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Research Article

Performance Testing in Indian Rugby League Players

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Abstract: Success in rugby league football seems heavily reliant on players possessing adequate position specific, physical fitness qualities such as strength, power, speed, agility, endurance, and individual skills. The purpose of this study was to compare specific fitness components of strength, speed and power of Indian rugby league players & to determine if there were position specific fitness differences within the players. A experimental study with total of 40 (26 males & 14 females) rugby union team players, average body mass of the players (26.10± 3.77), average height (168.22± 7.88 cms), competing at a national level, underwent measurements of body mass, muscular power (vertical jump), speed (10m & 40m sprint), muscle strength of upper limb (bench press) and lower limb (squat). Forwards were significantly (p= 0.002) heavier than backs. The backs were significantly faster (p=0.008) than forwards over 10m sprint. Back had significantly (p=0.00) greater power than forwards. When data was analysed according to position of players, it was found that the no significant differences were found between forwards and backs over 40m sprint (p=0.21), upper limb strength (p=0.06) and lower limb strength (p=0.06). We hereby conclude from our study that the speed in back players for a 10m sprint, power during vertical jump is significantly more than that of the forward players.
Keywords: Fitness testing, Position specific training, Rugby.

INTRODUCTION

Rugby league is an international collision sport played at semi professional and professional levels which involves two teams of 15 players. Rugby match is 80 minutes in duration competing for possession of the ball and scoring a goal. The game is played over two 30 - 40 min halves separated by a 10 min rest interval power [1, 2].

There are two major groups in a game of rugby; the forwards (ball winners) and backs (ball carriers) players. Each of the players within the two groups has a specific role to play based on the physical demands of their position & their physical & physiological characteristics [3]. While their high physical performance qualities are likely to contribute to effective playing performance power [4].

Physical tasks like scrummaging, rucking & mauling place unique physiological demands on the different playing positions within the forwards & requires even greater strength & power [4]. Success in rugby heavily relies on players possessing an adequate degree of various physical fitness qualities, such as strength, power, speed, agility, and endurance, as well as the individual skills and team tactical abilities [5].

The primary focus of earlier studies has been to develop effective training programs aimed at improving athlete's abilities, but still in some countries during recruitment & development of rugby players Less emphasis is placed on the specific physiological requirements of playing positions; which can be enhanced if emphasis is also given on understanding of the movement patterns and assessment of physiological demands of different positions of players region wise, countrywide. It would allow the development of strength and conditioning programs to meet the precise requirements of these positions power [1].

Several studies have attempted to detail the optimal physiological requirements of various countries' rugby players [6, 7]; but as there are genetic, nutritional, environmental etc variations in different regions anthropometric and physiological requirements will vary but it has a important implications in team selection and highlight the necessity for individualized training programmes and also there is paucity of research on Indian rugby player's abilities & position specific performance assessment; this study is conducted to compare specific fitness components and

to determine if there were position specific differences within the Indian rugby players

METHODOLOGY

Forty players (26 males & 14 females) of Indian Rugby Football Union participated in this study, aged between 18-25years (Table 1). All subjects received a clear explanation of the study, including the risks and benefits of participation and written informed consent was obtained from players and the coach. The study was approved by the institutional review board ECR/90/Inst/MH/2013.

All tests have been performed in the off season. However, players with neck pain, back pain, fractures, and soft tissue injuries were excluded from this study. Average height (168.22 $\pm$ 7.88cms) & BMI (26.10 $\pm$ 3.77) of all players were calculated. A warm up of 15 minutes was made a mandatory pre requisite before the tests.

- Sprint testing was done over a distance of 10 and 40 metres with the players positioned in a 4- point crouched position behind the starting line. Players were instructed to run as quickly as possible along the 10m and 40 m distance. Speed was measured with stopwatch. All tests were conducted on a well grassed surface. Three trials were taken. 120 second's recovery time was given between each trial. The best reading has been taken into consideration [8].

- For strength testing of upper limb, players were assessed by one repetitive maximum bench press with a barbell using free weights.

