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Comparative Analysis of Some Selected Anthropometric and Physiological performance Variables between Sidama Coffee and Hawassa Town Ethiopia Premier league Male soccer players

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Key words- Anthropometric measurements, Illinois agility, Physiological variable, Ethiopian premier league
Abstract;The purpose of the present study was to analyze some selected anthropometrical and physiological performance variables between Sidama Coffee and Hawassa Town Ethiopia Premier league Male soccer players. Descriptive cross-sectional study was employed on purposely selected 28 male soccer players (14) from Sidama Coffee soccer club and (14) from Hawassa Town Soccer club. To serve this purpose, three types of anthropometric data were included. Basic (mass, height, and body mass index), Girths (upper arm, waist, thigh and calf circumferences), skeletal diameter (shoulder width) and physiological performance variables (30 meter speed test and Illinois agility test) were performed on each subjects. The obtained quantitative data was analyzed by paired sample t-test ($p<0.05$) and Pearson correlation ($p<0.05$, 0.01) with the help of SPSS version 20.00 software. The study results showed there were no significant ($p<0.05$) difference found in all selected anthropometric and physiological performance variable indicator except calf circumference between clubs. Pearson correlation shows height had significantly positive correlations with body mass index and thigh circumferences were shown in Sidama Coffee club players. Body mass had significantly positive correlations with body mass index, shoulder width, waist, and thigh circumference in both clubs. Illinois agility had negative correlation ($p<0.05$) with calf circumference in Sidama Coffee players but 30 meter speed was highly positive correlation ($p<0.05$) with calf circumference in only Hawassa Town soccer club players. Significantly, positive correlations noted among physiological performance variables too. We conclude that there is no significant difference between clubs both selected anthropometric and physiological performance parameter.
Key words- Anthropometric measurements, Illinois agility, Physiological variable, Ethiopian premier league

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I. INTRODUCTION

Football, which is also known as Soccer is probably world's most popular sports, played in practically every nation at varying levels of competence. Football played for competitively or for fun, as a career, a means of keeping fit or simply a recreational pursuit (Amarpreet Singh et al., 2015). The game comprises activities like sprint and jumps in attack and defense. It also requires aerobic capacity as the game lasts one and half hour, sometimes even longer than the official time. These short and long lasting activities were performed over the entire game. Therefore, both aerobic and anaerobic capacities are very important to exhibit better performance (Swapan K Dey, 2010). Soccer training is mainly based on movement implementing the endurance qualities consisting of moderate activity alternating with periods of intermittent high intensity, leading to a significant production of metabolic heat (Popovic S, et al. 2013).

Morphological characteristics, tactical, physical and technical skills successfully discriminate soccer players by competitive level and position. Besides fitness and the technical skills of the footballers, anthropometric indicators and body composition play an important role in successful performance (Reilly T, 2010). Anthropometry is the study of the measurement of the human body in terms of the dimensions of bone, muscle, and adipose (fat) tissue. Anthropometric and physical fitness characteristics provide important information about normality of body size, health condition, and body shape (Amarpreet Singh, 2015). Morphological characteristics are important to succeed in a sport (Robert Malina, 2004). The assumption that anthropometric parameter have an impact on the physical performance component of footballers (Jasmina PL, 2014). Footballers are expected to have certain morphological and physiological attributes in order to make a continuous and successful career. Team game sports are where required body size, shape, body composition and

level of fitness. These are an important part in providing distinct advantages for the highest levels of performance where there is a high degree of player specialization (Munoz-Catol MJ, 2007). There are many practical implications of studying anthropometry among sports participants. For soccer managers, coaches, and physiotherapists, an understanding of the optimal anthropometric characteristics of players can help to develop squad members to their full potential. Additionally, physiological performance testing is of great importance for monitoring fitness, strength, agility, skill, and examined according to the different positional roles within the team (Clare Hencken et al., 2006).

