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Anthropometric and Physical Fitness of the Under-16 Regional-School Cricket Players, of Bahawalpur, Pakistan

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Key Words

Anthropometry, Body Segments, Cricket Bowling, Cricket Batting, Cricket Players

Abstract *The aim of this study was to analysis the anthropometry and fitness of the under-16 regional and school cricket players. Twenty participants were selected from the Bahawalpur regional cricket team and (n = 20) from school teams. Selected variables were height, weight, skinfolds, girths, bone lengths, breadths, 30-m race, set-ups, hand grip strength, flexibility, standing broad jump, and agility. the anthropometric and physical fitness of regional and school cricket players was compared by applying Independent t-test. The results disclosed that the regional cricket players were significantly higher in arm span, arm length, and leg lengths, shoulder, elbow and knee breadths. The regional cricketers were faster in 30 m sprints, hand grip strength, set-ups, flexibility, and standing broad jump than school players. It was concluded the under-16 regional players were superior in anthropometric and physical fitness because they were selected from the larger population and regular in training program than school cricketers.*

Introduction

Cricket based on the specified skills of fielding, batting, and bowling. The fielding is the combination of catching, running, diving, sliding, stopping and throwing. The bowling skill depends on running, jumping and delivering the ball by vertical rotation of the arm. The batting skill depends on running and swinging of the bat in the direction of the ball. The specific anthropometric and fitness characteristics

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such as stature, body mass, physical strengths, dash sprint and jumping are associated with the good performance of players (Ackland, Ong, Kerr, & Ridge, 2003; Mohamed, et al., 2009; Koley, 2011). It was concluded the stronger anthropometric and fitness characteristics exhibit good performance during domestic and international competitions (Stuelcken, Pyne, & Sinclair, 2007; Koley, 2011). It is was also reported the longer arms provide mechanical advantages to increase the batting and bowling performance of the cricket players (Aruparayil & Chattopadhyay, 2013). The anthropometric data of athletes informed us about the physical appearance which contributes in their higher performance, as well as assists coaches for team selection by providing information about fat percentage, muscles size and bones length (Pant, & Parsekar, 2017). The players who participated in higher competitions were superior in physical fitness than lower rank players (Kohmura, Aoki, Yoshigi, Sakuraba, & Yanagiya, 2008). It was concluded the baseball batting and pitching performance is associated with the anthropometry and fitness of the selected players (Hoffman, Vazquez, Pichardo, & Tenenbaum, 2009).

Earlier studies have examined the anthropometric measures of district and state cricket players (Koley & Yadav, 2009), district players (Koley, Kumar & Shadagopan, 2012), and university cricket players and sedentary students (Koley, 2011). It was reported that South African university cricketers were superior in their physical characteristics than sedentary subjects (Stretch & Buys, 1991). Koley (2011) reported that Indian university cricketers were better in body size than inactive university students. There was a lack of study which compared the anthropometric and physical fitness of under-16 regional cricket players and school cricket players. Therefore, this research was designed to analysis the anthropometry and physical fitness of under-16 regional and school cricket players. It was hypothesized that school cricketers and under-16 regional cricketers would be similar in their anthropometric measures and physical fitness.

Methods

Purposive sampling method was adopted for this cross-sectional study. Forty participants were as group one (n = 20) was the under-16 Bahawalpur regional cricket team players who participate in Pakistan inter-regional cricket championship. The second group (n = 20) players were the members of winner and runners-up school teams' cricket who participated inter-scholastic championship in Bahawalpur district. The age range of selected participants was 14-16 years. Data was collected from the Satellite Town Boys School, Bahawalpur, and Abbasia Boys Higher Secondary School, Bahawalpur. The regional team's data was collected at the Dring Stadium, Bahawalpur.

Anthropometric Measurements

Twenty-seven anthropometric variables were measured as height with a stadiometer and data was recorded in centimetres. The subjects were in barefooted and in a standing position (Koley, 2011). The height was noted from the surface of the stadiometer to the highest point of head. Weight was measured with the digital weighing machine (Seiko, Tokyo, Japan) and reading was recorded in kg. A Harpenden caliper (Holtain Ltd, UK) was applied to record the skinfolds with the reading millimetres. The measurements cite for skinfold were triceps, subscapular, biceps, illiaccrest, supraspinale, abdomen, thigh, and calf minimum.