  The players performed a warm up with 4-6 repetitions of sub maximal bench press and then lifting progressively heavier resistance to 1Repetitive Maximum (1RM).The hand position was selected by the players and Foot position was recorded on the bench, which was consistent over consecutive attempts and tests. The barbell was lowered to a position where the elbows were at 900 and then the barbell was pushed vertically upwards. The result was recorded on recording sheet. Assessor position was 45º to front of athlete level with hips to facilitate observation of feet, shoulders and buttocks and bar contacting chest [9].

- For strength testing of the lower limb, Players were assessed by 1RM Squat test with a barbell using free weights

  The players performed a warm up with 4-6 repetitions of sub maximal squat and then lifting progressively heavier resistance till 1 RM was reached. Players have assumed a natural stance with feet approximately shoulder width apart. Bar was held in a 'high' bar position on the trapezius during test. Hands should be held in a comfortable position close to shoulders. During the lowering action knees should go forward over toes. Heels were in contact with the floor at all times during test. The depth of the squat was determined as the top of the thigh being parallel to the floor below. 1RM was recorded on recording sheet [9].

  Assessor position was on the side of the athlete to facilitate observation of hip/knee angle, back posture and depth .

- Power testing with vertical jump test: Subjects were made to stand away from the wall, with feet flat on the floor. With the marker held in the hand, they reached as high as possible to make a mark on the wall with the dominant hand. They were asked to lower the dominant hand and perform a countermovement squat by flexing the hips and the knees, moving the trunk forwards and downwards and swinging the arms backwards in order to jump to their maximum ability. The dominant hand reaches upwards. Three trials were given with a three minute recovery period between each trial. Best of the three was taken as the final reading which is assessed by measuring the difference between players standing reach & their maximum jumping reach from a semi-crouch position [10].

Data Analysis

Unpaired t-test (Independent t-test) was used to compare speed, strength, power fitness components between two groups. The level of significance was set at $p \leq 0.05$ and all data are reported as means and confidence interval set at 95% .All the analysis was done using SPSS version 12.

RESULTS

Table 1 shows a summary of the body mass characteristics of the forward and back players. When data was analysed according to position of players, it was found that the Forwards had a greater mean body mass than Back players. There was a statistically significant (p= 0.002) difference between the two groups for body mass index. A significant difference (p=0.008) was shown between the Backs and Forwards over the 0-10m sprint distance; Backs were significantly faster than forwards. Back had generated significantly (p=0.00) greater mean power per kilogram of the body mass during the countermovement jump than forwards. In terms of speed and strength, although the results indicated the forwards had a greater mean upper limb (p=0.06), lower limb strength (p=0.06), greater sprinting speed over 40m (p=0.21), but independent t test showed that these differences were not statistically significant in Table 2.

Table 1: Demographic Data

Sl. No.		
1	**No. of Players**	40
2	**Gender**	
	Male	26
	Female	14
3	**BMI**	
	Forward	27.90± 3.66
	Back	24.30 ± 3.01

Table 2: Fitness components

Fitness components	Position of Players		p value
	Forward	Back	
Body Mass Index	27.90± 3.66	24.30 ± 3.01	0.002*
Power testing (VJT)	43.59 ± 3.28	48.41 ± 3.88	0.00*
LL strength (Kg)	98.52 ± 19.83	84.88 ± 24.48	0.06
UL strength (Kg)	85.28 ± 16.28	75.85 ± 14.41	0.06
Speed of 10meter sprint (sec)	2.61 ± 0.11	2.45 ± 0.22	0.008*
Speed of 40metersprint (sec)	6.37 ± 0.79	6.04 ± 0.89	0.21

