IOSR Journal of Sports and Physical Education (IOSR-JSPE)
e-ISSN: 2347-6737, p-ISSN: 2347-6745, Volume 3, Issue 6 (Nov. – Dec. 2016), PP 25-29
www.iosrjournals.org

Physiological Characteristics of Female Ethiopian Youth Sport Academy Football Players at Different Age Groups

Tilahun Bereded[1], Prof.Paramvir Singh[2]
[1](Sport Science, Faculty of Medicine / Punjabi University, Patiala, India, PhD scholar)
[2](Sport Science, Faculty of Medicine/ Punjabi University, Patiala, India)

Abstract: *The purpose of this study was to investigate physiological characteristics of Ethiopian youth sport academy femalefootball player across different age groups. The entire population was selected for participation in this study rather than a sample due to the relatively small population size (all N = 101, U15=40, U17=41 and U20=20) and ease of accessibility. Statistical Package for Social Science (SPSS) version 20 was used to analyze mean, standard deviation (SD) and one way ANOVA. The researcher was used indirect method of estimated maximal aerobic power to measure Vo2max capacity by covering Cooper 1.5-mile run, resting heart rate, blood pressure (systolic and diastolic) and Vertical jump to measure leg muscular power. Result dictates,Means and standard deviations of VO2MAX of the Ethiopian youth sport academy female football players of U15 (49.78 ±2. 46), U17 (50.83 ±3.19) and U20 (49.84±2.69) age groups are occurred.Moreover, Means and standard deviations of Resting heart rate of U15 (65.02 ±7.65), U17 (70±9.54) and U20 (62.6±4.68) age groupsaredemonstrated.Means of blood pressure of U15 (109.75/76.75mmhg), U17 (109.27/78.05 mmhg) and U20 (108.50/76mmhg) age groups are observed. Furthermore,Means and standard deviations of vertical jump U15 (31.44 ±5.65), U17 (30.46 ± 4.64) and U20 (37.50 ± 3.90) age groupsare presented.Outcomes of the age group data indicate that differences in physiological capacities are evident across age groups in some physiological parameters. There was a statistically significant difference at the p < .05 level in Resting Heart rate and vertical jump scores for the three age groups. However, There is no a statistically significant difference of VO2MAX, Systolic blood pressure and diastolic blood pressure across all age groups (p >.05). Therefore the academy should underline the development of Resting heart rate and leg strength in developing female football players in these age category.*

Keywords: *Physiology; Maximal Oxygen; Blood Pressure; Resting Heart rate; Football; vertical jump*

I. Introduction

Football is one of the best, oldest and world's most well-liked form of sport, being played in every nation without omission. According to FIFA (2013) the modern history of the world's preferred game periods more than 100 years it encompasses 206 member association from every part of world managed by FIFA. Football is an extremely dynamic, popular sport and played by massive number of athletes, men and women, young and adults, amateurs and professionals participate (Jorge Aurelio et al., 2016; Arifi, F. and Alajand, I.,2015; Gligoroska, J.et al.,2014). There are currently about 265 million players, 26 million of whom are women, 5 million referees and officials are actively involved or 4% of the world population (FIFA, 2014, Haugen & Seiler,2015).

As it is explained by Reilly & Williams (2003) Football is the only sport which attracts almost the entire world population. For example, More than 750 million television viewers watched the FIFA Women's World Cup Canada 2015(FIFA, 2015).

According to Martinez-Lagunas ,V. et al. (2014) number of systematic study on female's football to player physiological demands of the sport has substantially improved in current years due to the increased attractiveness female football in the globe, even though they are not yet as plentiful as in the case of men's football.

Some physiological and physical requirements are needed as well as technical and tactical skills in order to be successful in football (Redfame, 2016). Ethiopian athletes are concerned, environmental and genetic influences may justify their success in endurance events. Furthermore, in high altitude Ethiopian residents (3500m), hemoglobin, erythropoietin and oxygen saturation were found close to sea level control, despite chronic, lifelong hypobaric hypoxia (Kinfu et al., 2011). As supposed by Turner, A. et al. (2011) various physiological parameters have been shown to have strong correlations with football performance.

