A Study of Speed, Power & Fatigue Index of Cricket Players

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Abstract

The purpose of this investigation was to study speed, power and fatigue index of under 19 year cricket players. The design of this study required participants to perform six sprints each of 35 meter. Thirty one (N=31) trained male cricketers between the ages of 15 and 19 years volunteered for this study. The mean age, height and weight of cricketer were 16.81±1.13year, 172.23±6.85cm and 61.33±8.93Kg respectively. The mean sprint time of each 35m sprints-of cricketers was 5.39±0.34 seconds, 5.53±0.31 seconds, 5.61±0.36 seconds, 5.85±0.26 seconds, 5.94±0.25seconds and 6.07±0.17 seconds. The mean power-1, 2,3,4,5 and 6 of cricketer was 491.00±105.90 watts, 454.90±94.81watts, 435.23±90.49 watts, 382.84±78.54watts, 364.68±78.62watts and 339.94±58.96watts.The maximum power, minimum power and average power of cricketer was 511.55±94.97watts, 333.71±65.83watts, and 411.42±73.59 watts. It was concluded from the results of this study that sprint time and power decline in cricketer may be due to reduced energy production via anaerobic glycolysis and muscle acidosis.

Key words: Speed, Power, Anaerobic glycolysis, Fatigue

Introduction

Although cricket is one of the oldest organized sports, there is a relative lack of scientific research of this sport or its players. Very few studies of the physical and physiological demands of cricket playing are available in the literature *(Woolmer & Noakes, 2008; Christie & King, 2008).* International cricket is undergoing a phase of rapid change as it competes to attract a more global audience. International cricketers are now exposed to greater demands reflected by more five-and one day matches per season, longer seasons and more frequent touring *(Noakes & Durandt, 2000).* Thus, there is a real need to understand critically the physiological demands of modern cricket, initially for the benefit of individual players and teams, but eventually for the survival and growth of the game itself. Due to the nature of cricket that demands varying degress of intermittent activities such as batting, bowling, fielding, anaerobic power and capacity is of great interest to those involved in the sport, as most rely heavily on players' ability to move quickly and powerfully. Sprint running times have been shown to be well correlated to peak and mean power output *(Patton & Duggan, 1987).* The purpose of this investigate was to evaluate the speed, power and fatigue index (i.e. anaerobic power and capacity) of under 19 year cricket players.

Materials & Methods

The design of this study required participants to perform six sprints each of 35 meter. A rest of 10 second was given to the participants between each sprint. Thirty one (N=31) trained male cricketers between the ages of 15 and 19 years of Punjab Cricket Academy volunteered for

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this study. Sprint running style requires specific set of technique for the assessment of anaerobic power and capacity. Hence, a cricketer population was deemed to be more familiar with the skill set required for cricket style than the athletes of other sports. The use of trained participants with experience of sprint running style has generated no questionable results either due to inefficiency of movement due to lack of familiarity or due to the physiological adaptations of completely unfamiliar training. The power and fatigue index was calculated using the equations of *Draper and Whyte (1997).*

Statistical Analysis

Statistical analysis was performed with SPSS version 16.0 (free trial, SPSS Inc, Chicago). Mean and Standard Deviation was observed for age, height, weight, speed, power and fatigue index.

Results & Discussion

The mean age, height and weight of cricketer were 16.81±1.13year, 172.23±6.85cm and 61.33±8.93Kg respectively. The mean sprint time 6 sprints of each 35m with rest intervals of 10s between each trial of the cricketers was 5.39±0.34 seconds, 5.53±0.31 seconds, 5.61±0.36 seconds, 5.85±0.26 seconds, 5.94±0.25seconds and 6.07±0.17 seconds (Table 1). The mean power-1, 2,3,4,5 and 6 of cricketers at each trial was 491.00±105.90 watts, 454.90±94.81watts, 435.23±90.49 watts, 382.84±78.54watts, 364.68±78.62watts and 339.94±58.96watts respectively. In addition, the maximum power, minimum power and average power of cricketer was 511.55±94.97watts, 333.71±65.83watts, and 411.42±73.59 watts (Table 1).

