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Physical Evaluation of Selected Malaysian National Rugby Players

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***Abstract*—**Currently, there is no database or local norms for the physical performance of Malaysian rugby players. This database or norms are vital for Malaysian's sports development as programs can be setup to improve the current status. This pilot study was conducted to evaluate the status of our semi professional rugby players. The rugby players were randomly selected from the Malaysian National team and several clubs in the Klang valley, Kuala Lumpur Malaysia. 54 male rugby players (Age: 24.41 ± 4.06 years) were selected for this pilot study. Height, bodyweight, percentage body fat and body mass index (BMI) and several other physical tests were performed. Results from the BLEEP test revealed an average of level 9, shuttle 2 for the players. Interestingly, forwards were taller, heavier, and had lower maximal aerobic power than backs in the same team. In conclusion, the physical characteristics of the rugby players were much lower when compared to international players from other countries. From this pilot study, the physical performance of the Malaysian team must be improved in order to further develop the sports.

***Keywords*—**Rugby, Malaysia, Fitness, Collision sports

I. Introduction

RUGBY is one of the most demanding sports requiring players to sprint, tackle and getting physical collisions [1]. It has been reported that rugby players cover approximately 8 to 10 km each match and this highly depends on their playing position on field [2]. Previously, several studies have reported the fitness characteristics of rugby players of several playing levels i.e. international to junior level [3]-[6]. Fitness testing as well as anthropometric measurement is useful for assessing and monitoring rugby players. These studies also provided important information on fitness level, normative data of each group and are used for the development of new young team [6]. Previous studies have well documented the anthropometric characteristics and physical performance of rugby players to provide the physical qualities that are needed to give the best performance in rugby [1]. Therefore, it is really important for a rugby player to have an ideal physical appearances as well as optimum fitness level. Furthermore, rugby is a very high physically demanded game and thus, every rugby player need to be extremely fit. With high physical performance and suitable anthropometric characteristics will definitely contribute to a team total performance [4].

Basically, there are two types of players' position in a rugby team which are forwards and backs. Since there was a different playing position in a rugby team, the fitness level and anthropometry of each playing position may be differ with each other. [1], [6] reported that forwards were heavier and had greater skinfolds compared to other position. Besides that, forwards also were found out to be slower in change of direction speed, 20 m sprint and 40 m sprint [1]. Although forwards did look like heavier and slower than other position, their characteristic are suitable for them as they are the required more combative attribute compared to backs.

In Malaysia, rugby is less popular compared to football/soccer or badminton [7]. However, this sport is popular among university students and secondary schools. Unfortunately, no database or local norms for the physical characteristics of Malaysian rugby players. These norms are vital for our nation's sports development as programs can be setup to improve the current status. This pilot study was conducted to evaluate the status of our semi professional rugby players. Thus, this study will be able to determine the physical characteristics of Malaysian national rugby players through anthropometric evaluation and three fitness testing which are sit and reach test, bleep test and standing broad jump.

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II. Procedure for Paper Submission

A. Subjects

All players were playing for local semi-professional clubs and the Malaysian rugby team. All subjects performed this fitness testing at the beginning of their training for the national team organized by the Malaysian Rugby Union (MRU).

The players were then divided into their playing positions i.e. forwards (including props, second rows, hookers, flankers and number 8) and backs (including fullbacks, three-quarters, half-backs and utility backs).

All participants received explanation of the current study prior to their written consent was obtained. All the risks and benefits of this current study were given to the players in detail. All procedures were approved by the institutional ethical committee in the Faculty of Medicine and Health Sciences, UPM, Malaysia.

B. Fitness Testing

The players standard anthropometry data were collected such as height, bodyweight, sum of four skinfolds, estimated lower body power (standing broad jump), flexibility and estimated maximal aerobic power (bleep test) were the test performed. All tests were performed indoor (temperature at 30 $\pm$ 1.0^{o}C and humidity at 70.0 $\pm$ 5%). Subjects were instructed not to performed strenuous exercise at least 2 days prior to this testing session.

C. Anthropometry

For any athlete, losing the extra kilos is essential in order to improve body strength, speed, power and also agility. In this study the percentage of body fat was estimated by skinfold thickness at four sites using a Harpenden skinfold caliper [8]. Bicep, tricep, subscapular and suprailiac on the right side were the sites selected [9]. Height and body mass of the rugby players were assessed using a Seca Stadiometer and weighing scales [8].

D. Flexibility

The sit and reach test is a test of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles [10]. This test can be performed with or without a sit-and-reach box [11]. In this study, the test was performed using the box. The players were given three chances to provide the best readings.

E. Lower Body Power

Lower body muscular power was evaluated using the standard standing broad jump test using broad jump mat [12]. Players were asked to stand with their feed flat on the ground, extend their arm and hands. Flexion of the knee joint was allowed and jumped forward. Horizontal distance was measured. The players were given three chances to provide the best readings.

