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Original Article

Anthropometric Characteristics of Pakistan Rugby Union Players and Differences in Anthropometric Characteristics of Forwards and Backs

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ABSTRACT

Rugby is a contact sport played in Pakistan and worldwide at domestic, national and international level. Rugby union forwards and backs bear differences in anthropometric characteristics which are important while the assortment of players in the team. **Objective:** To describe anthropometric characteristics of Pakistan rugby union players and differences in anthropometric characteristics of forwards and backs. **Methods:** It was an observational study / cross sectional survey. Study was compiled at RCRS after data collection from players. Convenient sampling technique was used and 52 players were enrolled. Stadiometer, Digital weight scale, Skinfold caliper and retractable steel tape was used for data collection. Data were analyzed using SPSS 18.0. **Results:** Mean weight of forwards was 94.3 ± 12.1 kg while that of backs was 71.2 ± 12.0 kg. The mean of the sum of the eight skinfold measurements of forwards was 150.9 ± 24.9 mm, and that of backs was 93.5 ± 33.9 mm. Mean body fat percentage of forwards was 19.2 ± 2.9 %, while backs have 12.4 ± 4.5 %. Mean fat mass of forwards was 18.2 ± 4.4 kg, and of backs was 9.1 ± 4.94 kg. **Conclusions:** Rugby union forwards and backs have significant differences in anthropometric characteristics with respect to body weight, skinfold thickness, girth measurement, and body fat percentage, all higher among forwards. No difference was observed in age and stretch stature.

INTRODUCTION

Rugby is a contact sport played worldwide. World's first rugby football union (RFU) was established in England in 1871. Later the game was introduced to other countries as well. The first rugby union was founded in Ceylon in 1879. Rugby was introduced in Karachi in 1925 by gymkhana club members. Asian Rugby Football Union (ARFU) was founded on 15 December, 1968 with eight member unions [1]. The Pakistan Rugby Union was founded in 2000 as the representative of the Rugby in Pakistan. From November 2003 Pakistan has become a regular member of International Rugby Board. Now it has membership of the World Rugby, The Asia Rugby, and The Pakistan Olympic Association. It is also the Governing body of the rugby by the Pakistan Sports Board [2]. Now the game is growing at domestic level in Pakistan due to efforts of rugby union. World Rugby has started its Mass Participation Program "Get into Rugby" and Pakistan is most active member of it. At domestic level, multiple competitions are arranged at senior and junior level for both men and women. Opportunities are also available for women rugby players.

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Time to time training and development courses are arranged by the Pakistan rugby union for training of professional players to improve their skills and competencies. Pakistan rugby has four Provincial Associations (Punjab, Sind. KPK and Baluchistan) and two regional units (Islamabad and FATA), five departments at government level (Army, Police, HEC, Railways and WAPDA) [2, 3]. Now days, Rugby is being played globally at elite as well as sub-elite levels. A standard game lasts for 80 minutes, consists of two halves with 10 minutes break or rest time. Fifteen players participate from each team and all of them have specific playing positions. Of these fifteen players eight forwards are in the scrum and seven backs spread throughout the field [4]. Anthropometry is the branch of human sciences dealing with the measurement of the human body in terms of the dimensions of muscle and bone, body shape, size, body fats, mobility, strength and working capacity [5, 6]. It is essential to identify the important key factors which determine a productive performance during a match while choosing elite players. To determine which position is most suitable for a given athlete it is commonly done by assessing anthropometric characteristics. Body mass, standing height, sum of skinfolds and circumference (girth) measurements are often most commonly measured anthropometric measures. Physical abilities that a player possesses depict his ability levels to cope up high in rugby sport. Sevens rugby players are required to have greater sprinting ability and aerobic power and less recovery time required for repetitive sprints. A fewer total players and smaller duration of match in rugby sevens is considered a running dominant game with higher sprinting abilities [7, 8]. Previous researches in rugby union have revealed greater differences in the anthropometric characteristics of forwards and backs, revealing forwards usually being heavier and bigger and retain greater total upper and lower body strength and power, whereas backs are usually faster and leaner having more aerobic power [9]. Anthropometric profile of rugby players is required to meet the increasing training and game demands at succeeding levels [10]. Studies have revealed that anthropometric characteristics increase with each playing level [11]. Disparities in the physiological and anthropometric characteristics of sub-elite rugby league forwards and backward lines is noticeably lighter in backs and displaying greater muscle power, speed, and gauged maximal aerobic power as compared to forwards [12]. 85-95% of the Rugby League game consists of low intensity physical activity like walking with normal pace or standing still. Rugby Union consists 85% of low intensity activity while Soccer consists of 88% [13]. Sprints and tackles hike the overall intensity of the game which are described under the category of high-intensity physical activity. The global ratio of high to low-intensity physical activity has been gauged as 1:6 for forwards and 1:8 for backs because forwards spend more time carrying out tackles while backs spend more time in carrying out high-intensity physical activity such as running [14]. Descriptive studies on the physical attributes of female rugby players have shown that forwards gravitate to be heavier and larger than backs. Rigg and Reilly correlated the players on the bases of different tests. In terms of body size, body weight and height have most consistent anthropometric differences between farwards and backs. US female college rugby players showed that in terms of aerobic power the performance of forwards was significantly better than backs. Whereas no such difference or change was noted on agility run [15]. Considering the anthropometric and physiological attributes and game-specific competences that show prejudice between players in rugby sport will direct coaches, trainers and researchers to develop highly compelling training plans and provide specific tests to screen players' dexterities [16]. It is now well documented that physical limitations can constrain skilled performance. The importance of development of these physical characteristics is reduced if a physical parameter does not lead to improved skilled performance. Tackling ability and high physical fitness indicate the performance during a competition. An equally important factor is the procurement of such game specific skills [17]. Even with the potential value of anthropometric, physiological and skills potential to playing performance, and regular assessment of these qualities, there is presently limited evidence to accurately assess their input to rugby playing performance [18].

