THE ANTHROPOMETRIC CHARACTERISTICS OF PAKISTAN U-19 AND MALAYSIAN U-19 CRICKET PLAYERS

*Muhammad Zia Ul Haq[1], Jeffrey Low Fook Lee[1], Bendri Bin Dasril[1], Shahid Aslam[2]
[1]Faculty of Sports Science & Coaching, Universiti Pendidikan Sultan Idris, 35900, Tanjong Malim, Perak, Darul Ridzuan, Malaysia
[2]National Cricket Academy Gaddafi Stadium, Lahore, Pakistan
*muhammad.zia@iub.edu.pk

ABSTRACT *This study was aimed to compare the anthropometric characteristics of the Pakistani and Malaysian under-19 male cricket players. Thirty participants were selected from Pakistani and Malaysian under-19 national cricket teams. The anthropometric variables were stature, body mass, skin folds, girths, lengths, breaths and somatotypes. The independent t - test was applied for statistical analysis. Results showed that Pakistan under-19 cricketers were taller, heavier, longer and wider body segmental than Malaysian. It was predicted, Pakistani under-19 players were superior in body segments because they were selected from high population country where cricket is the most favorite game. On the other hand Malaysian under-19 cricket team was selected from lesser population country, and cricket was not favorite sports as like pakistan. The longer and wider anthropometric characteristics provide biomechanical advantages to Pakistan under-19 players as a result, they performed better than Malaysian under-19 teams during the Asian under-19 championship. This study would assist coaches and selectors for considering the anthropometric measures during team selection process.*

Keywords: Cricket, cricket players, physical characteristics, somatotype

INTRODUCTION

Every cricket player either a batsman or a bowler contribute in the over all performance of team [1]. The consistency of bowlers in taking wickets and batsmen in making the score through boundaries (4 or 6 runs at one ball) or run increase the winning percentage of the cricket teams [2]. Physically stronger cricketers play a decisive role in team's performance because they perform consistenlly, remain physically fit and playing for a longer time [3]. The body mass and arm length of bowlers increase their bowling performance [4] and upper body strength of batsmen increase the ability for hitting boundaries [5].

The sports coaches consider the anthropometric characteristics to assign a specific playing position as defender, attacker and blocker in team games like basketball, volleyball or football [6], as batsmen and pitcher in baseball [7]. Assessment of the anthropometric characteristics would help to estimate the competency of played in competitions [8]. As like other sports, the anthropometric characteristics cricketers exhibit effects on player's performance. Previous studies compared the anthropometric characteristics of the cricket players according to their playing role as batsmen, bowlers, and all-rounders and reported no significant difference [9]. Pyne and colleagues [4] reported that senior bowlers were significantly superior in their anthropometric measure than juniors. Koley [10] reported that junior cricketer (16-18yrs old) were shorter and lighter than the seniors (22-25y) and middle age (19-21y) players. The senior and u-19 batsmen were heavier, taller with wider and lengthier body segments than u-16 batsmen [11]. However, no study has compared the anthropometric characteristics of two international cricket teams.

This study was designed to compare the anthropometric characteristics of high and low rank cricket teams. The Pakistan and Malaysian under-19 cricket teams participated in Asian Cricket Championship in 2013-14 in Dubai. Pakistan under-19 cricket team was the runners up of the tournaments and Malaysian under-19 cricket team loss all matches. Therefore, It was hypothesized that the Pakistan u-19 and Malaysian u-19 cricket team players would be homogenous in their anthropometric measures.

METHOD AND MATERIAL

A cross-sectional designed was adopted to compare the anthropometric characteristics of Pakistan under-19 and Malaysian u-19 cricket team players. The purposive sampling method was used for data collection from (n = 15) Pakistani under-19 cricket players and (n = 15) Malaysian under-19 cricket players. The age pf Pakistani players wa (18.50 ± 2.94 years) and Malaysian was (18.13 ± 3.68 years). A written consent was acquired from all patriciapnts to assure their willingness. The study was Approval was obtained from the ethical research committee of the Sultan Idris Education University, Malaysia. All data was compiled at the Kinarara Oval Cricket Stadium, Kuala Lumpur, Malaysia and the National Cricket Academy, Lahore, Pakistan.

