached during the jump was marked with sticky paper and measured using a measuring tape to record the height. Vertical jump height was defined as the difference between the height of the raised hand in the standing position and that acquired during the jump. Each player received two trials with a 3 min rest in between the

trials. Then, the best trial was recorded as the vertical jump height [12].

2.4.2. Speed Test

40-m speed test was used to sprinting speed. From a stationary position, players started a run at the starting line. Each player was given two trials separated by a recovery period. The fastest time for the 40-m run was recorded using a stopwatch [12].

2.4.3. T-Test

Agility can be recorded using T-test follows a standard protocol as described by a previous study [13]. A set of 10-5-5 meters lines was set up to form a 'T'. Markers then were placed at each line. Player ran forward on the 10m line. Then, he/she ran to the left through the 5m line. Player then ran to the right through the 5m line. Finally, the player ran back toward the starting line as quick as possible. The time was recorded using a stopwatch. Each player finished two trials to achieve the fastest time. The players were also not recommended to step on the line too much as it will increase their performance time.

2.4.4. V-Sit and Reach Test

V-sit and reach test was used to evaluate the lower back and hamstring flexibility [14]. Each player received two attempts to get the best records for further analysis.

2.4.5. Hand Grip Strength

The grip strength of both hands is commonly determined using a standard adjustable grip strength dynamometer (Takei Scientific Instruments Co., LTD). Players were in standing position with the shoulder in adduction and neutral rotation and elbow in full extension. The players then held the dynamometer freely without the support and apart from the subject's trunk. The position of the hand remained without the downward direction. They were encouraged to put maximum force on the dynamometer [15]. The test was performed two times of each side. The values were documented in a kilogram. The highest value was recorded for further statistical analysis.

2.4.6. Multistage Shuttle Run Test

The multistage Fitness Test Shuttle Run is commonly used to measure VO_{2max} among athletes in team sports because of its validity and reliability [16-17]. It consists of a 20m shuttle run in which the speed increases progressively. The players ran continuously in accordance to the

beeps until they were not able to keep pace with the velocity of the tape. The last level and ended shuttle number that the players voluntarily resigned from the test were defined as the final results and the predicted VO_{2max} was analyzed.

2.4.7. 1 Minute Push-Up

Upper muscle strength can be assessed using push-up. Players were in prone lying with hands were in line with the shoulders. The back was kept straight throughout the test. The test was started when the players lowered their body until the chest touched the clenched fist of the assistant and returned back to starting position within 1 minute. They were not allowed to rest their both knees on the ground if they stopped in the middle of the test. Only the push-ups with the correct procedure were counted and recorded as the final result. This test was performed only once to prevent fatigue.

2.4.8. 1 Minute Sit-Up

The method of sit-up was performed similar to the suggested procedure specifically for physical fitness test [18]. Players were asked to lay on their back with both knees in right angle while both feet are resting flat on the ground. They crossed their hands against chest throughout the test. Then, from the starting position they sat up until the elbows touched their knees while an assistant was holding their feet. Then, they returned to the starting position. The same procedure was repeated within 1 minute. The sit-ups with correct technique only were accepted for records. The test was measured only once due to fatigues.

2.5 Data analysis

The total of missing data, data error and outlier were determined prior the main statistical analysis. Normality of the data and outlier then were identified using Kolmogorov-Smirnov.

2.5.1. Principal Component Analysis

Principal Component Analysis (PCA) was used to identify the most significant components in identifying the talents in female adolescent field hockey sport. It can be expressed in Equation (1):

$$z_{ij} = a_{i1}x_{1j} + a_{i2}x_{2j} + ... + a_{im}x_{mj} \tag{1}$$

where z is the element score, a is defined as the element stacking, x is the assessed estimation of the variable, i is assumed as the element number, j is the subject number and m is the

aggregate number of variables [19]. It describes the most critical parameters because of differences of relative performance found in the components that explain the whole dataset with a minimal loss of original data [20].

