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Biomechanical Variables of Sprinting and Dribbling Performance Highlight Gender Differences in Football Players

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ABSTRACT

The objective of the study was to compare between male and female footballers with regard to sprinting and dribbling variables biomechanically. Twenty (ten male and ten female) inter collegiate, well trained football players were randomly selected as subjects for the study. Age of the subjects ranged from 17 to 24 years. Data was collected using a digital video recording system and a two-dimensional analysis was done using Kinovea 0.8.15 software. The data was computed as mean, Standard Deviation and 't' test and the hypothesis was tested at 0.05 level of significance. According to our findings, the variables namely height ($t=2.70$), weight ($t=5.46$), average time taken for zigzag sprint ($t= -4.55$), average time taken for dribbling ($t=-7.03$), average speed of zigzag sprint ($t= 4.59$), average speed of dribbling ($t=8.07$), ratio between average time taken of dribbling and zigzag sprint ($t=-5.17$), ratio

between average speed of dribbling and zigzag sprint ($t=4.45$) were significantly different in male and female players.

Key Words: Dribbling, Sprinting, Football

INTRODUCTION

Dribbling in football is an invaluable key skill especially in the third part of a pitch or at the wings where most attacks take place. Dribbling creates space in difficult situations where the dribbler is marked and closely guarded by a defender and the dribbler can either score or create scoring chances after a successful dribble. However, if dribbling is poorly mastered and used, it may result in the loss of possession of football either when the ball is intercepted or when tackled by a defender. Some players prefer getting past players with speed, some players go straight at their opponents and look to go past them directly with kicking the ball through their legs whereas others may use feints, control, agility, and acceleration to evade tackles (1, 2, 3).

Dribbling is the key skill if a player has to succeed at the highest level of the game of football. Though considered a basic skill, it is the most dynamic and exciting component in the game (4). A very important aspect for the football players is to understand the biomechanics of the dribbling with sprinting. Generally, the strength, speed and power of male players are higher than those of females, however, literature on biomechanical differences between males and females in regard to dribbling in football is not available.

The objective of the study was to compare the sprinting and dribbling variables in male and female footballers biomechanically. It was hypothesized that there might be significant gender difference between the sprinting ability and dribbling ability in the selected variables.

METHODOLOGY

Twenty inter collegiate football players (ten male and ten female) were randomly selected as subjects for the study. Age of the subjects ranged from 17 to 24 years.

Data was collected using a digital video recording system and two-dimensional analyses was done using Kinovea 0.8.15 software. The protocols for the study consisted of three maximal shuttle zigzag sprints for 20- meter distance and three maximal dribbles with soccer ball for 20-meter distance (Fig. 1). Six cones were placed in a straight line, two meters apart from first cone to second, second to third, third to fourth, fourth to fifth and fifth to sixth accordingly. Each of the 20 meters shuttle zigzag sprint had nine turns. Sprints were recorded by placing the camera 1.05 meter above the ground (approximately at hip height) and at 10 meters away from the centre line.

The first cone was considered as the starting line, remaining five cones were placed two meters apart in straight line from first cone to second, second to third, third to fourth, fourth to five and five to six accordingly. For sprint at the signal (GO), the subject starts zigzag sprint and finishes at the starting line. For dribble also, at the signal (GO) the subject starts to dribble around the cones in a zigzag manner. It was done by 10 males and 10 female football players.

The data was computed with mean, standard deviation and t- test. The hypothesis was tested at 0.05 level of significance.



Figure- 1 Course of Zigzag Sprint and Dribbling Performances

Selection of Variables

Table 1 Abbreviation of the variables used in the study

S. No.	Name of Variables	Abbreviation	Unit
1	Height	H	Cm.
2	Weight	W	Kg.
3	Average Time Taken in Zigzag Sprint	AT	Sec.
4	Average Time Taken in Dribbling	AX	Sec.
5	Average Speed of Zigzag Sprint	ASZS	m/sec.
6	Average Speed of Dribbling	ASDB	m/sec.
7	Ratio between Average Time Taken of Dribbling and Zigzag Sprint	R1	–
8	Ratio between Average Speed of Dribbling and Zigzag Sprint	R2	–

RESULTS

In spite of an increase in the participation of female players in the game of football, very few studies are available that compare the performance of female athletes with those of their male counterparts. In an interesting paper, Barfield et.al. (5) examined kinematic instep kicking differences between elite female and male soccer players and their study showed that males generally kicked the ball faster than the females and displayed greater kinematic variables (5, 6). Male athletes are usually known to be faster and stronger than the females owing to their built but female players are also noted to get better in speed while sprinting and dribbling.