* significant (p<0.05), UL – Upper limb, LL- Lower Limb, VJT- Vertical Jump Test

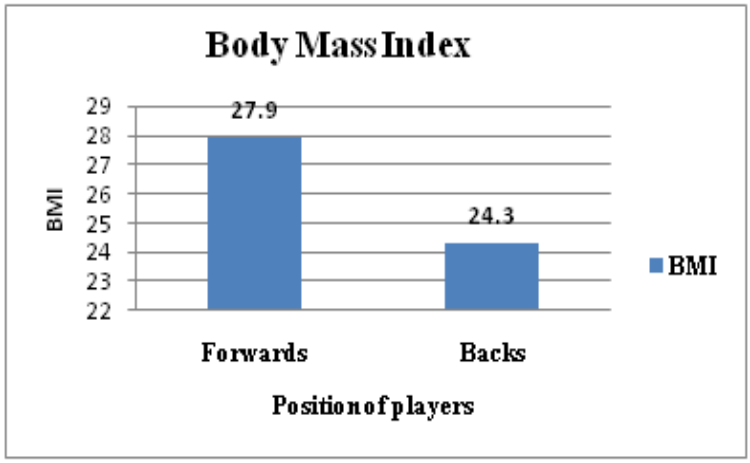

Fig. 1: Body Mass Index

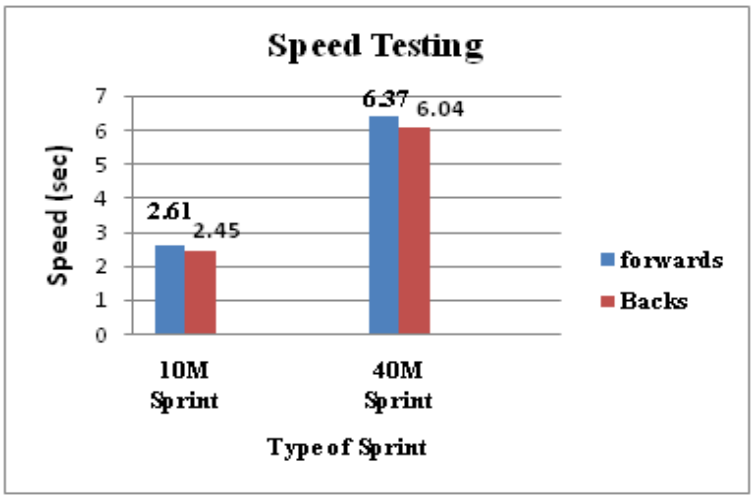

Fig. 2: Speed testing

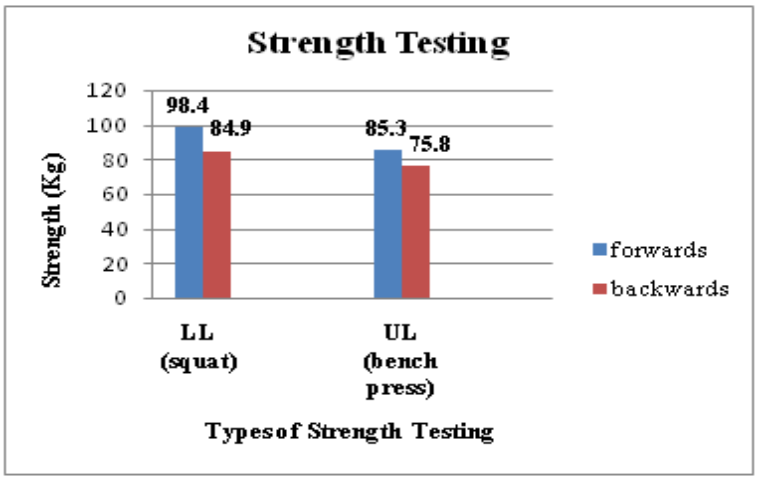

Fig. 3: Strength testing

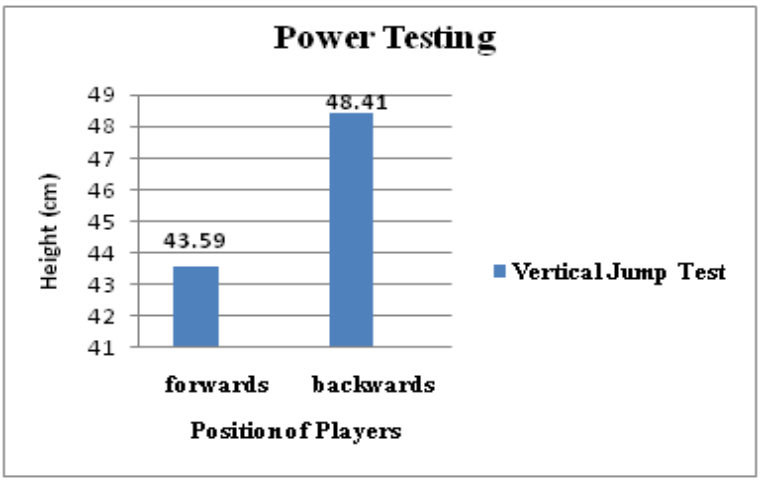

Fig. 4: Power testing

DISCUSSION

Rugby league is a body contact sport that is played at amateur, semiprofessional and professional levels [11, 12]. Senior rugby league match typically lasts for 60–80 minutes that involves frequent intense bouts of running and tackling, interspersed with short bouts of recovery [12-14]. Thus, rugby league is physically demanding that requires players to draw upon a variety of fitness components like strength, speed and muscular power [14].

The players in the game have a specific role to play with respect to their position and the physical demands. Forwards have significantly greater body mass (27.90) than backs (24.3) as shown in Fig. 1.

Often selection criteria for the position of forward players generally involve players with higher body mass as it favors the physical demands of the position to generate greater momentum and to tolerate high impact forces in tackles [15]. These differences reflect the different roles [16]; heavier players have increase force producing capability [7]. Forwards being involved in a higher number of physical collisions and tackle, backs spending more time running and carrying the ball [16].

The difference between the sprinting speeds as in Fig. 2 can be attributed to the fact that Rugby players very rarely are required to run more than 40m in a single bout of intense activity. At the same time, Forward players perform fewer sprints & cover less distance (<10m) as compared to backs [17]. However, Secondly, because of higher body mass, there is a reduction in the 10metre sprint speed in forwards (2.61 sec) than backs (2.45 sec) as shown in Table 2 depicting slower acceleration & high speed may be achieved, when sprints are commenced from striding effort rather than from stationary as in forward players [3]. The insignificant difference in the speed of 40m sprint between the two groups may be due to the fact that similar training patterns exist for both (Forward & Back) players.

Comparison of average upper limb and lower limb strength between the forwards and the back players in Figure 3 shows that the forwards have better strength (UL-85.28,LL- 98.52 kg) than

Backs(75.85,LL-84.88 Kg) but the difference between the two groups is not significant.

Forwards mainly Experience static muscle load, slower speed during scrumming, tackling & dynamic muscle load, fast speed during sprints; this varied nature of force application on forward players develops their static and dynamic strength on account of contact components of the game.