2.5.2. Cluster Analysis

Hierarchical Agglomerative Cluster Analysis (HACA) was employed to identify the groups in relative to the performance of the evaluated components. HACA is an effective analysis in identifying and categorizing the components or subjects (observations/population) into clusters with greater homogeneity state within the class and greater heterogeneity state among classes with regard to a predetermined selection criterion [21]. The finding is presented in dendrogram, giving the clusters and their closeness [22].

2.5.3. Discriminant Analysis Discriminant Analysis (DA) acts in controlling the variables that separate among two or more joined group/clusters. It builds a discriminant capacity (DF) for every group [23]. The Equation (2) is used to identify the DFs:

$$f(G_i) = k_i + \sum_{j=1}^{n} w_{ij} \, P_{ij}$$

(2)

where *i* is assigned as the amount of groups (G), k_i is defined as the constant inherent to each group, n is the quantity of parameters utilized to categorize a set of data into a certain group and w_j is the mass coefficient assigned by DF analysis (DFA) to a given parameter (p_j). In this study, DA was used to determine whether the groups obtained from HACA vary with respect to the mean of a variable and to utilize that variable to predict group membership [24]. The data then was analyzed using standard, forward stepwise and backward stepwise methods. These were used to construct DFs to evaluate the three groups' variations in the physical fitness and anthro-energy intake performance. The groups of the athletes were dependent variables and the evaluated components as the independent variables. In forward stepwise mode, the variables are calculated accordingly starting with the utmost significant variable until no significant changes were obtained. Meanwhile, in backward stepwise mode, the removal of variables occurred gradually starting with the less significant variable until no significant changes were obtained.

Prior to data analysis, the Kaiser-Meyer-Olkin (KMO) and Barlett's tests were applied to

determine the adequacy of the sampling to quantify and interpret the data [25]. The KMO value presented 0.55 for physical fitness components and 0.58 for anthro-energy intake components. It is indicated that all the data met the assumptions of the sampling adequacy and adequate to make a realistic interpretation.

3. RESULTS AND DISCUSSION

Table 1. Descriptive statistics of the evaluated variables

Variable	N	Min	Max	M	SD
Vertical Jump	45	15.00	57.15	34.80	11.62
40M	45	6.29	8.06	7.22	0.46
Agility	45	10.60	13.35	11.95	0.56
Flex	45	33.60	72.50	54.66	12.95
1 Min Push-Up	45	10.00	58.00	29.38	10.79
1 Min Sit-Up	45	0.00	69.00	27.02	11.45
Right hand grip	45	15.30	34.35	23.40	4.09
Left hand grip	45	14.40	53.70	23.00	7.03
Endurance	45	24.70	45.20	37.87	5.45
MUAC	45	22.00	47.80	25.30	3.95
Thigh C	45	23.50	58.00	47.59	5.71
Calf C	45	26.50	38.50	33.26	2.89
Triceps	45	4.00	22.10	14.63	3.72
Sub-Scapular	45	7.30	66.50	13.73	8.70
Mid-Axillary	45	5.20	17.00	9.35	2.77
Suprailiac	45	7.50	24.00	14.30	3.62
Abdominal	45	4.00	25.20	15.68	4.76
Thigh	45	9.00	41.40	22.93	7.53
Calf	45	7.00	29.80	16.32	5.75
Energy Intake	45	1648.95	2473.10	2105.30	130.51

Table 1 presents the descriptive statistics in terms of number of participants, the score of minimum, maximum, mean and standard deviation of this study.

