ASSESSMENT OF ANTHROPOMETRIC AND PHYSIOLOGICAL PARAMETERS IN RUGBY PLAYERS BEFORE, DURING AND AFTER TRAINING

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Introduction

Rugby league is an international sport played at junior and senior levels by amateur semi-professional and professional competitors (Gabbett, 2000). The physiological demands of rugby, like other football codes, are complex when compared with individual sports such as running, swimming, cycling. The important body movements in this game involve catching, holding, locking and jumping. Thus, the possession of desirable anthropometric and physiological characteristics such as lung function parameters will have a greater advantage in executing a better performance in competition. To date, most of the studies have investigated the physiological and anthropometric characteristics of rugby players, with little emphasis on the effect of training on those parameters. An understanding of such effects would allow making changes in training programmes to meet the specific requirements of the players. However, no published studies on investigating anthropometric and lung function characteristics of rugby players or the effect of rugby training on them are available in Sri Lanka. Hence this study was carried out to obtain anthropometric and physiological profiles of rugby players and to assess the effect of training on anthropometric and respiratory parameters.

Materials and Methods

In total, eleven healthy rugby players with a mean (±SD) age of 22.9 (±3.3) years volunteered for this study. Playing experience of the players averaged 6 ± 3.3 (mean ± SD) years. Ethical clearance was obtained from the Ethical Review committee, Faculty of Medicine, Peradeniya.

The rugby season lasted for 9 months. Measurements were taken at the beginning of rugby (before training), 4 months after training commenced (during training) and, when the season was over (after training).

Anthropometric measurements: Standing height, body mass, skinfold thickness and waist circumference were measured using standard techniques.

Lung Function Tests: Vital capacity (VC), Forced vital capacity (FVC), Forced expiratory volume in one second (FEV1), Forced expiratory

ratio (FER), Peak expiratory flow rate (PEFR), Flow rates at 50 % and 25% lung capacity ($V_{max\ 50}$ and $V_{max\ 25}$ respectively) were measured using an electronic spirometer.

Differences in the physiological and anthropometric characteristics during 3 different sessions (before, during and after training) were compared using repeated measures ANOVA followed by Bonferroni correction. The level of significance was taken at $p<0.05$.

Table 1: Comparison of anthropometric measurements before, during and after training

Parameter	Before training Mean ± SD	During training Mean ± SD	After training Mean ± SD
Weight (kg)	82.3 ± 14.4	83.9 ± 15.2	83.9 ± 14.5 (n.s.)
Skinfold thickness			
Triceps (mm)	9.7 ± 4.5	7.9 ± 3.9	8.9 ± 3.5 (n.s.)
Biceps (mm)	5.3 ± 1.5	4.0 ± 0.9	4.2 ± 1.6 (n.s.)
Suprailiac (mm)	11.9 ± 3.8	9.6 ± 2.7	12.4 ± 4.6 (n.s.)
Subscapular (mm)	15.6 ± 5.8	12.5 ± 5.3	14.7 ±6.0 (n.s.)
Waist circumference (cm)	35.7 ± 3.9	33.8 ± 3.9	34.9 ± 3.6 (n.s.)

N=11; n.s =any of the parameters are not significant

Results

Anthropometric Characteristics: The mean ± SD of age, height and playing experience of the players were 22.9 ± 3.9 years, 180.0 ± 6.3 c.m, and 6 ± 3.3 years respectively. The means and SD of weight, skin fold thickness and waist circumference of players before, during and after training are presented in Table 1. A slight increase in body weight and a decrease in skin fold thickness and waist circumference were observed with training. But the changes are not significant for all parameters.

Lung Function Parameters: The means and SD of all respiratory parameters of 11 players are presented in Table 2.

VC, FVC and FEV_1 values of players during training were significantly greater $p=0.01$, $p<0.05$ and $p<0.001$ (respectively) than those before training. The flow rates (PEFR, $V_{max\ 50}$ and $V_{max\ 25}$) were higher during training but the increase was not significant. None of the parameters were significantly different between during training and after training.

Discussion

Studies have shown improvement in physiological characteristics after a period of training or competition. Burke, *et al* (1986) studied the seasonal changes in body composition in Australian footballers and found a significant or not significant gain

Table 2. Lung function parameters before, during and after training of rugby players

Parameter	Before training (BT) Mean ± SD	During training (DT) Mean ± SD	After Training (AT) Mean ± SD	Significance
VC (L)	4.6 ± 1.2	5.9 ± 0.83	5.4 ± 0.76	BT vs DT p= 0.01
FVC (L)	4.4 ± 0.76	5.6 ± 0.73	5.0 ± 1.2	BT vs DT p< 0.05
FEV_1 (L)	4.0 ± 0.60	5.3 ± 0.61	4.7 ± 0.85	BT vs DTp<0.001
FER (%)	95 ± 13.7	93.8 ± 5.5	96.7 ± 15.4	BT vs DT n.s.
PEFR (L/sec)	11.2 ± 2.0	13.0 ± 2.2	11.6 ± 2.7	BT vs DT n.s.
V_{max50} (L/sec)	5.7 ± 1.8	7.0 ± 2.2	5.7 ± 2.3	BT vs DT n.s.
V_{max25} (L/sec)	3.3 ± 1.4	4.1 ± 1.2	3.6 ± 1.2	BT vs DT n.s.

N=11; n.s =not significant

in body mass and no change in body fat depending on the level of players. In contrast, the current study in rugby players showed a reduction in body fat, and increased body mass although they are not significant among the seasons especially after the training. The reason for not observing a significant difference could have been due to year round involvement of sports and the result of initial high levels of conditioning. Also, the rugby team under study was a top level team who maintains a higher level of activities during the pre-season and begins the season with a lower level of body fat. Any loss of body fat during the season is therefore, minor. The small sample size of the team also could have been a factor for the findings not being significant. In the present study, it was found that all lung capacities and flow rates were higher after training. This might have been brought about by the fact that physical training improves the strength of respiratory muscles. The current study provides a base for future studies on lung function parameters in rugby players.

Conclusions

This study provides a relatively comprehensive profile of the physiological and anthropometric characteristics of a rugby team in Sri Lanka and provides a basis for further studies designed to assess those qualities needed for successful participation in the sport. However, further research is needed with a larger sample involving many rugby teams in Sri Lanka.

References

Burke, L.M., Gollan, R.A. and Read, R.S.D. (1986). Seasonal changes in body composition in Australian Rules Footballers. Brit. J. Sports. Med., 20: 69-71

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