METHODS

It was an observational study / cross sectional survey. Data was collected from different places including UMT, UOL and DHA H-Block stadium. Study was compiled at Riphah College of Rehabilitation Sciences Lahore. Study was completed in 6 months after the approval of synopsis. Convenient sampling technique was used for data collection. 52 players of Pakistan rugby Union were enrolled in this study. Since the total population of rugby players was less than 100 so instead of sample whole population of rugby players present at that time were selected. Only male players with 18 years of age or above and who have played at least 1 match at domestic level with proper health and free from any injury were included while players who were physically or mentally unfit, who never played at domestic level and who were not involved in their regular conditioning programs were excluded from the study. All the players who met the selection criteria were

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enrolled for the study. All of them were explained the purpose of the study, including the risks and benefits of participation, and written consent was taken. They were free to withdraw from the study at any time. All the procedures were safe and approved by the ethical review board and written permission was granted from the ethical review board of the university. Demographic data were gathered on a pre-designed questionnaire. Information regarding the years of playing rugby, number of national and international matches played and positional sub groups were also recorded on the same questionnaire. Anthropometric measurements were taken according to the protocols provided by ISAK [19]. ISAK provides internationally accepted standardized guidelines and protocols for the measurement of anthropometric characteristics. All measurements were taken and data was recorded by two trained physiotherapists following the guidelines of ISAK, along with one official physiotherapist of Pakistan rugby union. Body mass was measured using a portable digital weight scale measuring up to 0.01 kg. Weight scale was placed on a firm and even surface and calibrated to reading zero. Weight was taken with shoes off and minimal dressing in football shorts. Stretch stature was measured using a portable stadiometer measuring up to 0.1 cm. participant stands with shoes off, feet together, heels, hips and upper back touching the scale of the stadiometer and head was positioned in Frankfort horizontal plane. Before taking measurement player was asked to take a deep breath and hold it. Stretch stature and body mass measurements were used to compute BMI of the players. Skinfold thickness was measured using a skinfold caliper and measurements were taken from eight sites including biceps, triceps, subscapular, iliac crest, supraspinale, abdominal, front thigh and medial calf. Following the ISAK instructions skin folds were grasped between thumb and index finger of left hand and measurement was taken with skinfold caliper in right hand. Caliper was held at 90 degree to the skin at a distance of 1 cm away from index finger and thumb. Surface land marking and Girth (circumference) measurements were taken using a retractable steel tape. Girths measurements recorded were arm relaxed, arm flexed and tensed, waist, gluteal, and calf. All measurements were taken twice on the right side of the body and a mean of the two was used for further computation to produce results. Utilizing skinfold measurements and girth measurements, body fat percentage and lean body mass were calculated with the help of Jackson and Pollock equation [20]. Data were entered and analyzed by using computer software SPSS 25.0.

It was an observational study / cross sectional survey. Data was collected from different places including UMT, UOL

RESULTS

27 backs and 25 forwards were among the 52 players that took part in the study. Rugby union forwards and backs had a mean age of 24.3 and 23.7 years, respectively. The age difference between the forwards and the backs was non-significant. Mean weight of forwards was 94.3 ± 12.1 kg while that of backs was 71.2 ± 12.0 kg. Forwards' mean stretch height was 174.6 cm with a 4.3 cm SD, while backs' stretch stature was 173.1 cm with a 5.5 cm SD. In terms of stretch stature, there was no discernible difference between forwards and backs as presented in Table 1.

Demographics	Position of player	Mean ± SD	Sig. (2-tailed)
Age	Forwards	24.36 ± 3.29	0.522
	Backs	23.78 ± 3.23	
Weight	Forwards	94.32 ± 12.14	0.000
	Backs	71.27 ± 12.05	
Stretch Stature	Forwards	174.696± 4.38	0.276
	Backs	173.17 ± 5.52	
BMI	Forwards	31.27± 4.42	0.000
	Backs	23.59 ± 3.53	

Table 1: Summary Table of Demographics

The mean of the sum of the eight skinfold measurements of forwards was 150.9 ± 24.9 mm, and that of backs was 93.5 ± 33.9 mm as shown in Table 2.