Table 2. Factor loading after varimax rotation of physical fitness component

Variables	D1	D2	D3	D4
Vertical Jump	**0.88**	0.25	-0.02	0.06
40M	-0.16	-0.07	**0.83**	-0.01
Agility	0.12	-0.04	**0.84**	-0.08
Flex	**-0.85**	-0.23	-0.11	-0.04
Push-Up	0.55	-0.14	0.18	0.56
Sit-Up	-0.06	-0.02	-0.15	**0.90**
Right hand grip	-0.06	**0.91**	-0.08	0.10
Left hand grip	0.28	**0.80**	-0.04	-0.24
Endurance	**0.81**	-0.21	-0.24	-0.11
Eigenvalue	2.72	1.68	1.50	1.09
Variability (%)	30.23	18.64	16.62	12.07
Cumulative %	30.23	48.87	65.49	77.56

Table 2 illustrates the PCA after varimax rotation of physical fitness variables for female field hockey players. Fourth PCs were obtained with eigenvalues larger than 1. Previous study defined the VF coefficients with a correlation greater than 0.70-factor loading threshold are strong significant factor loadings [26]. Therefore, only components that achieved the 0.75-factor loading threshold were accepted for the PCs interpretation in this study. It can be seen that from VF1 two components were identified with strong positive factor loadings: vertical jump (0.88) and endurance (0.81) and one component with strong negative factor loadings: flexibility (-0.85). However, VF2 has identified only right hand grip (0.91) and left hand grip (0.78) with strong positive factor loadings. The table also presents 40M speed (0.83) and agility (0.84) with strong positive factor loadings resulted from VF3. Finally, from VF4 only 1 minute sit-up (0.89) was identified with strong factor loadings. Therefore, it is suggested that lower limb strength, endurance, flexibility, hand grip, 40M speed, agility and 1 minute sit-up are considerable in identifying the field hockey players.

Table 3. Factor loading after varimax rotation of anthro-energy intake component

Variables	D1	D2	D3	D4
MUAC	0.07	-0.01	-0.02	**0.88**
Thigh C	-0.28	**0.72**	0.23	0.08
Calf C	-0.01	0.65	0.43	0.02
Triceps	0.46	0.19	0.67	-0.26
Sub-Scapular	-0.24	0.10	0.31	0.61
Mid-Axillary	-0.06	0.02	**0.85**	0.13
Suprailiac	0.23	0.10	0.63	0.32
Abdominal	**0.79**	0.06	0.17	-0.08
Thigh	**0.89**	0.09	0.09	-0.01
Calf	**0.72**	-0.39	-0.08	0.02
Energy Intake	0.25	**0.75**	-0.29	0.00
Eigenvalue	2.67	2.35	1.41	1.07
Variability (%)	24.30	21.40	12.82	9.73
Cumulative %	24.30	45.69	58.51	68.24