F. Maximal Aerobic Power

The multi stage fitness test or Bleep/beep test was employed to estimate aerobic power adapted from the Australian Sports Commission, Canberra, Australia [13]. Players are required to run a 20 m track back and forth with a series of signals on compact disk. The frequency or audio signals will progressively increased making the running speed increased by time. Players will keep running till exhaustion. VO_{2max} was estimated using methods of [13]. According to [16], a high estimated VO_{2max}, can be used as a common discriminator between starters and non-starters in a rugby team.

G. Statistical Analysis

Data were expressed as mean ± standard deviation (SD) and subjected to ANOVA or student's t test. Statistical significance was set at $p<0.5$ and significant means were subjected to Duncan Multiple post test for ANOVA. Statistical analysis was performed using SPSS V.16.

III. Result and Discussion

The test sequence was performed according to previous studies where players were firstly measured for the standard anthropometry data before a 20 minutes whole body warm up [1,2]. Immediately, the players underwent the flexibility and the lower body power tests. The last test after a 30 minutes break was the multi stage fitness test or Bleep/beep test.

The anthropometric characteristics of rugby players are shown in Table 1. The average age of Malaysian national player was similar to of other nations. The height and body weight of these players were interestingly almost similar to the average selected Australian Rugby League player. The Australia senior league players were 184 $\pm$ 4.5 cm height, 96.1 $\pm$ 3.5 kg weight [14]. These data are statistically similar to the data of Malaysian national rugby players reported in this study. Results also indicated that Malaysian rugby players have mean of 50.37 ± 20.5 mm of four skinfolds with estimated total body fat predicted to be at 19.1 ±4.3%.

TABLE I
ANTHROPOMETRIC CHARACTERISTICS OF SELECTED MALAYSIAN RUGBY PLAYERS

	Mean $\pm$ SD. (n=54)
Age (year)	24.41 $\pm$ 4.06
Height (cm)	174.0 $\pm$ 5.6
Bodyweight (kg)	82.9 $\pm$ 11.9
BMI	27.5 $\pm$ 2.98
Sum of four skinfolds (mm)	50.37 $\pm$ 20.5
Estimated total body fat	19.1 $\pm$ 4.3

The fitness characteristics of rugby players are shown in Table 2. Standing broad jump test might reflect the lower body power. Malaysian rugby players can jump up to a mean of 2.34 ± 0.25 m. Flexibility was tested using sit and reach test and the finding indicate a good result which is 18.05 ± 6.6 cm.

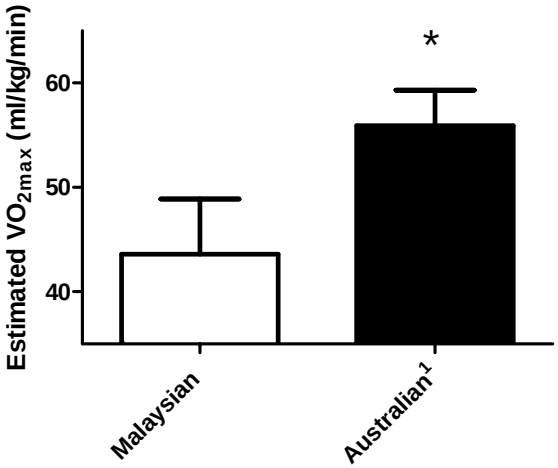
The flexibility of these players was good as reported previously; Asians are generally more flexible than Caucasian [15]. The present study also found that the aerobic capacity of Malaysian rugby player were below average. Average VO_{2max} of 43.6 ± 5.3 ml/kg/min were recorded and this was statistically lower than the average selected Australian league player of 55.9 ± 3.4 ml/kg/min [14]. Figure 1 illustrates the statistically different mean VO_{2max} of both rugby nations. Interestingly, the value of VO_{2max} of Malaysian elite rugby players was statistically similar to that of Australian junior sub-elite rugby league players (Average VO_{2max} of 48.2 ± 4.6 ml/kg/min) [16].

TABLE II
FITNESS CHARACTERISTICS OF SELECTED MALAYSIAN RUGBY PLAYERS

	Mean ± SD (n=54)
Standing Broad Jump (cm)	2.34 ± 0.25
Sit and reach (cm)	18.05 ± 6.6
Maximal aerobic power	
Level, shuttle	L9: S2
Estimated VO_{2max} (ml/kg/min)	43.6 ± 5.3

Table III illustrates the comparison of anthropometric characteristics of forwards and backs of Malaysian rugby players. As expected, forwards had significantly higher body weight, BMI and in our study when compared to their back teammates. There was no differences in their age, even though forwards had a higher mean age. The sum of skinfolds and the estimated total body fat of forwards were higher than backs but did not reached statistical significance (P>0.05). This was in contrast of findings of [1]. They reported forwards having significantly higher skinfold thickness and body fat when compared to the elite rugby backs. The explanation is most likely the lesser number of subjects participated in this current study (n=54) when compared to 98 players in [1]. Furthermore, in this study, the measurement of skinfold only considered in four places (bicep, tricep, subscapular and suprailiac) as suggested by [9]. However, in study done by [2, 4, 6], skinfold thickness measurement done by was done at seven sites (biceps, triceps, subscapular, supraspinale, abdomen, thigh and calf).

