

Digit Finger Ratio of Cricket Players and their Association with Maximal Oxygen Uptake (Vo_{2max}) and Lactic Acid

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Abstract

Digit length during the fetal period has been correlated to testosterone exposure. In fact, the ratio of finger lengths involving the second and fourth fingers (2D:4D) has been seen as an established biomarker for the degree of prenatal testosterone exposure, and a person's digit ratio is quite stable throughout development because it is determined before birth. In the present study, total 90 male cricket players were selected from different clubs and stadia located at Varanasi and nearby, on the basis of stratified random sampling technique fall under three group i.e. Under-16 cricket players, Under-19 cricket players, and Under-23 cricket players. Each group contains 30 subjects with age ranging from 14 to 23 years. Yo-Yo intermittent test was conducted for testing and calculating of maximum oxygen uptake. For testing the Lactic acid concentration of the subjects the Blood Lactate. At the conclusion of the yo-yo (level 1), fingertip capillary blood samples were taken within 1 minute of finishing from selected subjects. Regarding digit finger ratio, Finger length of all the samples for this study were measured with the help of Digital Vernier Caliper (Fink et al., 2006) accurate to 0.01 mm. On the basis of observed data results it was concluded that significantly negative relationship were found between Digit Finger Ratio (Left hand & Right hand) with Vo_{2max} and Coefficient of determination explaining 11.8 % contribution of Digit Finger Ratio (LH), 0.09 % contribution of Digit Finger Ratio (RH) and 12.2 % contribution of both (right/left 2D:4D) on the variable Vo_{2max} . It was also concluded that no relationship were found between Digit Finger Ratio (Left hand & Right hand) with Lactic acid and Coefficient of determination explaining only 0.007 % contribution of Digit Finger Ratio (LH), only 0.002 % contribution of Digit Finger Ratio (RH) and 0.003 % contribution of both (right/left 2D:4D) on the variable Lactic acid.

KEYWORDS: - Digit Finger Ratio, Vo_{2max} , and Lactic acid.

Introduction

Cricket is one of the oldest organized sports and International cricket is undergoing a phase of rapid change as it competes to attract a more global audience. As a result, modern international cricketers are now exposed to greater physical physiological and psychological demands. These expanded demands include more five and one day matches per season. There is relative lack of scientific research of the sports or its players. There are, for example very few studies of the physiological demands of cricket or of the specific physiological, biochemical and anthropometrical attributes of top-class cricketers. Perhaps this reflects the innate conservatism of either the game or the scientist who study it.

Elite game performance results from a mixture of elite factors that interact with each other are very poorly understood but complex sense to mould a complex athlete in a champion (Tucker & Collins, 2012). The identification of future elite sportspersons in early childhood has become a necessity. The sportspersons selected for specific sports activities require suitable physical and physiological conditions/ demands and sports facilities including advance/latest sports equipment, rational style of life and services of sports experts like well educated and experienced coaches, sports physicians, dieticians, sports psychologists, and sports medicine specialists. Such facilities are necessary for all selected sportspersons of various sports events. Therefore, correct identification, selection, and placement of young talents is becoming important everywhere. (Dirix A. et al. 1986).

Testosterone, are related to muscle development, spatial abilities, physical exertion, aggression, and competition in human research (Archer, 1991). Athletes are commonly related to these factors in addition because many athletic environments tend to be highly physical, aggressive, and visually demanding. These factors commonly related to athletic performance tend to vary among athletes in several competitive sports. The role of testosterone has been related to competitive aggression in several animal studies but remains a receptive debate in humans, with numerous contradictory findings causing reviewers to draw different conclusions (Salavodor, Suay, Sanchis, Simon, & Brain, 1999).

Within the sector of sports science, elite performance is known to be the result of both training and genetic factors. However, the extent to which champions are born or made may be a question that is still one among considerable interest, since it's implications for talent identification and management (Vaeyens, Güllich, and Warr, 2009; Schneider, 1997). Nowadays the need for studying digit finger ratio which is a new concept in talent identification is gaining importance in the field of genetics, psychology, and physiology and in the research field of sports. The study of digit ratio can play a vital role in identifying talent in the field of sports.