Table 3 shows the PCA after varimax rotation of anthro-energy intake variables for female field hockey players. Four PCs were obtained with eigenvalues larger than 1. In this study, only components that achieved the 0.70-factor loading threshold were accepted for the PCs interpretation. The table demonstrates the skinfolds of abdominal (0.79), thigh (0.89) and calf (0.72) have strong positive factor loadings from VF1. It is also detected that from VF2 energy intake (0.75) showed strong positive factor loadings. In addition, it can be seen that from VF3 only the skinfold of mid-axillary (0.85) has strong positive factor loading. Finally, it can be observed that from VF4 only middle upper arm circumference (0.88) presented with strong positive factor loadings. Therefore, the skinfolds of abdominal, thigh, calf and mid-axillary, middle upper arm circumference and energy intake are highlighted as the significant components in recognizing the high potential field hockey players.
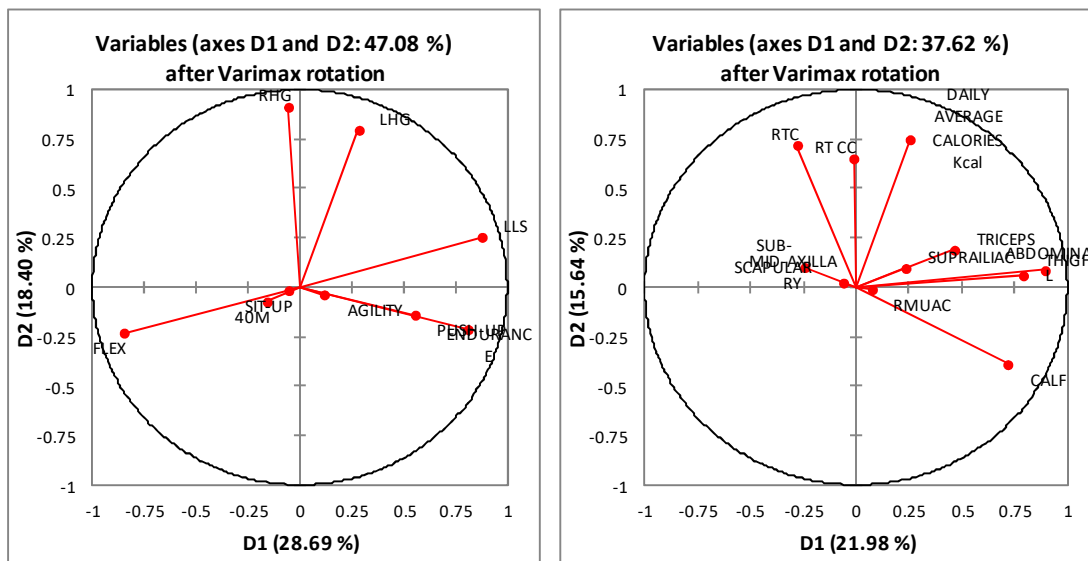
Fig.1. Factor loading plot after varimax rotation of physical fitness and anthro-energy intake

component

Fig. 1 presents the factor loading plot after varimax rotation of physical fitness and anthro-energy intake. The contribution of each varifactor within the components and their variability are also shown in this figure. It can be seen that VF1-VF4 contributed to about 47.08% of the total data set and the variability of 28.69% and 18.40% for physical fitness component. Meanwhile, it can be observed from the figure above VF1-VF4 contributed to about 37.62 % of the entire data set and the variability of 21.98% and 15.64% for anthro-energy intake respectively.
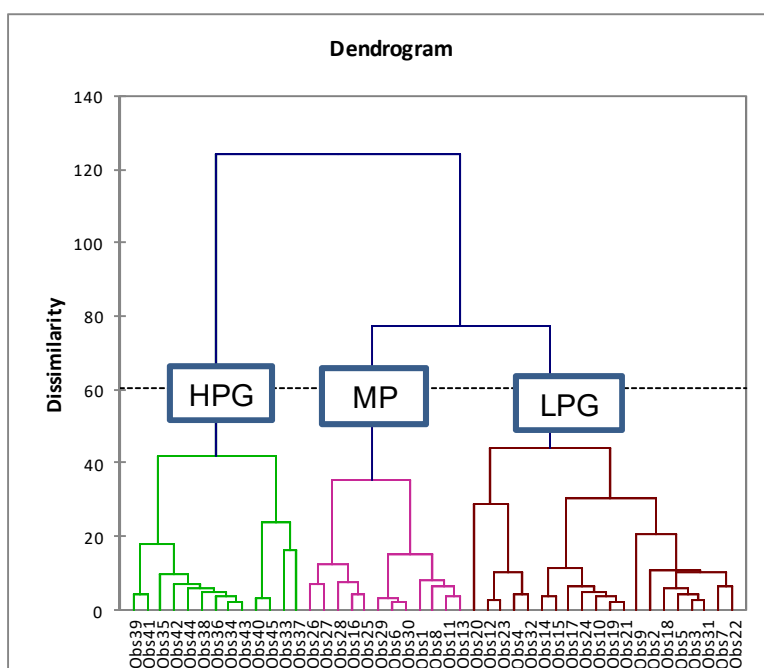

Fig.2. Dendogram of the three classes assigned by the cluster analysis

Fig. 2 represents the grouping of the field hockey players in relation to their performance classes using HACA. They were classified based on their similarity level of the relative performance components evaluated. The figure shows the three groups given by HACA namely: High Performance Group (HPG), Middle Performance Group (MPG) and Low Performance Group (LPG).