According to FIFA rule of law, a football game lasts 90 min, comprising two periods of 45 min separated by a 15 min intermission. The ball is typically in play for 55-60 minutes (Wallace and Norton, 2013). Analysis of football matches has determined that football consists of many different physiological variables; aerobic power, anaerobic power, musculature strength, agility, repeated sprint ability and flexibility (Svensson&Drust, 2005, Stolen et al., 2005; Bloomfield et al., 2007; Randers et al., 2010).

Previous investigations, have evaluated physiological profiles of young football players in most parts of Europe and America. Even though the world most accepted game increased time to time together with female participation, there is a shortage of scientific research on physiological characteristics towards women players' equivalent with male. However similar studies are extremely limited in Ethiopia. Ethiopia female physiological measurement of player in football is not ordinary. Therefore, the purpose of this study was to investigate physiological characteristics of both male and female Ethiopian youth sport academy football player across different age groups.

II. Materials and methods

1.1. Subjects

The participants of this study were Ethiopian youth sport academy football players. The entire population was selected for participation in this study rather than a sample due to the relatively manageable population size (all N = 101, U15=40,U17=41 and U20=20) and ease of accessibility.

1.2. Statistical Analysis

This study used descriptive statistics such as mean, standard deviation (SD), and one way ANOVA analysis were used as a part of inferential statistics using Statistical Package for Social Science (SPSS) version 20.One-way ANOVA was used for detecting the differences among the physiological characteristics of the players at different age group. Calculating the effect size for One-way ANOVA most commonly used being eta squared was used (Cohen, 1988) as cited in Julie Pallant (2007). The formula for eta squared is as follows:

$$\text{Eta squared} = \frac{\text{Sum of squares between-groups}}{\text{Total sum of squares}}$$

1.3. Procedure of Data Collection

All field testing were conducted in the Ethiopian youth sport academy by an independent investigator to provide all information. Following approval from the administrators of the Ethiopian youth sport academy a mutual time was arranged for conducting the field testing after half day orientation. On the day of testing, the researchers meet the athletes in the morning and give information about the significance of measurement as well as the purpose of research. Furthermore the researcher encouraged them to cooperate with the researchers.

1.4. Physiological parameters Testing Procedure

The researcher was used different procedures to measure physiological characteristics of Ethiopian youth sport academy female players in the academy.

1.4.1. Testing V02 MAX

Purpose**:** measuring maximal oxygen

Equipment: A standard l/4-mile track (6 laps = 1.5 miles).

Procedures:

1. Subjects should be encouraged to warm up and stretch prior to the run.
2. Subjects should be instructed to complete the 1.5-mile distance as fast as possible; walking is permitted.
3. Subjects should cool down gradually upon completion of the test.
4. Have the client start the test; start a stopwatch to coincide with the start. Give your client feedback on time to help them with pacing.

Scoring:

- ✓ Record the total time to complete the test and use the formula below to predict for women: VO2max (mL. kg^{-1} . min^{-1}) = 3.5 + 483 /Time
- ✓ Time = time to complete 1.5 miles in nearest hundredth of a minute.

1.4.2. Testing Resting heart rate:

Purpose**:** measuring: measuring heart beat per minute

Equipment**:** stopwatch (Casio HS-80TW)

Procedures:

- ✓ Step One is sit quietly for one minute
- ✓ Step two: Apply light to moderate pressure with the fingers (ring and middle fingers; do not use thumb, because it has a pulse of its own) until the blood pulsing beneath the fingers is felt.
- ✓ Step three: Using a stopwatch with a second hand, count the number of beats felt in 30 seconds

Scoring

- ✓ Number of beats felt in 30 seconds, and then multiply that number by two to compute a heart rate, expressed in BPM (beats per minute).

1.4.3. Testing Blood pressure

Purpose: measuring systolic and Diastolic blood pressure

Equipment: Blood pressure monitor (DinamapProCare DPC300N; GE, Milwaukee, Wisconsin, USA)

Procedures:

- ✓ The examinations were preferably conducted before exercise. Owing to logistical reasons some of the players exercised before the examination; however, at least 1 h rest was requested. BP was measured by trained personnel after 5 min rest in a sitting position, using a validated automatic BP monitor

Scoring:

- ✓ were registered as the mean of two consecutive BP measurements and categorized according to American heart Association (2013)

1.4.4. Testing Vertical jump

Purpose

- ✓ Measure the explosive strength of legs.