Procedure of Data Collection

The anthropometric measurements were taken in a single session. The competency of the investigator was obtained by adopting inter-tester reliability as adopted by [4, 1]. Interclass coefficient of correlation was adopted for the reliability test as adopted [12]. The procedure of anthropometric measurements was followed as guided by the International Society for the Advancement of Kinanthropometry (ISAK) as recomed by [13]. All anthropometric measurements except heights and body mass were taken from the right side of the batsmen. Triplicate criterion were adopted for all measurements and median score was considered as the final score. Each batsman visited seven separate measurements stations such as 1) landmarking, 2) skinfolds, 3) girths, 4) lengths, 5) breadths, 6) stature and body mass and 7) physical strengths. All batsmen were instructed to be barefooted with light clothes.

The anatomical sites of participants were marked as acromial, radiale, mid acromial-radiale, subscapular, stylion, mid-stylion, mesosternal, ill-crystal, illospinale, supraspinal, trochanterion, mid trochanterion- tibial lateral, mid-thigh, tibial lateral, tibial medial and sphyrion. Harpenden skinfold caliper (Holtain Ltd, Crosswell, Crymych, UK) was used to

examine the skinfolds of triceps, subscapular, biceps, iliac-crest, supraspinal, abdominal, frontal thigh, a medial calf. A measuring tape (HaB Int Ltd, UK) was used to measure the girths of relax and flex arms, forearm maximum, wrist minimum, chest mesosternal maximum, waist minimum, hips maximum, thigh maximum and calf maximum girth. The minimum reading for girth was considered 0.1cm.

The large and small sliding calipers (Lafayette Instruments Company, LTD, USA) were used for the measurements of lengths such as upper arm, lower arm, hand, total arm, upper leg, lower leg, total leg. The large and small calipers were also used for the measurements of breadths of shoulder, pelvis, chest, elbow, and knee. The minimum reading model for lengths and breadths was determined 0.1cm. Stature (height) was measured by using a stadiometer (Holtain Ltd., Crymych Dyfed, UK). This measurement was determined from the surface of the stadiometer and to the vertex (highest point of the skull of the human body). The participants were in the upright standing position. A 46 cm wooden box and a meter scale chart were pasted on the wall to measure the sitting height of the batsman. Sitting height was taken from the surface of the box to the vertex of the head. A scale chart was pasted horizontally at the wall to measure the arm span of batsmen. The arm span measured in full stretched position of arms and from right to left dactyl-ion. Body mass (weight) was measured by using the digital standing scales (Seiko, Tokyo, Japan) with the nearest point of 0.1kg.

Handgrip strength was recorded with the adjustable digital hand grip dynamometer (Taki Scientific Instruments Co, LTD. Japan). Subjects were in standing position, elbow was flex at 90° degrees, inward rotation of the forearm and apply the maximum force of the musculature of the right-hand to seqeez the dynamometer. All participants were instructed to bent knees, inclined chest at 60° degrees, both hands gripped the handle of the dynamometer. The participant were asked to straighten their knees while applying the maximum force at the handle that attached to the dynamometer with a steel chain. Proper warm up time was given to all participants before commencements of the hand grip and back strength. Three efforts with one-minute interval were given to each participant and the maximum score was considered as the final score.

Data Analysis

Descriptive statistics (mean ± standard deviation) were calculated from the selected anthropometric variables. Independent t-test was applied to compare the anthropometric measures of the Malaysian and Pakistani u-19 cricket players. The level of significance was set at $P < 0.05$. All data were analyzed by using the SPSS (Statistical Package for Social Sciences) version 20.0.

RESULTS

Table 1 shows that Pakistan under-19 cricketers were significance taller than Malaysian under-19 cricketers $t = 2.732$, $P < .010$. Pakistani under-19 cricketers were significance heavier than Malaysian under-19 cricketers $t = 2.334$, $P < .024$. Table 2 shows no significant difference in the somatotype values of height-weight ratio, endomorph, mesomorph, ectomorph, and in the hand grip and back strength.