The database of physique and performance qualities of the players of the famous clubs throughout the country is very important to make a National team. It is a fact that in Ethiopia there is still limited information of club footballers regarding anthropometric, physique, physiological profiles and performance. Hence, an attempt has been made to study and comparison of some selected basic anthropometric and physiological performance of the Hawassa Town and Sidama Coffee soccer club players.

The purpose of the present study is to analyze some selected anthropometrical and physiological performance status of the study participants, and ultimately, to compute correlation between anthropometrical characteristic and physiological performance variables of players within the clubs and to determine how closely these emulate previous findings.

II. MATERIALS AND METHODS

Subjects

Twenty-eight Ethiopia Premier league male soccer players were selected by using purposive sampling technique. The participants were selected from Sidama Coffee soccer club and from Hawassa Town soccer club players. Descriptive cross sectional research design was implemented. The main criteria for selection of subjects for the sample were as follows: they have been at least 2 years active member of the clubs, best players (from all position, GK, DF, MD, SK), they are in good health. The study period was during the second season Ethiopian premier league competition in 2018 competitive season. The privacy of the participants was protected with written consent provided which was approved club coaches and Regional (SNNP) Football federation. The Arba Minch University Research Coordination office review board (No, RCP/1234/09 and date 2/23/2018) approved all methods and procedures.

Procedures

Anthropometric Measures

The anthropometric data included three types of measurements: basic (age, body mass, standing height, body mass index), girths (upper arm, waist, thigh and calf circumference) and skeletal diameter (shoulder width). Each subject was measured in accordance with the standard methods proposed by the international society for the advancement of kinanthropometry, 2001. Height and body mass were measured using calibrated digital stadiometer and weighing machine. Body mass was measured to the nearest 0.1 kilogram and height was measured to the nearest of 0.001 meter. Body mass index is calculated using body mass index formula, i.e. weight (kg) divided by height (m^2). Body circumference were taken at four sites (upper arm, west, thigh and calf circumference) and skeletal diameter (only shoulder width) was measured by flexible tape to the nearest 0.001meter and all data were collected by the author who had experienced in taking body circumference.

Performance Measures

Before the start trials, standard warming up exercise was given for 15 minutes. Selected participants have knowledge and experience with various test protocol. In order to keep the test accurate and worthwhile, all tests have been performed during the period of 1st may 2018 under condition of temperature(15ºC to 25ºC) in the same moment of day at 10h am after getting balanced meal.

30 Meter Dash Test

The test involved running a single maximum sprint over 30 meters, with the time recorded. Start from a stationary position, with one foot in front of the other. The front foot must be behind the starting line. This starting position should hold for 2 seconds prior to starting, and no rocking movement allowed. The tester should encouraged to continue running hard through the finish line. There were two trials in total, and a 3-minute recovery allowed between each trial. The best (fastest) 30m sprint time selected for analysis. The timing starts from the first movement and then the timing system triggered, and finishes when the chest crosses the finish line and/or the finishing timing gate triggered. The time was recorded using standardize stopwatch. All methods and procedures in accordance with 30-meter dash test standard made by (Davis B, 2000).

Illinois's Agility Test

The athlete started on standing start at the starting cone. The athlete started on a "ready-set-go" countdown. The researcher started the watch when he says goes. The athlete then must sprint as fast as possible around all the cones without knocking them down. The stopwatch stopped when the athlete crossed the finish line. Test each athlete 2 times and rest fully in between each repetition (Munoz-Catol MJ et al., 2007). Agility measured by using the stopwatch and the best times of three successful trials (to the nearest 0.1 second) were recorded in accordance with Illinois's Agility test standard made by (McKenzie B, 2005)

Statistical Analysis

The analysis carried out using Statistical Package for Social Sciences (SPSS) version 20.0 for IBM. A comparison of means of anthropometric variables and physiological fitness variable between the clubs carried out using a t-test. Statistical significance was set at $p<0.05$. The relationships between anthropometric variables and physiological fitness variable were determined using Pearson product moment correlation coefficient. The correlation was high when $r>0.50$, moderate when $0.30<r>0.50$ and low when $r<0.30$.

