Assessment of role of physical fitness of cricket players in response to the various tests

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ABSTRACT

Background: Physical fitness is a very important aspect of cricket performance with physically prepared cricketers proven to perform better, more consistently, and with fewer injuries. The physical attributes of strength, speed, and endurance enable a cricketer to bat with power over long periods of time, bowl faster, and with greater accuracy, and to field athletically. **Aim and Objectives:** The present study was aimed to test the physical fitness of cricket players in response to the various tests administered for evaluation of different components of physical fitness. **Materials and Methods:** It was a cross-sectional analytical study conducted among 65 cricket players of a well-known cricket club in Mumbai. Physical fitness of cricketers was evaluated by measuring various health-related as well as skill-related fitness components. **Results:** Mean reading of balance in dominant leg of 37.25 ± 9.8 s, while that in non-dominant leg as 21.65 ± 8.9 s. We compared the results using unpaired "t"-test. Static balance of dominant leg is significantly higher as compared to non-dominant leg (P < 0.01). **Conclusion:** The present study will be helpful to recognize level of fitness in each player and accordingly to organize and strengthen the cricket training program, to excel the performance, and also to avoid sport specific injuries in each cricketer.

Key words: Agility; Cricket training program; Cricket; Physical fitness index; Physical fitness

INTRODUCTION

The general fitness is the pre-requisite for all the sports, which include strength, speed, aerobic capacity, anaerobic capacity, endurance, agility, reaction time, flexibility, balance, and coordination, whereas specific fitness varies from sport to sport. In certain sports, the strength component of fitness is a dominating factor, whereas in other sports endurance, speed, and agility may be required for achieving better results.

Cricket is a sport, in which fitness is not traditionally seen as extremely important. The significance of fitness in any recreational activity cannot be overstated. The more fit you are, the better you will be able to play. Cricket, on the other hand, is a game that challenges your game competences, intellectual capacity, stamina, and physical endurance. The various test gambling nations have lately put a greater focus

on health and are enjoying the rewards. With the advent of someday Cricket and, more recently, 20, the sport has seen significant modifications, and the physical demands placed on a cricketer's body have also increased substantially. The significance of fitness will vary depending on the version of the game being played and the function of the player in the team: the fitness requirements of a fast bowler may be more and also exclusive than that of an opening batter, and 1-day cricket may be more demanding than a test in shape.[1-3]

Physical fitness is a very important aspect of cricket performance with physically prepared cricketers proven to perform better, more consistently and with fewer injuries. The physical attributes of strength, speed, and endurance enable a cricketer to bat with power over long periods of time, bowl faster, and with greater accuracy, and to field athletically. Every cricketer has a different role, position, action or technique, and fitness training which

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should recognize these differences and be programmed accordingly. A well-structured training program for a cricketer must consider the individuals training history, injury history, training age, positional requirements, technical execution, and training objectives. The physical fitness may be classified as general physical fitness and specific physical fitness.[4,5]

Aims and objectives

The present study was aimed to test the physical fitness of cricket players in response to the various tests administered for evaluation of different components of physical fitness.

MATERIALS AND METHODS

It was a cross-sectional analytical study conducted among 65 cricket players of a well-known cricket club in Mumbai.

Physical fitness of cricketers was evaluated by measuring various health related as well as skill related fitness components. Components measured were height, weight, resting and maximum heart rate, physical fitness index (PFI), flexibility, hand grip strength, upper body endurance, agility, static balance, and hand eye coordination. Parameters such as maximum aerobic capacity and body mass index (BMI) were computed from the recorded parameters.

The data were collected with the help of standard, semi-structured, and pre-validated case record pro forma.

Ethical approval

The ethical approval was obtained from the Institutional Ethical Committee before the start of the study. Patient's informed consent was taken before enrolling them in the present study.

Statistical analysis

The data entry was done in MS-EXCEL (2007) and analysis was done by SPSS Version 16 software. The descriptive statistics was used, that is, Mean and Standard deviation for describing parameters.

Unpaired "t"-test or independent t-test was used to compare the static balance of dominant and non-dominant leg. $P < 0.01$ was considered as significant.

RESULTS

The study procedure was carried out on 65 cricket players of a well-known cricket club in Mumbai. This section details the results of those players aged 18–40 years to evaluate physical fitness of them.