Also, their requirement in short duration, intermittent, high intensity efforts causes muscle adaptation in forward players. The higher body mass in forwards is required to generate and tolerate high impact forces in tackling; this may lead to an increased muscular strength [18] but lack of proper training to forward players attributed to the insignificant differences of strength between both group players

Comparison of power between forwards and back players in Figure 4 shows that Backs demonstrated significantly greater power during vertical jump (48.41cm) ($p<0.05$) than forwards (43.59 cm) with a significant difference within the two groups (Table 2).

The ability to generate high levels of muscular power is an important attribute of rugby league players. Players are required to have high levels of muscular power to effectively perform the tackling, lifting, pushing, and pulling tasks that occur during a match [19].

Forwards are involved in short duration, high intensity work so when velocity increases it produces less force or enough time is not given to the muscles to generate all force required for that work. On the contrary, Backs are slower, lighter but more powerful as during their effort enough time to use more of the available muscles is there & hence more force production during muscular work.

The differences in vertical jump height, therefore, may be a result of the higher mean body mass in the forwards reducing higher vertical jump displacement [20, 21].

The results of this study show that the physiological and anthropometric characteristics of rugby league players are poorly developed with respect to sprinting speed and strength. Furthermore, these findings suggest that position specific training does not occur in rugby league players. Training for the forwards should emphasise on higher work rates of the game, while extended rest periods can be provided to the backs [21]. Limitations of this study was Timing mats and timing gates were not used for vertical jump test and sprints respectively, Skin fold measurement was not done for the anthropometric measurement and no comparison between the male and female players has been done due to uneven data.

CONCLUSION

We hereby conclude that the physiological and anthropometric characteristics of rugby league players are poorly developed with respect to sprinting speed and strength. Forward Players had greater body mass than Back players but Back had greater speed over 10m sprint distance and also showed a higher countermovement jump displacement of COG as compared to the forwards.

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