Table 1: Descriptive Statistics of male cricketers

Variables	Mean	SD
Age, year	**16.81**	**1.13**
Height, cm	**172.23**	**6.85**
Weight, kg	**61.38**	**8.93**
Sprint time-1,seconds	**5.39**	**0.34**
Sprint time-2,seconds	**5.53**	**0.31**
Sprint time-3,seconds	**5.61**	**0.36**
Sprint time-4,seconds	**5.85**	**0.26**
Sprint time-5,seconds	**5.94**	**0.25**
Sprint time-6,seconds	**6.07**	**0.17**
Power-1,watts	**491.00**	**105.90**
Power-2,watts	**454.90**	**94.81**
Power-3,watts	**435.23**	**90.49**
Power-4,watts	**382.84**	**78.54**
Power-5,watts	**364.68**	**78.62**
Power-6,watts	**339.94**	**58.96**
Maximum power, watts	**511.55**	**94.97**
Minimum power, watts	**333.71**	**65.83**
Average power, watts	**411.42**	**73.59**
Fatigue index	**5.20**	**1.92**

The mean fatigue index of cricketers was 5.20 ± 1.92 (Table 1). Table 2 shows absolute and percent increase in time among six different sprint times. It was found that the maximum absolute and percent increase value of sprint time was 0.68 seconds & 12.61 % (sprint time-1 vs. sprint time-6) followed by 0.55 seconds & 10.20% (sprint time-1 vs. sprint time-5), 0.54seconds & 9.76 % (sprint time-2 vs. sprint time-6), 0.46 seconds & 8.53 % (sprint time-1 vs. sprint time-4), 0.46 seconds 8.19 % (sprint time-3 vs. sprint time-6) and 0.41 seconds and 7.41 % (sprint time-2 vs. sprint time-5). Thus, it was observed that the time taken by the subjects for the completion of sprint-1 was minimum (5.39±0.34 seconds) then there was an increase in the value of time for the subsequent sprint-2 (5.53±0.31 seconds), sprint-3(5.61±0.36 seconds), sprint-

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4(5.85±0.26 seconds), sprint-5(5.94±0.25 seconds) and sprint-6(6.07±0.17 seconds) trials.

Table 2. Mean ±SD of absolute & percent change in time for different sprints

Variables	Mean±SD	Absolute	%percent
Sprint time-1 vs. time-2	5.39±0.34 vs. 5.53±0.31	0.14	2.59
Sprint time-1 vs. time-3	5.39±0.34 vs. 5.61±0.36	0.22	4.08
Sprint time-1 vs. time-4	5.39±0.34 vs. 5.85±0.26	0.46	8.53
Sprint time-1 vs. time-5	5.39±0.34 vs. 5.94±0.25	0.55	10.20
Sprint time-1 vs. time-6	5.39±0.34 vs. 6.07±0.17	0.68	12.61
Sprint time-2 vs. time-3	5.53±0.31 vs. 5.61±0.36	0.08	1.44
Sprint time-2 vs. time-4	5.53±0.31 vs. 5.85±0.26	0.32	5.78
Sprint time-2 vs. time-5	5.53±0.31 vs. 5.94±0.25	0.41	7.41
Sprint time-2 vs. time-6	5.53±0.31 vs. 6.07±0.17	0.54	9.76
Sprint time-3 vs. time-4	5.61±0.36 vs. 5.85±0.26	0.24	4.27
Sprint time-3 vs. time-5	5.61±0.36 vs. 5.94±0.25	0.33	5.88
Sprint time-3 vs. time-6	5.61±0.36 vs. 6.07±0.17	0.46	8.19
Sprint time-4 vs. time-5	5.85±0.26 vs. 5.94±0.25	0.09	1.53
Sprint time-4 vs. time-6	5.85±0.26 vs. 6.07±0.17	0.22	3.76
Sprint time-5 vs. time-6	5.94±0.25 vs. 6.07±0.17	0.13	2.18