The various statistical descriptors such as mean, range, standard deviation, minimum, and maximum are tabulated for age, weigh, height, and BMI are given in Table 1. Mean age of the study subjects was 25.4 years, mean weight was 72.7 kg, mean height was 1.77 m, and mean BMI was 23.3 Kg/m².

Sit and reach, hand grip strength, resting and maximal HR, flexibility, muscle endurance, agility, balance, and hand eye coordination are mentioned in Tables 2 and 5 and percentile distribution of fitness of cricket players is mentioned in Table 4. Furthermore, the distribution of heart rate during resting and maximal exercise state is mentioned in Table 5.

According to PFI of cricket players, majority had fair PFI, that is, 91–102 (67.7%), followed by good PFI, that is, 103–115 (29.2%) (Figure 1).

Figure 2 depicts maximum oxygen consumption (VO_{2max}) of cricket players. Majority had it between 3.5 and 3.6 L/min (41.5%), 16.9% had VO_2 max between 3.7 and 3.8 L/min.

Table 1: Distribution of cricket players according to height, weight, and BMI.

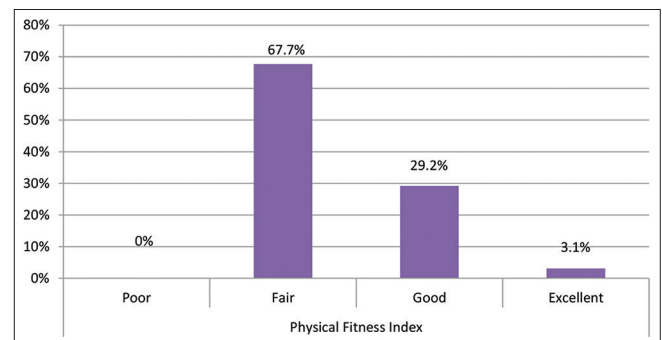| Parameters	Frequency	Percent	Mean
Age (years)			
18–22	27	41.5	25.4 years
23–27	17	26.2	
28–32	16	24.6	
33–37	5	7.7	
Weight (kg)			
61–70	35	53.8	72.7 kg
71–80	16	24.6	
81–90	14	21.5	
Height (Meters)			
1.60–1.69	21	32.3	1.77 mt
1.70–1.79	16	24.6	
1.80–1.89	17	26.2	
>1.89	11	16.9	
BMI (kg/m²)			
Normal 18.5–24.99	54	83.1	23.3 Kg/m²
Pre-obese 25–29.99	11	16.9	
Total	65	100.0	--

Figure 1: Gradation of cricket players according to physical fitness index

Table 2: Physical fitness characteristics of cricket players

Characteristics	Minimum	Maximum	Mean	Std. Deviation
Sit and reach test (cm)	18.0	39.0	30.1	5.7
Hand grip (kg)	25	48	36.1	4.0
Basal HR	54	72	62.9	4.3
Exercise HR	131	162	144.5	7.5
PFI	93.8	116.3	99	5.4
VO^2 max (L/min)	3.5	4.4	3.8	0.3
Agility (seconds)	14	24	16.6	1.8
Balance dominant side (seconds)	15	60	37.25	9.8
Balance non-dominant side (seconds)	8	45	21.65	8.9
Alternate hand wall toss test (seconds)	7	48	32.4	6.9
Push-up test (number of repetitions)	24	56	44.3	7.3

Table 3: Distribution of cricket players according to flexibility, hand grip strength, and upper body endurance

Parameters	Frequency	Percent
Sit and reach test (cm)		
18–27	21	32.3
28–37	33	50.8
>37	11	16.9
Hand grip test (kg)		
25–29	3	4.6
30–34	17	26.2
35–39	35	53.8
40–44	8	12.3
45–49	2	3.1
Standard push-up test		
Excellent	33	50.8
Good	17	26.2
Above average	14	21.5
Average	1	1.5
Total	65	100.0

Table 4: Percentile distribution of fitness of cricket players

S. No.	Factor	Percentiles		
		25th	50th (Median)	75th
1.	Physical fitness index	94.9	96.2	103.4
2.	VO^2 max (L/min)	3.5	3.7	4.1
3.	Sit and reach test (cm)	24.75	30.0	34.0
4.	Hand grip (kg)	34.0	36.0	38.0
5.	Agility rate	15	16	17.5
6.	balance dominant (score)	14	21	30
	Balance non-dominant side (Score)	13	24	26
7.	Alternate hand wall test	30	34	36
8.	Push-up test (Repetition)	38	46	50