Procedure and Methodology

In the present study, total 90 male cricket players were selected from different clubs and stadia located at Varanasi and nearby, on the basis of stratified random sampling technique. The subjects were selected in three group i.e. Under-16 cricket players, Under-19 cricket players, and Under-23 cricket players. Each group contains 30 subjects with age ranging from 14 to 23 years. All the elite players selected on this study who had participated in any competitive sports/ game at least board (national) / inter-university level in the discipline of Cricket.

Yo-Yo intermittent test was conducted for testing and calculating of maximum oxygen uptake. The yo-yo is similar in format to the 20MSR but has a 2×5 -m, 10-second active recovery at the end of every 2×20 -m shuttle run. Subjects ran the 2×20 -m shuttles (20 m out and 20 m back) at the speed designated by the Yo-Yo Compact Disc (Helle Thompson, Copenhagen, Denmark). At the end of each 2×20 -m shuttle, subjects walked or jogged (as they wished) 2×5 m (out and back) and then waited at the starting line for the next signal to run again. Yo-yo level 1 starts at 10 km/h and level 2 at 13 km/h, with both levels progressively increasing in speed throughout the test. Finishing

speeds can be over 20 km/h, but this depends on the subject's fitness and fatigue levels experienced during the test. Yo-yo level 1 usually takes 6 to 20 minutes, and level 2 takes 2 to 10 minutes. The number of completed levels and shuttles and the total distance covered were recorded at the end of the test.

For testing the Lactic acid concentration of the subjects the Blood Lactate. At the conclusion of the yo-yo (level 1), fingertip capillary blood samples were taken within 1 minute of finishing from selected subjects. Krstrup et al. (2003) reported that samples taken 1 to 6 minutes after the yoyo were not different; therefore only 1 post exercise sample was taken here. The first drop was discarded and 3 μ L of blood was then collected in an EDGE Blood Lactate Test Strips. Lactate concentration (La⁻) was determined using a THE EDGE BLOOD LACTATE ANALYZER, which was regularly calibrated using precision standards and routinely assessed by external quality controls.

Regarding digit finger ratio, Finger length of all the samples for this study were measured with the help of Digital Vernier Caliper (Fink et al., 2006) accurate to 0.01 mm. Total length of the second finger which is index finger and fourth finger which is ring finger was measured in form of millimeter and centimeter from the basal (lowest) crease of finger to the fingertip along the medical line bisecting the finger. First the photocopy of right and left hand palm were collected from the subjects and then the measurement was done by the help of digital vernier calipers. Ratios were calculated by dividing the length of the second digit (2D) i.e. index finger by the length of the fourth digit (4D) i.e. ring finger for both left and right hand separately and then calculating the mean of these two ratios.

Results of the study

Table 1: Group wise Descriptive Statistics of Digit Finger Ratio (Left hand, Right hand), Vo₂max and Lactic acid

GROUP		UNDER-23	UNDER-19	UNDER-16	OVER ALL
		Mean \pm S D			
L.H.	Ratio (2d:4d)	0.964 \pm 0.021	0.956 \pm 0.021	0.961 \pm 0.024	0.960 \pm 0.022
R.H.	Ratio (2d:4d)	0.962 \pm 0.020	0.949 \pm 0.015	0.961 \pm 0.024	0.957 \pm 0.021
	Vo ₂ Max	47.002 \pm 0.867	47.083 \pm 1.042	47.031 \pm 0.890	47.038 \pm 0.921
	Lactic Acid	7.605 \pm 0.709	7.720 \pm 0.841	7.925 \pm 0.524	7.750 \pm 0.704