A metallic tape was used to measure girths the arm, forearm, chest, waist, hips, thigh, and calf. A slid caliper was used for the measurements arm length, leg lengths, shoulder breadth, pelvic breadth, transfers of chest breadths, elbow and knee breadths. A 46 cm wooden box was used for the measurements sitting height. Meter chart was horizontally pasted at the wall for the measurements of the arm span. The anthropometric measures were recorded according to the suggestions of the ISAK-International Society of Advancement of Kinanthropometric.

Physical Fitness Tests

Speed was assessed by recording the time of 30-meter dash run. The time was recorded from the initiation movement of the participants from the starting point and completed at the finish line. The 10 x 5-m shuttle run was recorded by using 5 x 10-m shuttle sprint in the following of the previous study (Nakata, Nagami, Higuchi, Sakamoto, & Kanosue, 2013; Spaniol, 2009).

An agility test was recorded by the zig-zag running of a subject such as three lines were marked with 5 meters. The subject run 5-m away from the start line, then changed direction toward left side for the 5-m run, reversed the direction and run for 10 meters, then retune toward the centre mark for 5 meters and finish his run where he started. The players have to complete their task in speed without break. Data was recorded in second with a digital stopwatch.

For standing long jump, players were taught to stand apart behind the starting line and to jump forward. The distance was recorded from the start point to the closest point of landing. The reading was noted in centimetre, and the maximum score from two trials was recorded as the final score (Kohmura et al., 2008).

The flexibility was assessed through sit and reach test. The participant was asked to sit on the floor without shoes, extend his knees, put both hands on the device and push the scroll with the tip of the fingers with both hands. The maximum reached point was considered as the final score, and reading was taken in.

The handgrip and back strengths are measured with the adjustable digital dynamometers (Koley & Yadev, 2009; Koley et al., 2012). Three efforts are

suggested with the interval one-minute and maximum score was considered as the final score. Physical strength data be interpreted in kilogram with 0.1kg. The dynamometer is calibrated before the commencement of each effort. Body position for handgrip strength is proposed as right upstanding position, a slight abduction of shoulders, and inward rotation of forearm and elbow flexion at 90° degrees (Koley & Yadev, 2009). The subject applied his maximum force of hand by squeeing the dynamometer. Subject remain neutral without getting force from any external object such as wall, table and even not pushing the ground (Koley et al., 2012). The highest score was recorded among two efforts.

Statistical Analysis

The descriptive statistics as mean and standard deviation were analysis of the selected variables. Independent *t*-test was applied for the anthropometric and physical fitness analysis of under-16 regional and school cricket players. The level of significance was adjusted at .05.

Result

The anthropometric variables of the under-16 regional cricket players and school cricket players are presented in table 01. The under-16 regional players were significantly ($P < .04$) taller, ($P < .03$), and higher in weight than the school cricketers. The under-16 regional cricketers were significantly higher in the ($P < .01$) arm relax girth, ($P < .01$) arm flexed girth, ($P < .03$) forearm girth, ($P < .00$) thigh girth, and ($P < .02$) calf girths than from the school cricketers. In the segmental lengths the under-16 regional players were significantly higher ($P < .04$) in sitting height, ($P < .04$) in arm span, ($P < .00$) in arm length, and ($P < .02$) leg length than the school cricketers. The under-16 regional players were significantly wider ($P < .00$) in shoulder breadth, ($P < .00$) hips breadths, ($P < .00$) chest breadth, ($P < .01$) elbow breadth, and ($P < .01$) in the knee breadth than the school cricketers.