Forwards usually were heavier and had greater skinfold thickness compared to forwards and this characteristics suits their role in a rugby game which involving more of tackling and physical collision [16]. Therefore, with higher of body mass, forwards may assist their team with reducing the chances of opposing team players to tackle and bring them down [4, 16].



* Significantly different (p<0.05)
1 Data from O'Connor (1997) [14]

Fig. 1 Comparison of VO_{2max} between Malaysian national and Australian rugby league players

TABLE III
ANTHROPOMETRIC CHARACTERISTICS OF FORWARDS AND BACKS

	Forward (n=28)	Back (n=26)
Age (year)	26.30 ± 5.08	22.5 ± 2.62
Height (cm)	176.9 ± 4.75*	169.6 ±3.39
Bodyweight (kg)	91.3 ± 10.4*	73.8 ± 4.3
BMI	29.2 ± 2.89*	25.7 ± 1.4
Sum of four skinfolds (mm)	64.0 ± 21.5	45.4 ± 14.2
Estimated total body fat	21.3 ± 4.19	17.3 ± 3.72

* Significantly different (p<0.05)

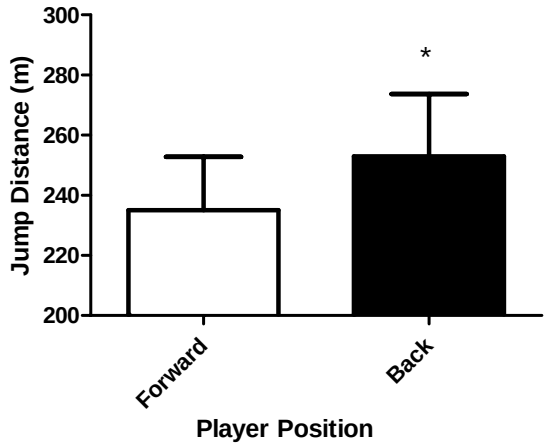
The comparison of fitness characteristics of forwards and backs is illustrated in Table 4. Three criteria of fitness characteristic determined through this initial study which were lower body power, flexibility and maximal aerobic power. The backs were having statistically higher lower body power compared to the forwards. The backs were approximately having 7% more power in their lower body (Figure 2). These results were in contrast to previously reported results of lower body power of elite rugby players having similar lower body power regardless of their playing positions (forwards, adjustable or backs) [1,16]. In this study, backs suspected to be having lower body power compared to forwards due to their lighter weight. Mean weight for backs is 73.8 ± 4.3 kg while forwards is 91.3 ± 10.4 kg respectively (refer to Table III). With heavier body mass, forwards were unable to jump higher as performed by backs.

TABLE IV
FITNESS CHARACTERISTICS OF FORWARDS AND BACKS

	Forward (n=28)	Back (n=26)
Standing Broad Jump (cm)	2.35 ± 0.18	2.51± 0.21*
Sit and reach (cm)	17.6 ± 6.3	20.1 ± 4.4
Maximal aerobic power		
Level, shuttle	L7: S6	L9: S5
Estimated VO_{2max} (ml/kg/min)	40.4 ± 5.5	45.0 ± 4.9

* Significantly different ($p<0.05$)

The backs also having higher means for maximal aerobic power (VO_{2max}) than the forwards but this results were not statistically significant. These results were in agreement to previous study where there were no statistical differences between the maximal aerobic power of forwards and backs in elite rugby players [1]. Interestingly, when compared to junior elite and sub-elite rugby players, VO_{2max} was statistically significant even between playing positions (ie. Forwards vs backs) [16].



* Significantly different ($p<0.05$)

Fig. 2 Standing broad jump results of forwards and backs

Similar to previous studies [1, 2, 16], this present study found that forwards were heavier with greater skinfold thickness/total estimated body fat and BMI. This report is the first (to our knowledge) describing Malaysian national/elite rugby players. Future studies evaluating their skills and tactics will indeed be beneficial not only to the development of rugby in Malaysia but any other nation that want to excel in this exciting sport.

IV. CONCLUSION

In conclusion, the present study reports the current status of selected Malaysian rugby players. Results indicate that although Malaysian rugby players are anthropometrically quite similar to the selected foreign players, the physiological status was far below the normal norms set by other countries. Improvement of these fitness parameters are vital in order to progress in this game internationally. Further fitness testing such as test for speed (10m, 20m and 40m sprint) and agility (505 and Illinois test) can be done as those two fitness characteristics also significantly affect the performance of a rugby players [1,2,4,16]. Moreover, players' performance in fitness training should be always being monitored and improved in order to develop a winning team in the future.

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