Table 1: Demographic and Physical Strengths of the Malaysian and Pakistani Cricketers

Variable	Malaysian u-19 M(SD)	Pakistani u-19 M(SD)	t-values	P
Stature	167.06(9.55)	173.35(6.08)	2.732	.010*
Body mass	61.56(10.98)	68.88(10.73)	2.334	.024*
Height-weight %	42.87(2.33)	42.59(2.09)	.438	.663
Endomorph	3.18(1.61)	2.65(1.36)	1.239	.222
Mesomorph	4.60(1.36)	4.38(1.81)	.470	.641
Ectomorph	2.72(1.59)	2.68(1.37)	.087	.931
Hand grip strength	36.44(7.33)	34.53(4.93)	1.060	.295
Back strength	94.80(17.15)	90.92(13.33)	.872	.288

*Significant level adjusted at 0.05**

Table 2: Somatotype of the Malaysian and Pakistani Cricketers

Variable	Malaysian u-19 M(SD)	Pakistani u-19 M(SD)	t-values	P
Height-weigh%	42.87(2.33)	42.59(2.09)	.438	.663
Endomorph	3.18(1.61)	2.65(1.36)	1.239	.222
Mesomorph	4.60(1.36)	4.38(1.81)	.470	.641
Ectomorph	2.72(1.59)	2.68(1.37)	.087	.931

*Significant level adjusted at .05**

Table 3 shows that Pakistani under-19 cricketers were significantly larger in biceps skinfold than Malaysian under-19 cricketers $t = 2.204$, $P < .033$. There was no significant difference in sums of eight skin folds, triceps, subscapular, iliac-crest, supraspinal, abdomen, and thigh and calf skinfolds measurements. Pakistani under-19 cricketers were significance larger in the wrist girth than Malaysian under-19 cricketers $t = 2.622$, $P < .012$. There was no significant difference in the arm relax and flex girth, forearm girth, chest girths, waist, hips, thigh, and calf girth measurements.

Table 4 shows that Pakistani under-19 cricketers were significantly lengthier in the measurements of sitting height than Malaysian under-19 cricketers $t = 2.578$, $P < .013$, in the arm span $t = 2.528$, $P < .015$, in the total arm length $t = 5.366$, $P < .000$, upper arm length $t = 2.932$, $P < .005$, forearm length $t = 5.068$, $P < .000$, hand length $t = 3.987$, $P < .000$, lower leg length $t = 2.989$, $P < .005$. Total leg and thigh

length were not significantly different between two group comparisons.

Table 3: Skinfolds and Girths Measures of the Malaysian and Pakistani Cricketers

Variable	Malaysian u-19 M(SD)	Pakistani u-19 M(SD)	t-Value	P
Sums of skinfolds(mm)	75.94(22.38)	74.53(13.17)	.265	.792
Triceps (mm)	7.35(1.89)	7.27(1.73)	.159	.875
Subscapular(mm)	9.18(2.48)	9.02(1.75)	.249	.804
Biceps Sf(mm)	4.73(1.39)	5.65(1.51)	2.204	.033*
Iliac crest SF(mm)	14.40(4.75)	12.27(3.32)	1.806	.078
Suraspinale (mm)	7.23(2.90)	7.77(1.06)	.865	.394
Abdominal (mm)	13.56(5.70)	14.38(4.03)	.589	.565
Thigh Sf(mm)	12.35(4.47)	10.20(3.60)	1.836	.073
Calf Sf(mm)	7.14(2.13)	8.01(1.18)	1.75	.089
Arm relax girth(cm)	26.23(3.69)	27.89(3.17)	1.674	.101
Arm flex girth(cm)	29.20(3.52)	30.63(2.84)	1.540	.130
Forearm girth(cm)	24.88(2.30)	26.07(2.04)	1.906	.063
Wrist girth(cm)	16.03(1.00)	16.78(.99)	2.622	.012*
Chest girth(cm)	84.33(10.15)	89.21(6.72)	1.964	.057
Waist girth(cm)	72.92(10.35)	75.42(8.06)	.935	.355
Hip girth(cm)	89.85(10.20)	94.08(6.97)	1.679	.101
Thigh girth(cm)	51.66(6.70)	55.08(5.79)	1.891	.065
Calf girth(cm)	34.49(3.18)	35.01(2.51)	.630	.532