III. RESULTS

Table 1: Mean of anthropometrical characteristics of soccer players with standard deviation.

	Clubs name							
	Hawassa Town				Sidama Coffee			
	N	M	SD	SE	N	Mean	SD	SE
Age(years)	14	22.785	3.400	.908	14	23.571	4.415	1.180
Height (cm)	14	175.055	3.703	1.234	14	176.000	6.145	1.642
Body mass (Kg)	14	67.577	4.872	1.624	14	71.171	7.959	2.127
BMI (kg/m^2)	14	22.057	1.600	.533	14	22.941	1.897	.507

M=Mean, SD= standard deviation, SE= standard error of mean BMI= body mass index

Table 1, Showed comparative of anthropometric characteristics along with the statistical comparatives of Sidama coffee and Hawasa Town male soccer players falling in the age range of 18 to 28 years. This study indicates the existence of differences among age, height, mass, body mass index, between clubs. The table shows the average age Hawassa Town players is little younger than Sidama Coffee players. Similarly, the mean height of Hawassa Town players is less height than Sidama Coffee players. The mean value of body mass of Hawssa Town players was less than Sidama Coffee players. The variation in standard deviation of mass of Hawassa Town players was less than Sidama Coffee players. However, the variation in their body mass index is higher within Sidama Coffee players. The average body mass index value of all clubs is at the midpoint of the normal category in football players. The variation in the mean anthropometric characteristics of players is higher for Sidama Coffee and lower for Hawassa Town players in all measurement. All the p-values are greater than 0.05, Hence we conclude that there is no significant difference between clubs age, body mass, height and body mass index of players.

Table 2 Differences and homogeneity of anthropometric characteristics between clubs

	Clubs name							
	Hawassa Town N=14			Sidama Coffee N=14				
	Mean	SD	SE	Mean	SD	SE	t	Sig. (2-tailed)
SW	51.214	3.166	.846	49.357	2.307	.616	1.774	.088
WC	80.428	2.953	.789	82.285	2.757	.737	-1.720	.097
UAC	30.285	1.938	.518	31.142	1.915	.512	-1.177	.250
CC	38.285	1.437	.384	39.500	1.652	.441	-2.075	.048*
TC	57.142	3.416	.035	58.214	3.683	.984	-.798	.432
Illinois's test	16.241	.542	.144	16.212	.435	.116	.154	.879
30m S	4.298	.131	.913	4.389	.163	.043	-1.616	.118

*SW=Shoulder width, WC=West circumference, UAC=Upper arm circumference, TC Thigh circumference, CC= Calf circumference, SD= standard deviation, SE= standard error of mean *Indicates P < 0.05,*

Distribution of mean values of five anthropometric measurements between Sidama Coffee and Hawassa Town soccer players were shown in table 2. The results showed no statically significant differences ($p < 0.05$) were observed in an all selected anthropometric measurement variable except calf circumference between clubs. However, Sidama Coffee players shown slightly higher mean value in west, upper arm, and thigh circumference than Hawassa Town players. Hawassa Town players score higher mean value than Sidama

Coffee players only in shoulder width. We can conclude that there is no significant difference between SidamaCoffe and Hawassa Town clubs in selected anthropometric variables. On the other hand, in some physiological variable depicted that both 30m speed and Illinois's agility performance of players found to be statistically no significant difference observed.

Table 3. Correlation matrix of selected anthropometric variables and physiological tests in Sidama Coffee Soccer club players.