Table 3 shows absolute and percent decrease in power for six different sprints. It was found that the maximum absolute and percent decrease value of power was -152watts & -30.95% (Power-1 vs. Power-6) followed by -127watts & -25.86% (Power-1 vs. Power-5),-115watts & -25.33% (Power-2 vs. Power-6), -109watts -22.19% (Power-1 vs. Power-4),-96watts & -22.06% (Power-3 vs. Power-6), -90watts & -19.82% (Power-2 vs. Power-5).,-71watts & -16.32% (Power-3 vs. Power-5) and -72watts & -15.85% (Power-2 vs. Power-4).Thus, it was observed that the maximum value of power was 491.00±105.90 watts for power-1 (i.e. during sprint-1) then there was a gradual decrease in the value of power for the subsequent sprints i.e. power-2(454.90±94.81watt), power-3(435.23±90.49watt), power-4(382.84±78.54watt), power-5(364.68±78.62watt) and power-6(339.94±58.96watt).

Table 3. Mean ±SD of absolute & percent change in Power for different sprints

Variables	Mean±SD	Absolute	%percent
Power-1 vs. Power-2	491.00±105.90 vs. 454.90±94.81	-37	-7.53
Power-1 vs. Power-3	491.00±105.90 vs. 435.23±90.49	-56	-11.40
Power-1vs. Power-4	491.00±105.90 vs. 382.84±78.54	-109	-22.19
Power-1 vs. Power-5	491.00±105.90 vs. 364.68±78.62	-127	-25.86
Power-1 vs. Power-6	491.00±105.90 vs. 339.94±58.96	-152	-30.95
Power-2 vs. Power-3	454.90±94.81 vs. 435.23±90.49	-19	-4.18
Power-2 vs. Power-4	454.90±94.81 vs. 382.84±78.54	-72	-15.85
Power-2 vs. Power-5	454.90±94.81 vs. 364.68±78.62	-90	-19.82
Power-2 vs. Power-6	454.90±94.81 vs. 339.94±58.96	-115	-25.33
Power-3 vs. Power-4	435.23±90.49 vs. 382.84±78.54	-53	-12.18
Power-3 vs. Power-5	435.23±90.49 vs. 364.68±78.62	-71	-16.32
Power-3 vs. Power-6	435.23±90.49 vs. 339.94±58.96	-96	-22.06
Power-4 vs. Power-5	382.84±78.54 vs. 364.68±78.62	-18	-4.71
Power-4 vs. Power-6	382.84±78.54 vs. 339.94±58.96	-43	-11.25
Power-5 vs. Power-6	364.68±78.62vs. 339.94±58.96	-25	-6.86

Discussion

The repeated sprint ability (RSA) tests which have been performed in

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previous studies involved 6x40 m sprints departing every 30s *(Dawson et al., 1993).* These studies recorded mean performance decrements of 5.6% and 5.3%, respectively. The present study also provides a similar mean performance decrement (i.e. sprint time) of 2.59%, 4.08%, 8.53%, 10.20%, and 12.61% respectively (Table 2). During 6x40 m sprints departing every 30s, approximately 2 - 3s of additional sprinting is performed for each sprint. This would be expected to deplete the CP stores during each sprint to a greater extent than the protocol used in the present study *(Hirvonen et al., 1987).* However, these previous RSA test protocols also provide an additional 7 - 8s of recovery. These longer recovery periods may offset the additional 2 - 3s of sprinting and allow for similar proportions of phosphagen depletion and resynthesis when compared with the sprint protocol used in this study. In the present investigation, sprint time, power and fatigue index was used as an indirect measure of anaerobic glycolytic energy production in the under 19 year cricketers. The results showed that power following sprint-1 to sprint-6 declined. Moreover, the decline in power was related to increases in running times. Therefore, these data support the view that reduced energy production via anaerobic glycolysis in cricketers may be a factor in the deterioration in sprint performance *(Reaburn and Dascombe, 2009).* In our study, results, suggesting muscle acidosis might have played a role in the fatigue response among these cricketers in different sprint runs.

Conclusion: It was concluded from the results of this study that sprint time and power decline in cricketer may be due to reduced energy production via anaerobic glycolysis and muscle acidosis.

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