Significant level adjusted at .05

Table 4: Lengths and Breadths Measures of the Malaysian and Pakistani Cricketers

Variable	Malaysian u-19 M(SD)	Pakistani u-19 M(SD)	t-Value	P
Sitting height (cm)	85.48(4.80)	88.77(4.01)	2.578	.013*
Arm Span(cm)	173.17(8.48)	178.56(6.11)	2.528	.015*
Total Arm length (cm)	74.33(2.81)	80.80(4.52)	5.366	.000**
upper length(cm)	30.85(2.52)	32.71(1.82)	2.932	.005*
forearm length(cm)	25.26(1.64)	27.88(1.92)	5.068	.000**
Hand length(cm)	18.44(.84)	20.03(1.77)	3.987	.000**
Total leg length(cm)	89.48(3.47)	90.48(4.15)	.912	.367
Thigh length(cm)	44.80(2.34)	43.91(1.91)	1.445	.156
Lower leg length(cm)	44.95(2.44)	46.48(3.36)	2.989	.005*
shoulder breadth(cm)	39.05(3.13)	42.74(2.74)	4.343	.000**
pelvis breadth(cm)	26.60(2.92)	30.08(2.29)	4.595	.000**
Chest breadth(cm)	26.58(3.04)	29.13(2.57)	3.150	.003*
Elbow breadth(cm)	6.64(.65)	7.77(1.20)	4.051	.000**
Knee breadth(cm)	9.42(.75)	9.45(1.62)	.068	.946

Significant level adjusted at P < .05.

The Pakistani under-19 cricketers were higher than Malaysian under-19 cricketers in shoulder breadths, $t = 4.343$, $P < .000$, pelvis breadth $t = 4.595$, $P < .000$, chest breadth $t = 3.150$, $P < .003$, humerus breadth $t = 4.051$, $P < .000$. There was no significantly different between groups in the measurements of femur breadth.

DISCUSSION AND CONCLUSION

This study is the comparison of the anthropometric characteristics of the Pakistan under-19 and Malaysian under-19 cricket team players. The anthropometric variables were measured as stature, body mass, sums of eight skinfolds, six girths, five lengths, five breadths, four somatotype values, along with hand grip and back strengths.

The Pakistan u-19 cricket players were significantly taller and heavier than Malaysian under-19 cricketers. The current study supported the findings of Tesfaye and colleagues [14] that Ethiopian were taller and heavier than Indonesian and Vietnamese. The Pakistan under-19 cricket team players were selected from larg population where cricket is most famous and popular sports. As a result Pakistani palyers were more physically stronger than than the Malaysian under-19 cricket players which selected from lower in population and cricket was not famous game. Cricket loving population provide larger option for selectors than the less cricket loving population.

All girth values of Pakistan u-19 and Malaysian under-19 cricket players were similar except forearm and wrists. The similarity in girth values may be effected by regular and similar type of fitness training which equally help to maintain the muscle size of the Pakistan and Malaysian under-19 cricket players. The current study contradicts with the findings of [15] that the Japanese and American students were significantly different in their girths values because they belongs to different race of population.

Malaysian under-19 cricket players were shorter in segmental lengths and breadth than Pakistan under-19 players such as sitting height, arm span, arm lengths, hand and lower leg length, pelvis, chest, humerus, and femur breadths. It can be concluded that lengthier and wider body segments provide a

biomechanical advantage in bowling, batting and fielding. It may be predicted that Pakistan under-19 players performed well in the 2013-14 Asian championship than Malaysian u-19 cricketers. This study supports the findings of Mikulić [16] that larger lengths of body segments provide biomechanical advantages to the senior players which increase their stroke distance. The current study supports the findings of Pyne and colleagues [4] that stature and lengthier body segments increase the performance of the cricket fast bowlers. This study also support the findings of Escamilla and colleagues [17] that adult baseball batter were superior in batting performance than youth because they were taller, heavier and larger in body segments than younger baseball batters.

The current study compared the somatotype values of Malaysian and Pakistan u-19 cricket players. Although, there was no significant difference in the somatotype values but Malaysian cricketer were more endomorphs than the Pakistani cricketers. The hand grip and back strength of Malaysian and Pakistani u-19 players were similar. This result indicates both team's players have a similar level in competition and training pattern that why they were similar in strength measures.   Finding of this study support the statement of Koley and Yadav [18] that the players with similar playing experience would be similar in hand grip and back strength.

PRACTICAL APPLICATION
This study suggest that the anthropometric characteristics would be measured during the selection process as like the batting, blowing technique and the existing performance. This assessment would provide valuable information to coaches to select players as batsmen and bowlers. It is suggested that future studies should be conducted to estimate the effect of anthropometric characteristics on overall batting and bowling performance. Furthermore, future research should be conducted to find the relationship between the anthropometric characteristics and batting and bowling performance.