Table 01: Anthropometric Characteristics of under-16 Regional and School Cricket Players

	Under-16 Players		School Players			
Variables	**Mean**	**Std. D**	**Mean**	**Std. D**	***t***	**Sig.**
Height (cm)	172.23	3.90	169.71	3.62	2.15	0.04
Weight (kg)	65.84	5.98	62.25	4.55	2.24	0.03
Triceps (mm)	12.31	3.71	12.78	3.43	-0.42	0.67
Subscapular skinfold (mm)	14.07	3.53	14.77	3.20	-0.67	0.51
Biceps skinfold (mm)	9.07	1.73	9.72	2.28	-0.98	0.33
Illiaccrest skinfold (mm)	16.38	3.03	17.01	4.82	-.533	0.60
Supraspinale skinfold (mm)	10.68	2.92	12.99	4.38	-1.85	0.07

Abdomen skinfold (mm)	17.77	3.73	17.93	5.16	-0.102	0.92
Thigh skinfold (mm)	17.31	5.76	20.11	4.62	-1.76	0.08
Calf skinfold (mm)	11.05	3.69	12.32	3.85	-1.05	0.30
Arm relax girth (cm)	25.61	2.14	23.72	2.13	2.80	0.01
Arm flex girth (cm)	28.83	2.10	26.81	2.47	2.71	0.01
Forearm girth (cm)	25.01	1.49	23.75	1.93	2.23	0.03
Chest girth (cm)	85.90	6.75	82.69	5.43	1.72	0.09
Waist girth (cm)	72.61	8.80	70.41	7.27	0.89	0.38
Hip girth (cm)	89.10	4.55	87.37	5.82	1.01	0.32
Thigh girth (cm)	51.38	5.71	46.74	4.36	3.03	0.00
Calf girth (cm)	35.25	3.58	32.60	3.14	2.54	0.02
Sitting height (cm)	88.23	3.09	85.96	3.51	2.12	0.04
Arm span (cm)	178.26	4.75	174.25	6.32	2.17	0.04
Arm length (cm)	77.81	3.46	70.27	4.37	5.82	0.00
Leg length (cm)	90.19	3.73	86.98	4.16	2.52	0.02
Shoulder breadth (cm)	41.32	1.72	38.11	2.78	4.09	0.00
Pelvis breadth (cm)	28.57	1.21	26.19	2.52	3.46	0.00
Transvers chest breadth (cm)	27.81	2.00	25.73	2.30	2.98	0.00
Elbow breadth (cm)	7.87	1.16	6.41	0.75	5.14	0.00
Knee breadth (cm)	9.71	1.21	8.89	0.75	2.84	0.01
**Significant at 0.05 level*						

Table 02: Physical Fitness of Bahawalpur u-16 and High School Cricketers

	Under-16 Players		**School Players**			
Variables	**Mean**	**Std. D**	**Mean**	**Std. D**	***t***	**Sig.**
Sprint 30 meters (m)	5.93	0.37	6.16	0.34	-2.27	0.04
Sit and reach (cm)	17.33	2.57	15.65	2.08	2.36	0.02
Standing broad jump (m)	2.52	0.24	2.34	0.23	2.48	0.02
Right hand grip strength (kg)	45.12	4.05	41.65	5.77	2.08	0.05
Left hand grip strength (kg)	42.68	2.56	40.09	4.10	2.24	0.03
Sit ups (n/ 30 s)	21.00	2.24	19.33	2.32	2.44	0.02
Agility run (s)	10.22	0.59	10.39	0.72	-0.88	0.38
Shuttle run (s)	15.92	0.54	16.05	0.40	-0.87	0.39

**Significant at 0.05 level*

The fitness variables of the regional under-16 cricket team and school cricket team players are presented in table 02. The under-16 regional cricket players were significantly ($P < .04$) in 30-meter dash run, ($P < .02$) in standing broad jump, ($P < .03$) right hand strength, ($P < .05$) left hand strength, and ($P < .02$) set-up than from the school cricket players.

Discussion and Conclusion

This study is the analysis of the anthropometric and physical fitness measures of the u-16 regional and school cricket players. Twenty-seven anthropometric and eight physical variables were measured from (n = 20) regional and (n = 20) school cricket players. Results of this investigation rejected the null hypothesis.