Table 1 revealed the group wise descriptive measures of Digit Finger Ratio (Left hand, Right Hand), Vo₂max and Lactic acid of Cricket players. The mean \pm Standard Deviation of Digit Finger Ratio (LH) were as follows: Under-23 (0.964 \pm 0.021), Under-19 (0.956 \pm 0.021), Under-16 (0.961 \pm 0.024), and for Overall (0.960 \pm 0.022). The mean \pm Standard Deviation of Digit Finger Ratio (RH) were 0.962 \pm 0.020, 0.949 \pm 0.015, 0.961 \pm 0.024, and 0.957 \pm 0.021 for Under 23, Under 19, Under 16, and Overall. The mean \pm Standard Deviation of Vo₂max were 47.002 \pm 0.867, 47.083 \pm 1.042, 47.031 \pm 0.890, and 47.038 \pm 0.921 for Under 23, Under 19, Under 16, and Overall. The mean \pm Standard Deviation of Lactic acid were 7.605 \pm 0.709, 7.720 \pm 0.841, 7.925 \pm 0.524, and 7.750 \pm 0.704 for Under 23, Under 19, Under 16, and Overall respectively.

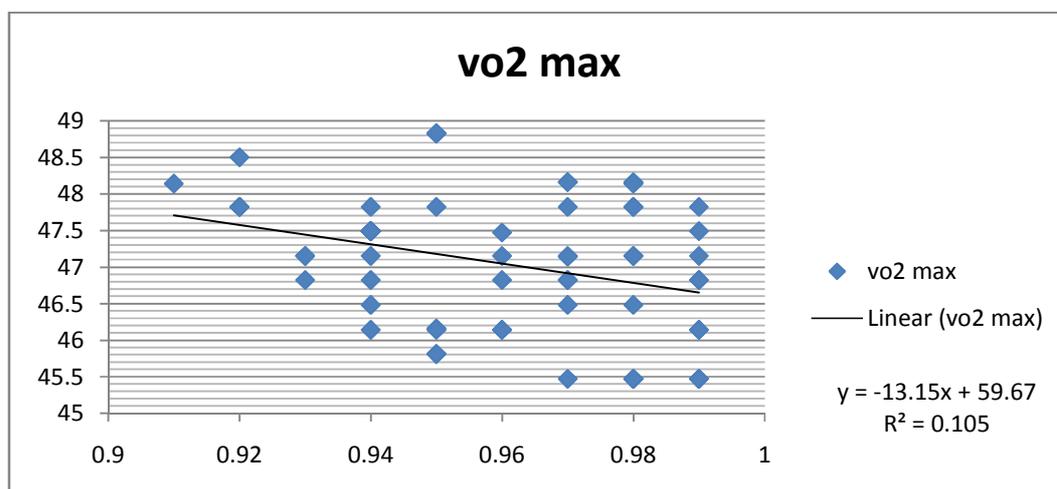
Based on observed data, table also revealed that all group were low in digit finger ratio left hand and right hand, since the mean value is less than 1.00.

Coefficient of determination for Digit Finger Ratio (Left hand) with Vo2max and Lactic acid of Cricket players

	R	R ²	Adjusted R ²	Std. Error of the Estimate
VO2MAX	0.344	0.118	0.103	0.02121
LACTIC ACID	0.082	0.007	-0.010	0.02251

Table 2 revealed that the correlation (R= 0.344) and Coefficient of determination (R²= 0.118) value for Digit Finger Ratio (LH) and Vo2max. This is explaining that the Digit Finger Ratio contributes only 11.8 % on the variable Vo2max.

Table also revealed that the correlation (R= 0.082) and Coefficient of determination (R²= 0.007) value for Digit Finger Ratio (LH) and Lactic acid. This is explaining that the Digit Finger Ratio contributes only 0.007 % on the variable Lactic acid.