ACKNOWLEDGMENT

REFERENCES
[1] M. Stuelcken, D. Pyne and P. Sinclair, "Anthropometric characteristics of elite cricket fast bowlers," *Journal of Sports Sciences,* vol. 25, no. 14, pp. 1587-1597, 2007.
[2] C. Petersen, D. B. Pyne, M. J. Portus and B. Dawson, "Analysis of Twenty/20 cricket performance during the 2008 Indian Premier League.International Journal of Performance Analysis in Sport," vol. 8, no. 3, pp. 63-69, 2008.
[3] B. Woolmer, T. Noakes and H. Moffett, Bob Woolmer's art and science of cricket, London, UK: New Holland Publishing, 2008.
[4] D. B. Pyne, G. M. Duthie, P. U. Saunders, C. A. Petersen and M. R. Portus, "Anthropometric and strength correlates of fast bowling speed in junior and senior cricketers," *The Journal of Strength & Conditioning Research,* vol. 20, no. 3, pp. 620-626, 2006.
[5] M. S. Taliep, S. K. Prim and J. Gray, "Upper body muscle strength and batting performance in cricket batsmen," *The Journal of Strength & Conditioning Research,* vol. 24, no. 12, pp. 3484-3487, 2010.
[6] A. Bayios I, N. K. Bergeles, N. G. Apostolidis, K. S. Noutsos and M. D. Koskolou, "Anthropometric, body composition and somatotype differences of Greek elite female basketball, volleyball and handball players," *The Journal of sports medicine and physical fitness,* vol. 46, no. 2, pp. 71-80, 2006.
[7] W. Carvajal, A. Ríos, I. Echevarría, M. Martínez, J. Miñoso and D. Rodríguez, "Body type and performance of elite Cuban baseball players," *MEDICC Review,* vol. 11, no. 2, pp. 15-20, 2009.
[8] U. Alemdaroğlu, "The relationship between muscle strength, anaerobic performance, agility, sprint ability and vertical jump performance in professional basketball players," *Journal of human kinetics,* no. 31, pp. 149-158, 2012.
[9] R. A. Stretch and F. Buys, "Anthropometric profile and body composition changes in first-class cricketers," *South African Journal for Research in Sport, Physical Education and Recreation,* vol. 14, no. 2, pp. 57-64, 1991.
[10] S. Koley, "A study of anthropometric profile of Indian inter-university male cricketers," *Journal of human sport & exercise,* vol. 6, no. 2, pp. 427-435, 2011.
[11] M. Z. U. Haq, F. L. J. Low, D. B. Bendri, B. K. Ong and M. Saleem, "Morphological characteristics of Malaysian national cricket batsmen," *International Journal of Physiotherapy,* vol. 3, no. 1, pp. 58-65, 2016.
[12] B. Inkster, A. Murphy, R. Bower and M. Watsford, "Differences in the kinematics of the baseball swing between hitters of varying skill," *Journal of Science and Medicine in Sport, 12,* pp. 1050-1054, 2010.
[13] K. Norton and T. Olds, Anthropometrica, Sydney: University of New South Wale Press, 1996.
[14] F. Tesfaye, N. G. Nawi, H. Van Minh, P. Byass, Y. Berhane, R. Bonita and S. Wall, "Association between body mass index and blood pressure across three populations in Africa and Asia. Journal of human hypertension,," vol. 21, no. 1, pp. 28-37, 2007.
[15] Y. Nakanishi and V. Nethery, "Anthropometric comparison between Japanese and Caucasian American male university students," *Applied Human Science,* vol. 18, no. 1, pp. 9-11, 1999.
[16] P. Mikulić, "Anthropometric and physiological profiles of rowers of varying ages and ranks," *Kinesiology,* vol. 40, no. 1, pp. 80-88, 2008.
[17] R. F. Escamilla, G. F. Fleisig, C. DeRenne, M. K. Taylor, I. C. T. Moorman, R. Imamura, E. Barakatt and J. R. Andrews, "A comparison of age level on baseball hitting kinematics," *Journal of Applied Biomechanics,* vol. 25, no. 3, pp. 210-218, 2009.
[18] S. Koley and K. M. Yadav, "An association of hand grip strength with some anthropometric variables in Indain cricket players," *Physical Education and Sport,* vol. 7, no. 2, pp. 113-123, 2009.