Table 5: Distribution of cricket players according to heart rate

Heart Rate (Beats)	Frequency	Percent
Resting		
54–58	13	20.0
59–63	19	29.2
64–68	28	43.1
69–73	5	7.7
Maximal Exercise		
131–140	21	32.3
141–150	31	47.7
151–160	11	16.9
161–170	2	3.1

Table 6: Rating of cricket players according to agility and balance

Rating	Frequency	Percent	Significance
Agility			
Poor (>18.3 s)	5	7.7	---
Fair (18.3–18.2 s)	0	0	
Average (18.1–16.2 s)	20	30.8	
Good (16.1–15.2 s)	21	32.3	
Excellent (<15.2)	19	29.2	
Balance (Dominant Leg) (Mean: 37.25±9.8)			
Fair (10–24 s)	2	3.1	t=9.357, P<0.001
Average (25–39 s)	39	60.0	
Good (40–50 s)	15	23.1	
Excellent (>50 s)	9	13.8	
Balance (Non-dominant Leg) (Mean: 21.65±8.9)			
Poor (<10 s)	4	6.2	
Fair (10–24 s)	40	61.5	
Average (25–39 s)	18	27.7	
Good (40–50 s)	3	4.6	

Table 5 shows distribution of cricket players according to flexibility, hand grip strength, and upper body endurance. Majority of the subjects show sit and reach test result between 28 and 37 cm (50.8%). Majority of the subjects show hand grip test results between 25 and 37 kg (53.8%). Majority of the subjects show standard push-up excellent test results (50.8%).

Table 6 shows mean reading of balance in dominant leg of 37.25±9.8 s, while that in non-dominant leg as 21.65±8.9 s. We compared the results using unpaired "t"-test. Static balance of dominant leg is significantly higher as compared to non-dominant leg (P<0.01).

Figure 3 depicted coordination according to alternate hand wall toss test of cricket players among the study subjects.
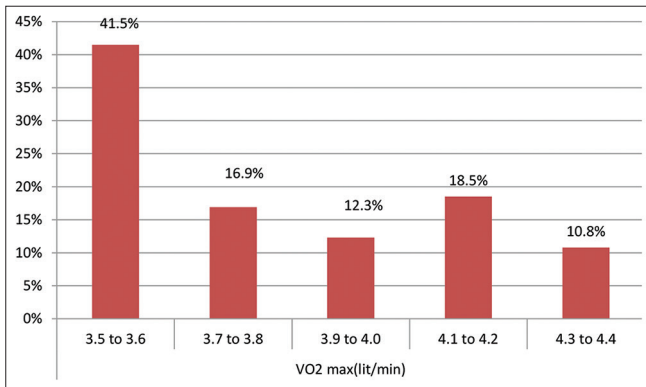
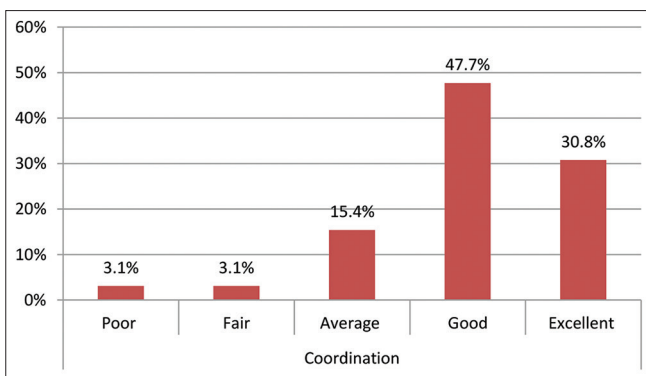**Figure 2:** Distribution of cricket players according to VO$_2$ max

Figure 3: Gradation of hand eye coordination within cricket players according to alternate hand wall toss test

We observed that majority of the subjects showed good rating, that is, 30–25 s (47.7%), followed by excellent rating among 30.8% study subjects (more than 35 s).