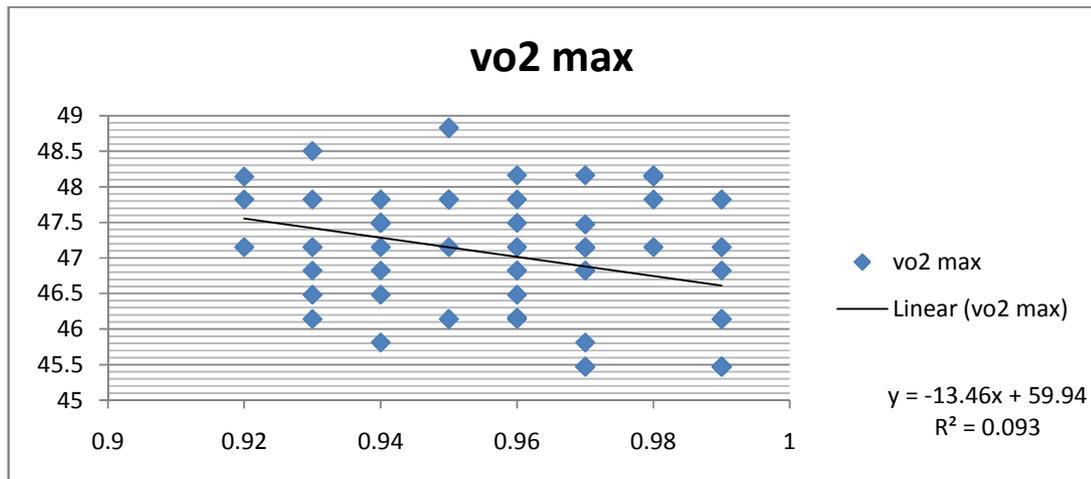


Coefficient of determination for Digit Finger Ratio (Right hand) with Vo2max and Lactic acid of Cricket players

	R	R ²	Adjusted R ²	Std. Error of the Estimate
VO2MAX	0.304	0.092	0.077	0.02041
LACTIC ACID	0.039	0.002	-0.016	0.02140

Table 3 revealed that the correlation (R= 0.304) and Coefficient of determination (R²= 0.092) value for Digit Finger Ratio (RH) and Vo2max. This is explaining that the Digit Finger Ratio contributes only 0.09 % on the variable Vo2max.

Table also revealed that the correlation (R= 0.039) and Coefficient of determination (R²= 0.002) value for Digit Finger Ratio (LH) and Lactic acid. This is explaining that the Digit Finger Ratio contributes only 0.002 % on the variable Lactic acid.



Discussion of Findings

In this study we examine the contribution of digit finger ratio in relation to Vo2max and Lactic acid of cricket players. Zitzmann and Nieschlag (2007) and Wang et al. (2010) have reported an elevation in haematocrit in men with low numbers of cytosine-adenine-guanine triplet repeats after testosterone administration or exercise. Therefore, On the basis of observed data results revealed that the significantly negative correlation was found between Digit Finger Ratio (LH & RH) and Vo2max and Coefficient of determination explaining only 11.8 % contribution of Digit Finger Ratio (LH), only 0.09 % contribution of Digit Finger Ratio (RH) and 12.2 % contribution of both (right/left 2D:4D) on the variable Vo2max. The similar result was found by several previous studies like R. Hill et al., (2011) who found that low right-left 2D:4D is associated with high maximal oxygen uptake ($\dot{V} O_{2max}$), high velocity at $\dot{V} O_{2max}$, and high maximum lactate concentration in a sample of teenage boys. It has been established that $\dot{V} O_{2max}$ is an important predictor of success in sports that require aerobic endurance (Costill, 1967; Foster, 1983). Noakes and colleagues (Noakes, Myburgh, & Schall, 1990), who reported that peak treadmill running velocity during a $\dot{V} O_{2max}$ test was the best laboratory predictor of running performance. It is also in accord with the findings of Longman and colleagues (Longman et al., 2011), who reported that right 2D:4D (but not left 2D:4D) was negatively related to rowing ergometer performance in men.

Conclusion

On the basis of observed data results it was concluded that significantly negative relationship were found between Digit Finger Ratio (Left hand & Right hand) with Vo2max and Coefficient of determination explaining 11.8 % contribution of Digit Finger Ratio (LH), 0.09 % contribution of Digit Finger Ratio (RH) and 12.2 % contribution of both (right/left 2D:4D) on the variable Vo2max.

it was also concluded that no relationship were found between Digit Finger Ratio (Left hand & Right hand) with Lactic acid and Coefficient of determination explaining only 0.007 % contribution of Digit Finger Ratio (LH), only 0.002 % contribution of Digit

Finger Ratio (RH) and 0.003 % contribution of both (right/left 2D:4D) on the variable Lactic acid.

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