Table 4. Classification matrix of the discriminant analysis on the three classes in relation to their performances on the variables measured

| Assigned Classes | %Correct | Classification Matrix Assigned by DA | | |
		HPG	MPG	LPG
Standard DA mode				
HPG	100.00%	13	0	0
MPG	95.00%	0	19	1
LPG	91.67%	0	1	11
Total	95.56%	13	20	12
Forward stepwise mode				
HPG	100.00%	13	0	0
MPG	100.00%	0	20	0
LPG	91.67%	0	1	11
Total	97.78%	13	21	11
Backward stepwise mode				
HPG	100.00%	13	0	0
MPG	95.00%	0	19	1
LPG	100.00%	0	0	12
Total	97.78%	13	19	13

Table 4 shows the discriminant analysis on clusters classified by HACA. The data was employed to determine the variation of performance in relative to evaluated components. In this study, the clusters were assigned as dependent variables while physical fitness and anthro-energy intake components were treating as independent variables. To find the discriminating variables, the data were subjected to standard, forward and backward stepwise

DA. The precision of classification using backward stepwise mode yielded 97.78% correctly with seven independent variables. Meanwhile, the precision of classification using standard and forward stepwise mode were 95.56% (nine independent variables) and 97.78% (five independent variables).
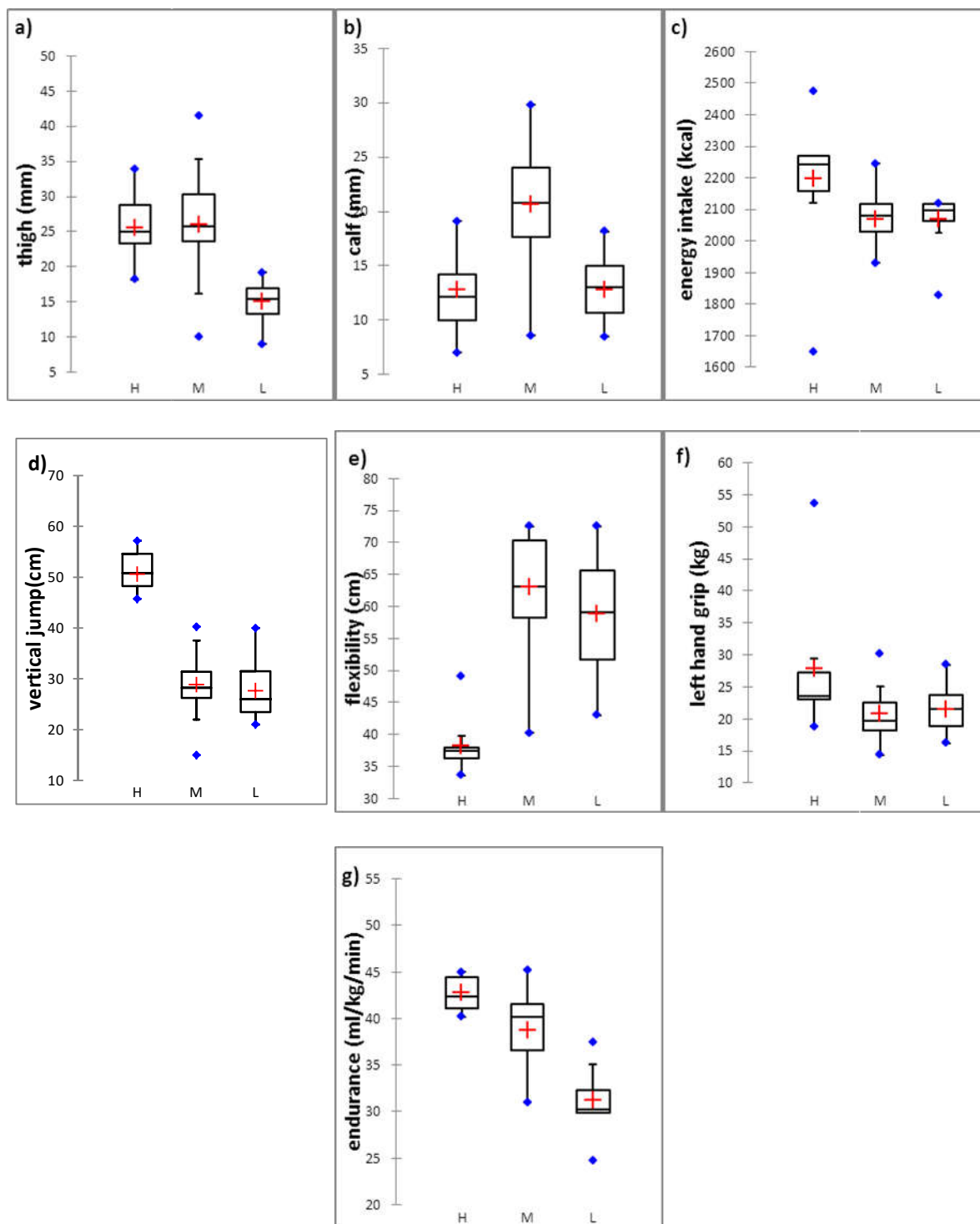