Skinfold Measurement	Position of player	Mean ± SD	Sig.(2-tailed)
Triceps	Forwards	16.04 ± 2.98	0.000
	backs	10.074 ± 3.46	
Sub-scapularis	Forwards	22.28 ± 4.41	0.000
	backs	13.85 ± 5.18	
Bicep	Forwards	8.32 ± 1.93	0.000
	backs	4.74 ± 1.81	
Illiac Crest	Forwards	24.88 ± 4.17	0.000
	backs	15.89 ± 6.56	
Supra-spinale	Forwards	18.76 ± 5.38	0.000
	backs	10.52 ± 6.09	
Abdominal	Forwards	29.56 ± 5.42	0.000
	backs	18.07 ± 6.63	
Front Thigh	Forwards	15.96 ± 3.61	0.000
	backs	11.26 ± 3.39	
Medial Calf	Forwards	15.1200 ± 3.28278	0.000
	backs	9.2222 ± 4.34417	
Sum of 8 Skinfolds	Forwards	150.9200 ± 24.98653	0.000
	backs	93.5556 ± 33.97661	

Table 2: Group Statistics of Skinfold Measurement of Forwards and Backs

Mean body fat percentage of forwards was 19.2 ± 2.9 %, while backs have 12.4 ± 4.5 %. Mean fat mass of forwards was 18.2 ± 4.4 kg, and of backs was 9.1 ± 4.94 kg as depicted in Table 3.

Girth Measurements	Position of player	Mean ± SD	Sig.(2-tailed)
Arm Relaxed	Forwards	34.44 ± 2.68	0.000
	backs	28.94 ± 3.133	
Arm Flexed and Tensed	Forwards	37.14 ± 3.08	0.000
	backs	32.00 ± 3.43	
Calf	Forwards	41.37 ± 2.68	0.000
	backs	35.97 ± 3.09	
Waist	Forwards	99.94 ± 8.67	0.000
	backs	83.05 ± 8.10	
Gluteal	Forwards	107.41 ± 6.03	0.000
	backs	95.92 ± 7.13	
Body Fat Percentage	Forwards	19.28 ± 2.99	0.000
	backs	12.41 ± 4.55	

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Girth Measurements	Position of player	Mean ± SD	Sig.(2-tailed)
Fat Mass	Forwards	18.28 ± 4.4	0.000
	backs	49.11 ± 4.48	
Lean Body Mass	Forwards	76.20 ± 8.59	0.000
	backs	61.96 ± 8.54	

Table 3: Girth Measurements and Body Composition of Forwards and Backs

DISCUSSION

This study is rst of its nature in Pakistan to explore the anthropometric characteristics of Pakistan rugby union players and positional differences of these anthropometric characteristics in rugby. Results of the study provided valuable information about anthropometric characteristics of Pakistan rugby union players and reveals that there are differences in the anthropometric characteristics of rugby union forwards and backs. These results are similar to previous studies conducted on rugby players in Asian and other countries. However, there was no significance difference in anthropometric characteristics of forwards and backs with respect to age and stretch stature. Of the 52 players who participated in the study there were 25 forwards and 27 backs. Mean age of rugby union forwards and backs was 24.3 years and 23.7 years respectively. There was no significant difference of age in forwards and backs. In another study conducted by Gabbett et al., mean age of forwards (28.6) was found to be greater than backs (24.2) [21]. Current study reveals that mean weight of forwards was 94.3 kg, while that of backs was 71.2 kg. There was significant difference (P=0.05) in the weights of forwards and backs. According to their activities forwards were heavier in weight as compared to the backs. As forwards are frequently involved in collisions and tackles, having an advantage of greater weight to produce greater momentum and are able to easily tolerate high impact forces. While low body weight in backs favors them in running and sprinting activities while carrying the ball. These results of body weight closely resembles with the results of a study conducted on Malaysian rugby players with mean weight for forwards 91.3 ± 10.4 kg and backs 73.8 ± 4.3 kg respectively. The mean stretch stature of forwards was 174.6 cm with a SD of 4.3 cm, while backs have stretch stature of 173.1 cm with a SD of 5.5 cm. No significant difference was found in stretch stature of forwards and backs [22]. Mean BMI of forwards was 31.2 kg/m2 (SD 4.4 kg/m2), while mean BMI of backs was 23.5 kg/m2 (SD 3.5 kg/m2). Forwards possess considerably (P=0.05) higher BMI as compared to the backs. This finding was in agreement with the study of Marwaha et al., who conducted his study on rugby players in India and found similar results [23]. Similar results were also found in Malaysian rugby players [22].

CONCLUSION

Rugby union forwards and backs have significant differences in anthropometric characteristics with respect to body weight, skinfold thickness, girth measurement, and body fat percentage, all higher among forwards. No difference was observed in age and stretch stature.

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