	Ht	BM	BMI	SW	WC	UAC	TC	CC	30m S	Illinois's A
Ht	1	.655*	.049	.239	.358	.600*	.375	-.203	-.358	.312
BM		1	.786**	.627*	.757**	.846**	.884**	.437	-.440	-.049
BMI			1	.613*	.707**	.635*	.851**	.738**	-.297	-.309
SW				1	.636*	.440	.796**	.393	-.258	-.124
WC					1	.487	.834**	.439	-.183	-.052
UAC						1	.671**	.462	-.411	-.212
TC							1	.600*	-.264	-.236
CC								1	-.018	-.567*
30m S									1	-.082
Illinois's A										1

. Correlation is significant at the 0.05 level (2-tailed),. Correlation is significant at the 0.01 level (2-tailed). Ht=height, BM=body mass, BMI=body mass index, SW=shoulder width, WC= west circumference, UAC=upper arm circumference, TC=thigh circumference, CC=calf circumference, 30m S=30 meter speed, Illinois's A= Illinois's agility*

Table 4, Correlation matrix of selected anthropometric variables and Fitness tests in Hawassa Town soccer club players.

	Ht	BM	BMI	SW	WC	UAC	TC	CC	30m S	Illinois's A
Ht	1	.268	-.314	.255	.485	-.212	-.068	.101	.220	.312
BM		1	.830**	-.142	.688*	.707*	.768*	.286	-.002	.197
BMI			1	-.269	.396	.824**	.792*	.246	-.108	.015
SW				1	.121	-.174	.047	.324	-.206	-.197
WC					1	.514	.458	.295	-.244	-.163
UAC						1	.783**	.272	.117	-.033
TC							1	.179	.009	.351
CC								1	.548*	-.043
30m S									1	.497
Illinois' A										1

. Correlation is significant at the 0.05 level (2-tailed),. Correlation is significant at the 0.01 level (2 tailed). Ht=height, BM=body mass, BMI=body mass index, SW=shoulder width, WC= west circumference, UAC=upper arm circumference, TC=thigh circumference, CC=calf circumference, 30m S=30 meter speed, Illinois's A= Illinois's agility*

Correlation matrix of selected anthropometric and physiological performance variables of Sidama Coffee and Hawassa Town soccer players shown in table 3 and 4. Height has significantly positive correlations ($p<0.05$) with body mass and arm circumference in Sidama Coffee players. Body mass has highly positive correlation ($p<0.05$ - 0.01) with body mass index, Shoulder width, west, and thigh circumference in both clubs except shoulder width in Hawassa players. Body mass index also highly correlated ($p<0.05$ - 0.01) with west circumference, upper arm, thigh, calf circumference and shoulder width in Sidama coffee but in Hawassa Town only upper arm, thigh were highly correlated with body mass index. In shoulder width also shown significantly correlated ($p<0.05$ - 0.01) with west and thigh circumference only in Sidama Coffee players. In upper arm circumference has highly correlated ($p<0.01$) with thigh circumference in both club players. In Illinois agility had negatively correlated ($p<0.05$) with only calf circumference in Sidama Coffee players but 30m speed was highly positive correlation ($p<0.05$) with calf circumference in Hawassa Town players.

IV. DISCUSSION

The purpose of this study was to analyze some selected anthropometrical and physiological performance status and to compute correlation of anthropometrical characteristic and physiological performance between Sidama Coffee and Hawassa Town Ethiopian male soccer club players. These studies revealed that specific anthropometric characters could play a momentous role in contributing to achievement in soccer sports and it offers certain type of natural advantages. The age of the football players in the study covers a wide range (19–26 years) and 22.8 mean age in Hawasa Town and (19-28 years) 23.5 mean ages in Sidama Coffee. Jasimina p et al, 2014 showed on the mean age of players was similar to Turkey (24.1 years) and South America (24.2 years), the mean age (26.4 years) of soccer players in four high level European Leagues (English, Italian, German and Spanish League). Height could be useful and which an important parameter in the selection process of the players (Popovic S, 2014). Body composition is an important aspect of fitness for soccer players. An