The regional cricket players were taller (+2.52 cm), and higher in weight (+3.59 kg) than school players. Finding of this study support the findings of Gabbett, Jenkins and Abernethy (2010) that elite 16 years rugby players were taller and heavier than the sub-elite rugby players. It was reported the taller and heavier rowers were superior in performance than shorter and lighter counterparts (Shephard, 1998). It was also reported that taller and heavier cricket fast blowers were faster in ball speed than the shorter and lighter bowlers (Pyne, Duthie, Saunders, Petersen, & Portus, 2006), and taller and heavier baseball batter bat swing with higher speed than shorter (Escamilla, et al., 2009). It is concluded the taller and heavier under-16 cricket players were selected from the larger geographical area than from the school team players. It was also stated the longer arms and legs provide biomechanical advantages to cricket while batting against the short-pitched ball (Aruparayil & Chattopadhyay, 2013).

The regional cricket players were higher in the arm and leg girths than the school cricket players. This study confirms the findings by Franchini, Nunes, Moraes and Del Vecchio (2007) that the elite judo players having larger arm and leg muscles than sub-elite players. It was found that players with larger muscles of the arms and leg were superior in performance than shorter counterparts. It is concluded the regional under-16 cricketer was regular in cricket related training, therefore, their arm and leg muscles were more developed than the school players. It was also reported that the elite players spend more time in such activities where their elbows and knees involve in flexion and extension which increase the muscles sizes of their arm and legs (Sklad, Krawczyk, & Majle, 1993).

The regional cricket players were (+ 2.27 cm) higher in the sitting height, (+ 4.01) in arm span, (+ 7.54 cm) arm length, and (+ 3.21 cm) leg lengths than school players. These findings were supported by Yoshiga and Higuchi (2003) that rowers with longer body segments depict higher performance than the shorter counterparts. It was also reported the cricket fast bowlers with longer arm and leg delivered faster balls than the shorter bowlers (Loram, McKinon, Wormgoor, & Rogers, 2005; Pyne, Duthie, Saunders, Petersen, & Portus, 2006). Longer arms increase the radius of rotation which generates larger momentum during the execution back foot cricket shots (Aruparayil & Chattopadhyay, 2013). The tall younger baseball players can generate extra force through longer levers of their arm and leg than the shorter players (Szymanski, et al., 2010).

The under-16 regional cricket players were (+ 3.22 cm) wider in shoulder breadths, (+ 2.38) in pelvis, (+ 2.08 cm) in chest breadth, (+ 1.46 cm) in elbow

breadth, and (+ 0.82 cm) knee breadth than school players. These findings are supported by the finding of Pyne et al., (2006) that higher breadths of the trunk increase the performance of cricket fast bowler. It is concluded these wider shoulder, hips, chest, elbows, and knee increase the batting and bowling performance which also increase the selection chance of cricket players for a higher level of participation.

The second aim of this research was examining the physical fitness of the u-16 regional and school cricket players. The regional cricket player was (+ 0.23 s) faster, (+ 1.68 n) higher in trunk flexibility, (+0.18 m) longer in standing broad jump, (+ 3.47 kg) stronger in right hand, (+2.59) in left-hand strength, and (+1.67 n) in the sit-ups than from the school cricket players. These findings of the current study are supported by the findings Hoffman et al., (2009) that physical strength, speed, agility, flexibility increase the performance of the baseball players. The speed and standing broad jump is associated with the better performance of the baseball players (Szymanski et al., 2010). It is concluded the regional players were stronger in anthropometric measures which increase their physical performance than the school players. On the other hand, the regional team players remain in regular training camps than the school cricket players. It can be predicted the school team players were recreational players and regional players were professional players. As a result, the regional players become physically stronger and develope better dash run, standing broad jump, hand grip strengths, trunk flexibility and agility test than from the school cricket team players.

Future Implications

It is suggested from the findings of this study that cricket coaches should focus to improve strength, speed, trunk flexibility and power of the cricket players. The sprint training would be an effective way to improve the strength of leg muscles was related to bowling speed and batting performance of cricket players.

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