Fig.3. Box and whisker plots based resulted from backward stepwise methods in DA

Fig. 3 presents box and whisker plots of the seven relative components. It highlights the significant differences in seven components between the three identified groups. The box and whisker plots were drawn based on the significant performance variables discriminated by backwards stepwise DA. It can be observed from the plots that the mean performances of the HPG are higher in many of the essential variables evaluated which are vertical jump, flexibility, left hand grip, endurance, thigh and calf circumference and energy intake.

The purpose of this study is to determine the most significant components of physical fitness and anthro-energy intake in identification talents among female adolescent field hockey players using a new scientific approach. To meet this objective, PCA, HACA and DA were employed to investigate the most significant components of physical fitness and anthro-energy intake towards field hockey performance, to define the clusters of the players and to identify the discriminating characteristics of the clusters.

The PCs have identified eight physical fitness components that are highly significant in field hockey performance namely vertical jump, flexibility, endurance, hand grip, 40M speed, agility and 1 minute sit-up. All the components satisfied the 0.75-factor loading thresholds. The PCs also have identified seven anthro-energy intake components as the most important components in field hockey sport performance. All the components namely the skinfolds of abdominal, thigh, calf and mid-axillary, middle upper arm and thigh circumference and energy intake that have met the value 0.75-factor loading thresholds. These components then were examined in order to classify the players into clusters based on their similarity level of the relative performance using HACA. Lastly, the DA was employed to determine the variation of relative performance on the clusters assigned by the HACA.

Vertical jump is considerable in identifying the talents in female adolescent field hockey players. It is considered as lower limb strength which is required in displaying a high performance game in field hockey. In addition, this finding is consistent with previous studies. It is believed this component able to identify players in different levels and enhance sport performance [27].

This present study has revealed that agility as the most significant component in identifying

the talents as it could enhance sport performance in field hockey. Changing directions and other explosive actions rapidly occur in this sport. Players need to maintain their balance without losing of speed during the game. Thus, the agility component is considerable as the nature of this sport consisting multidirectional explosive movements [28]. It is also indicated that speed as the most essentialcomponent in the adolescent female field hockey players' performance. This result supports the assumption that the field players spent 22% of total duration performing short duration (5.2 ± 0.6 s), high intensity actions during the game [15]. Therefore, it is important to note that the speed could enable the players to perform sprinting and exercising at the higher speed.