DISCUSSION

Cricket has become a deceivingly demanding sport nowadays with the introduction of 1 day cricket and more recently 20. Because, players spend a long day on their feet, there are periodic fast sprints when batting, chasing down a ball and bowling, plus various dynamic movements such as leaping, throwing, and turning quickly. They should be fit enough to prevent injuries due to these eccentric contractions during play; in addition, they should not get tired when they are facing a fast bowler!![6]

Hence, the present study was aimed to test the physical fitness of cricket players in response to the various tests administered for evaluation of different components of physical fitness. All 65 participants were cricket players, aged 18–40 years, which were playing for club from a minimum of 2 years regularly for 40–60 min duration per day for minimum 4 days in a week.

Mean age of the study subjects was 25.4 years, mean weight was 72.7 kg, and mean height was 1.77 m. Cricket players

were having normal mean BMI score (23.3±2.4 S.D.), with mean lower level of resting HR (23.3±4.3 S.D.) and maximal heart rate (144.5±7.5 S.D.). The mean BMI was 23.3 Kg/m².

PFI score on modified Harvard test showed that 2% cricketers were having excellent and 19% were having good score with the fair mean score (99±5.4 S.D.). Majority had fair PFI, that is, 91–102 (67.7%), followed by good PFI, that is, 103–115 (29.2%). Furthermore, cricketers were found to have mean higher level of aerobic capacity (VO$_2$ max – 3.8 L/min). When we assessed maximum oxygen consumption (VO2 max) among the cricket players, we observed that majority had it between 3.5–3.6 L/min (41.5%), 16.9% had VO2 max between 3.7 to 3.8 L/min.

Majority of the subjects show sit and reach test result between 28 and 37 cm (50.8%). Majority of the subjects show hand grip test results between 25 and 37 kg (53.8%). Majority of the subjects show standard push-up excellent test results (50.8%). Muscular fitness evaluation showed mean flexibility of 30.1±5.7 cm S.D., mean hand grip strength of dominant hand was found 36.1±4 kg S.D., and mean upper body endurance on push-up test found 44.3 repetitions.

Mean reading of balance in dominant leg of 37.25±9.8 s, while that in non-dominant leg as 21.65±8.9 s. We compared the results using unpaired "t"-test. Static balance of dominant leg is significantly higher as compared to non-dominant leg (P<0.01).

In this study we also assessed coordination with the help of Alternate Hand Wall Toss Test among the study subjects. We observed that majority of the subjects showed good rating, that is, 30–25 s (47.7%), followed by excellent rating among 30.8% study subjects (more than 35 s). Some skill-related component evaluation showed average mean agility score (16.6±1.8 S.D.), good mean score in hand eye coordination (32.4±6.9), while mean static balance for both legs evaluated showed significantly greater values for dominant leg (37.25±9.8) as compared to non-dominant leg (21.65±8.9) on unpaired "t"-test (P<0.01) with mean balance score for dominant leg was average.

Karangale observed in his research that improved physical fitness is associated to higher overall sports performance among cricketers. Physical fitness additives are unfavorable variables that help to greater overall cricket play. As a result, it is recommended that coaches, sports activities trainers, and players involved in the system of sports activities education take the utmost care of physical development in their athletes, as it has already been established through various studies that the variable in question is an important factor for advanced sports activities performance.[7]

The study's ultimate finding is most likely due to the fact that cricket performance is a complicated phenomenon and a direct bio-made of motor motions. As a result, strong abdominal power endurance, agility, explosive leg power, speed, and cardiovascular endurance are required to carry out the cricketing abilities effectively with the required elegance, precision, and duration.

Limitations of the study

In order to generalize the study, multicentric study is needed, and due to time constraints lesser sample size was enrolled, more sample size is needed to further explore the relationship between factors affecting fitness of the players and,various recommendations in order to improve their performances.

CONCLUSION

The findings of the present study will be helpful to recognize level of fitness in each player and accordingly to organize and strengthen the cricket training program, to excel the performance, and also to avoid sport specific injuries in each cricketer.

Better physical fitness is associated with improved overall sports performance among cricketers. Physical fitness additives are unfavorable variables that help to greater overall cricket play.

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Authors' Contributions:
SW- Study design and concept of the study, manuscript preparation; **YW-** Interpretation of the results, literature review; **KDN-** Collection of the data, Statistical analysis and interpretation.

Work attributed to:
The work is attributed to the department of physiology, Government Medical College Dhule and Shree Vighnaharta Superspeciality Hospital Dhule.

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