In the present study, the variables namely performance ranking (R) ($t=-7.39$), height (H) ($t=2.70$), weight (W) ($t=5.46$), average time taken of zigzag sprint (AT) ($t=-4.55$), average time taken of dribbling (AX) ($t=-7.03$), average speed of zigzag sprint (ASZS) ($t=4.59$), average speed of dribbling (ASDB) ($t=8.07$), ratio between average time taken of dribbling and zigzag sprint (R1) ($t=-5.17$), and ratio between average speed of dribbling and zigzag sprint (R2) ($t=4.45$) were found to be significantly different between male and female athletes at 0.05 level (Table II and Figure 2).

Table II shows Mean and Standard deviation ($M \pm SD$) of the variables. Height (H) was 170.20 ± 4.24 for male and 163.90 ± 6.05 for female. Weight (W) was 65.90 ± 6.14 for male and 51.40 ± 5.74 for female, average time taken of zigzag sprint (AT) was 6.60 ± 0.40 for male and 7.63 ± 0.60 for female, average time taken of dribbling (AX) was 12.26 ± 1.30 for male and 20.82 ± 3.62 for female, average speed of zigzag sprint (ASZS) was 3.04 ± 0.18 for male and 2.64 ± 0.21 for female, average speed of dribbling (ASDB) was 1.65 ± 0.18 for male and 0.96 ± 0.21 for female, ratio between average time taken of dribbling and zigzag sprint (R1) was 1.86 ± 0.21 of male and 2.74 ± 0.50 for female and ratio between average speed of dribbling and zigzag sprint (R2) was 0.54 ± 0.08 for male and 0.37 ± 0.09 for female.

Table II Descriptive Statistics of Male and Female Football Players

S. No.	Variables	Gender	Mean	Std. Deviation
1	H	M	170.20	4.24
		F	163.90	6.05
2	W	M	65.90	6.14
		F	51.40	5.74
3	AT	M	6.60	0.40
		F	7.63	0.60
4	AX	M	12.26	1.30
		F	20.82	3.62
5	ASZS	M	3.04	0.18
		F	2.64	0.21
6	ASDB	M	1.65	0.18
		F	0.96	0.21
7	R1	M	1.86	0.21
		F	2.74	0.50
8	R2	M	0.54	0.08
		F	0.37	0.09