excess body fat acts as dead mass in activities when body mass is lifted repeatedly against gravity in running and jumping during play (Aristotle G, 2014). In competitive sports, as soccer, players with a lower body fat percentage have better performance because low body fat is a direct measure of the intensity of training (Jayashree M et al., 2016 and Reeves S, et al., 1999). In our study, Hawassa Town club players showed healthy, normal BMI with a mean of 22.057±1.600 and Sidama Coffee also 22.941±1.897, in accordance with the BMI classification made by the World Health Organization, 1990. If we compare the players from the basic anthropometric variable (height, body mass and body mass index of Sidama Coffee have greater mean value than Hawassa Town. In all selected girth anthropometric variables (upper arm, west, thigh, and calf) Sidama Coffee playersshown slightly higher mean value than Hawassa Town club players. Pearson product moment analyses in the present study also showed that body mass was positively correlated with body mass index, shoulder width, west, and thigh circumference and statistically significant association showed in both clubs. A study done by Amarpreet S and Baljinder S,(2015) for endurance sports activities like soccer, body mass is positive correlation with body mass index. Body mass index also highly correlated with west circumference, upper arm, thigh, and calf circumference shown in Sidama coffee but in Hawassa Town shown only upper arm and thigh circumference.

Speed and explosive power were considered prerequisites for the success of youth soccer players. Elite players perform approximately 30 –40 sprints of various lengths during a match and more than 700 turns (Maly T, 2014). However, mean value of 30m speed shown higher in Hawassa Town than Sidama Coffee players. Although according to 30m dash standard made by Davis B, (2010) both clubs were shown on average level according to standard. Similar result found a study done by Popovic S, 2014 for young elite soccer players. Agility is the physical ability, which enables an individual rapidly change the body position and direction in precise manner. Agility is not a single ability but a complex of several abilities (Mario A M, 2013). Agility is therefore an important physical fitness component necessary for successful performance in soccer game (Alliance K et al., 2017). However, the average mean value of Illinois's agility of Hawassa Town and Sidama Coffee club players were found to be on average level to compare with the standard made by (McKenzie B, 2005).

The Product movement correlation analysis indicated there was no significantly relationship ($p<0.05$) exists between agility and anthropometric variables except calf circumference ($r = -.567^*$) in Sidama Coffee club players. In 30m speed was highly positive correlation ($p<0.05$) with calf circumference ($r = .548^*$) were observed in Hawassa Town club players. Again, speed and agility had low significant relationship between with other anthropometric variables. A study done by Maly T, (2014) agility correlated with the sprint performance over a short distance in elite young players. The present study result was disagreeing with the study done by Sajal M, Amit. B, 2015) and reported significant relationship between speed and anthropometric variables.

The results of this study generally supported our hypothesis that there are no club differences in anthropometric characteristics and physiological performances variables. Particularly, no significant differences were found in all measured physiological performance variable. Similar studies have been published by (Wong PL et al, 2009 and Mehdi Ben et al, 2013). However, the players from Sidama Coffee teams performed slightly better mean value than Hawassa Town club players in the majority of anthropometric and physiological performance parameters. Their annual league competition performance results also showed Sidama Coffee had finished better than Hawassa Town in 2017 Ethiopian male premier league competition result. Apart from absolute anthropometry and physiological advantages, psychological and soccer-specific skills should be considered for improving performance and in the selection of young soccer players for developing future high-class players. Further studies are required to identify comparison and determine some correlational value between selected clubs.

V. CONCLUSION

The results are quite clear that Sidama Coffee are superior in mean value in basic tests (age, body mass, height and body mass index) compared to Hawassa Town club players. It may be conclude from the present study that, off those anthropometric characteristics, body weight had significantly positive correlation with body mass index, shoulder width, west, and thigh circumference in both clubs. In physiological performance variable, Illinois agility had highly negative correlation ($p<0.05$) with calf circumference in Sidama Coffee and 30m speed with calf circumference shown highly positive correlation in Hawassa Town club soccer players.

Practical Implications

The data showed in the present study carry considerable practical applications. The results of this study can serve as normative data for comparison of the anthropometric examination of elite soccer club players in our country. Anthropometric characteristics studied can be used as the predictor of performance in soccer

players. It should be useful too in future investigation on player's selection, talent identification in soccer game and training program development.

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