Interestingly, in this present study, both hand grips are significant in identifying the talents among female adolesecent field hockey players. Right, and left hand grips appeared to be essential components as the players need to hold and handle the stick while hitting the ball for scores during the games. However, hand grip strength is not really significant in male athletes even they also use the sticks throughout the game. This finding has been documented in a study who concluded that there is no significant relationship between anthropometric features and hand grip power in Indian professional male hockey players in different levels [29]. Flexibility was found to be the significant components in identifying the most potential field hockey players. It can be defined as the range of motion (ROM) at a single joint or a series of joints [30]. Similar findings were reported by [31] who mentioned the important role of flexibility ininjury preventive among athletes. They found that the athletes with a greater flexibility presented with a low incidence of injury compared to the athletes with a lesser flexibility.

The present study also shows that the core muscle strength is an important component in recognizing the talents in field hockey game. It is believed to produce high force and lead the muscle contraction of shoulders, arms and legs to produce motions [32]. Better core muscle strength is considerable in the field hockey in terms of providing stability and big muscles controlling such as abdominal, paraspinal and gluteal during the games [33]. Endurance was found to have a significant effect in identifying the most potential players based on their performance in selected variables. As an endurance-based sport, the component of endurance

may be attributable and essential among the players. Thus, this study supports the assumptions those obtained from the previous studies. According to [34], itis documented that cardiovascular endurance has physiological effects in a relative of athletic performance. Players with a high level of endurance may be sustainable during the game because the heart is able to pump oxygen sufficiently to all the contracting muscles [35]. As a result, it may accelerate the responsive actions of the athletes toward to the fitness requirement of the sport they participate in [36].

Results of PCs showed a total of seven anthro-energy intake components have significant effects onsports performance among adolescent female field hockey players. This result can be explained by the fact that the anthropometric components could enhance sports performance in many sports [37]. It can affect an athlete's strength, agility and appearance. Many sportsemphasizethe lower body fat percentages among the athletes includes field hockey. As an endurance-based game, field hockey players present with small physique and carry little fat [38-40]. Low body fat can bring benefits in mechanical and metabolic aspects of athletes. In addition, it can lead to run fast and change direction rapidly during the game. Excess fat among athletes is not considerable as it will inhibit the motor performance due to the accumulation of not functioning mass in the body. Moreover, it will lead to the increment of metabolic consumption in performing the actions that require the movement of the whole body mass.

Anthro-energy intake analysis showed significant findings in this study. Energy intake resulted as the essential components in identifying the talents in field hockey sports. This result highlighted the importance of the energy intake among athletes in order to maintain the effectiveness of lean tissue mass, immune, reproduction and maximizing the athletic performance [41]. Each athlete requires sufficient energy for maintaining an appropriate weight and body composition while training and performing in sport [42]. Thus, this study has shown that anthro-energy intake factors could improve sport performance evidently and should be assessed when recognizing the talents among female adolescent field hockey players [43].

4. CONCLUSION

Based on results from this present study, we can conclude that the physical fitness and anthro-energy intake components are vital in identifying the talents in adolescent female field hockey players. These components are suggested to have significant roles in enhancing the sport performance. This study has also revealed that there are three performance groups in female adolescent field hockey players. They are assigned to high performance, middle performance and low performance. Each group was discriminated by important components which are skinfolds of thigh and calf, energy intake, vertical jump, flexibility, left hand grip and endurance.

The results also provide field hockey players with information on which training might be required to compensate for areas, where the players are in middle and low performance group for successful performance. Coaches should not eliminate the players who do not reach the ideal expectation of high performance field hockey players but can still train them through improved training. Those who do not fulfil the standard requirements can still succeed through superior or modified training program that includes all the necessary components. Lastly, the process of recognizing the talents among adolescent female field hockey players may use less time consumption, human power and cost.

These evaluated physical fitness and anthro-energy intake components from this study can be used as essential elements for successful performance in field hockey game. All the evaluated components could distinguish the high potential talents from middle and low groups scientifically using less efforts, money and time. Players who are in low and middle performance groups should be given information concerning the effective and strategic training to compensate their weakness and achieve optimal sports performance.

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