N=20; Note: M=Male, F=Female

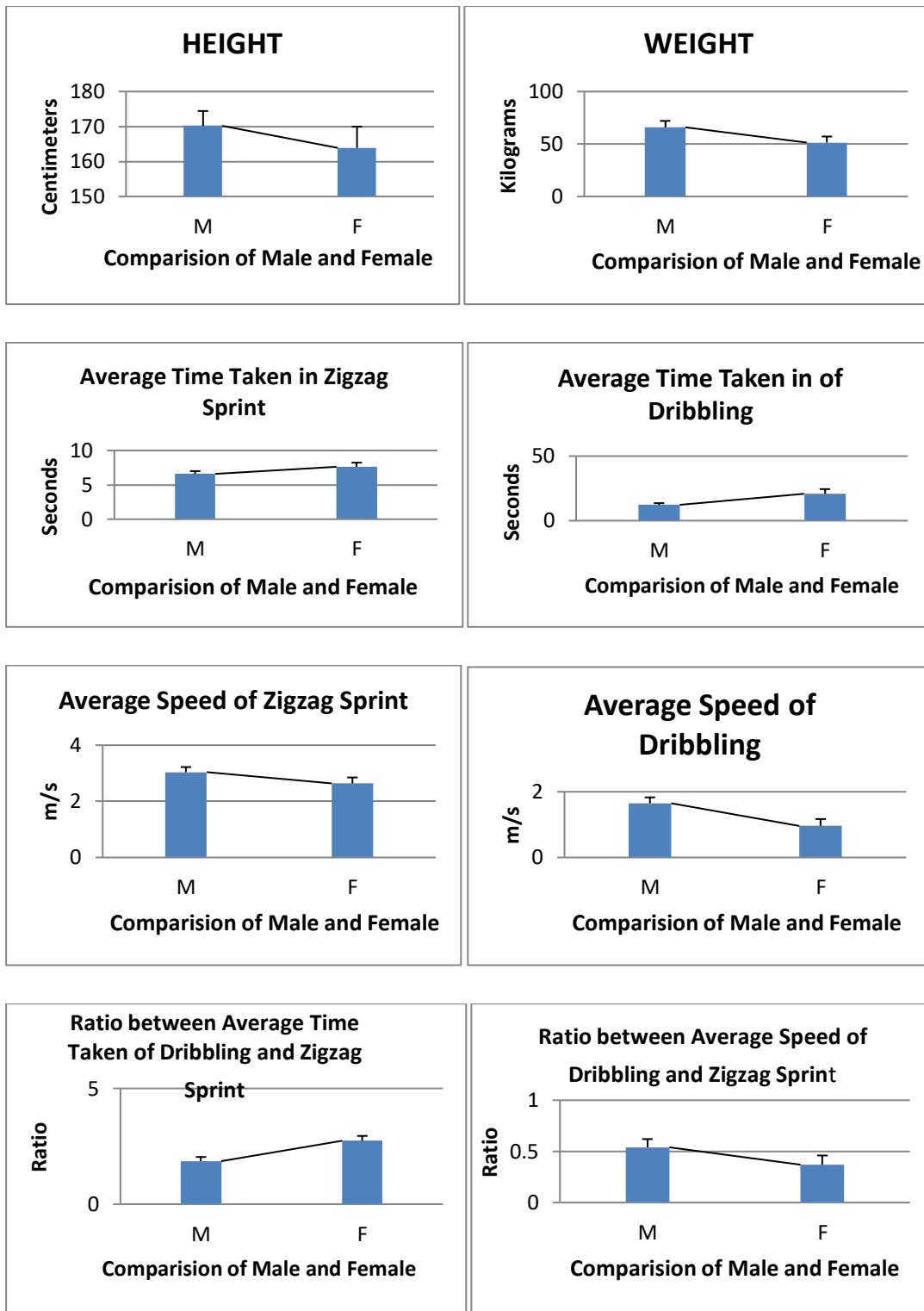


Figure 2. Graphical Presentations of Comparison of Male and Female Football Players

Table III Gender Differences with Regard to Selected Biomechanical Variables of Sprinting and Dribbling

Variables	F	Sig.	't'	df	Sig. (2-tailed)	Mean Difference
H	2.48	0.13	2.70*	18.00	0.02	6.30
			2.70	16.12	0.02	6.30
W	0.00	0.96	5.46*	18.00	0.00	14.50
			5.46	17.92	0.00	14.50
AT	1.01	0.33	-4.55*	18.00	0.00	-1.03
			-4.55	15.69	0.00	-1.03
AX	7.45	0.01	-7.03	18.00	0.00	-8.56
			-7.03	11.28	0.00	-8.56
ASZS	0.07	0.79	4.60*	18.00	0.00	0.40
			4.60	17.75	0.00	0.40
ASDB	0.35	0.56	8.07*	18.00	0.00	0.69
			8.07	17.54	0.00	0.69
R1	13.73	0.07	-5.17*	18.00	0.00	-0.88
			-5.17	12.04	0.00	-0.88
R2	0.05	0.84	4.45*	18.00	0.00	0.17
			4.45	17.42	0.00	0.17

N=20; Note:= Significant at 0.05 level, F ratio- two sets of degrees of freedom; one for the numerator and one for the denominator, Sig.- Significance att 0.05 level, df- degree of freedom, sig. (2 tailed)- statistically significant correlations between your two variables*

According to Table-3, the variables namely height (H) (t=2.70), weight (W) (t=5.46), average time taken for zigzag sprint (AT) (t=-4.55), average time taken of dribbling (AX) (t=-7.03), average speed of zigzag sprint (ASZS) (t=4.59), average speed of dribbling(ASDB) (t=8.07), ratio between average time taken of dribbling and zigzag sprint (R1) (t=-5.17), and ratio between average speed of dribbling and zigzag sprint (R2) (t=4.45) were significant at 0.05 level.

DISCUSSION

The performance of males and females are fairly similar in speed or strength till they hit puberty. Afterwards, the testosterone levels play a significant role, besides the average small group size of leg muscles and lesser oxygen consumption by females due to average smaller size of lungs. Also, on an average, males have higher haemoglobin content, about 150-160 mg/mL compared to 130-140 mg/mL for females (7, 8, 9, 10). These physiological differences could be contributing to the less average time taken by male players in sprint and dribbling. Men also have longer legs than females and better reaction time too (5, 6, 7). However, our study is the first to report that females perform better than males in average speed taken in sprinting and dribbling, contrary to the previous reports that show males average better in speed since they routinely engage in natural form of 'blood doping' (legally).

CONCLUSIONS

A significant difference between male and female football players with regard to the sprinting and dribbling abilities was observed. Male footballer players scored higher in average time taken in Zigzag Sprint and Dribbling and in the ratio between average speed of Dribbling and Zigzag Sprint. Female footballer players performed better with regard to average speed taken for Zigzag Sprint' and Dribbling and in ratio between average speed of dribbling and zigzag sprint.

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