Equipment

- ➢ A smooth wall with a ceiling high from this wall a board a 150 cm vertical distance was mounted to a wall during the vertical jump test.
- ➢ Measuring device; tape measure
- ➢ Finder powder

Procedure

- ✓ The first step is to measure the player's standing height. The player stands side on with the dominant shoulder facing the wall. The player then reaches up with the dominant arm and the standing height is measured at the point of their fingertips. They were asked to touch finger powder by tips of the index and middle fingers. The athlete is then ready to attempt the first jump attempt. The player is allowed to bend (flex) the knees and swing the arms prior to the jump. The player is not allowed a run up or do a shuffle step prior to the jump. The player is allowed a maximum of two efforts after a thorough warm-up. At the highest point of the jump the player reaches up and touches the wall, making a chalk mark. The player's vertical jump score is measured as the distance between the standing height and the jump height.

Scoring

Vertical jump height was measured to the nearest 0.1 cm, with the highest value obtained from two trials used as the vertical jump score. The standing height is subtracted from the jump height and recorded.

III. Results

1.5. physiological characteristics

Table 1. Descriptive Statistics ofPhysiological characteristics of Ethiopian youth sport academy female football player based on age group, (mean ±SD).*

Physiological parameter	**U15**	**U17**	**U20**
VO2MAX (ml/kg/min)	49.78±2.46	50.83±3.19	49.84±2.69
Resting Heart Rate (beats/min)	65.02±7.65	70±9.54	62.6±4.68
Systolic Blood Pressure (mmhg)	109.75±11.43	109.27±10.097	108.5±9.88
Diastolic Blood Pressure (mmhg)	76.75±8.29	78.05±8.13	76±6.81
Vertical Jump	31.44±5.65	30.46±4.64	37.5±3.90

Table 2. Analysis of Variance of Physiological characteristics of Ethiopian youth sport academy female football player based on age group

	Age Group			
	U15 (X±SD)	U17 (X±SD)	U20 (X±SD)	ANOVA
	N=40	N=41	N=20	
VO2MAX (ml/kg/min)	49.78±2.46	50.83±3.19	49.84±2.69	F(2,98)=1.619,p=0.203
Resting Heart Rate (beats/min)	65.03±7.654	70±9.537	62.60±4.684	F(2,98)=6.902,p=0.002
Systolic Blood Pressure (mmHg)	109.75±11.433	109.27±10.097	108.5±9.881	F(2,98)=0.93,p=0.911
Diastolic Blood Pressure (mmHg)	76.75±8.286	78.05±8.13	76±6.806	F(2,98)=0.521,p=0.596
Vertical Jump (cm)	31.438±5.654	30.463±4.634	37.5±3.90	F(2,98)=14.479,p=0.001

1.5.1. VO2MAX

This test measured the maximal oxygen of the participants. Means and standard deviations of VO2MAX of the Ethiopian youth sport academy female football players of U15 (49.78 ±2. 46), U17 (50.83 ±3.19) and U20 (49.84±2.69) age groups are presented in Table 1.ANOVA revealed that female Football players of Ethiopian youth sport academy female football player based on three age groups (U15,U17 and U20) did not differ significantly at the $p < .05$ level in their VO2MAX ($F(2, 98) = 1.619$, $p = .203$) which is presented in Table 2.

1.5.2. Resting Heart Rate

This test measured the Resting Heart Rate of Ethiopian youth sport female football players of three age groups. Means and standard deviations of Resting heart rate of U15 (65.02 ±7.65), U17 (70±9.54) and U20 (62.6±4.68) age groups are presented in Table 1. Significant difference was existed at the $p < .05$ level between the three age groups female Football players of Ethiopian youth sport academy in their resting heart rate ($F (2, 98) = 6.902$, $p = .002$) as mentioned in Table 2. As a consequence there is a statistically significant difference across all age groups. As well the effect size, calculated using eta squared, was .012, which has small effect. In addition, Post-hoc comparisons using the Scheffe test indicated that the difference was occurred between U15 and U17 (mean difference =-4.975, p=.024) as well as between U17 and U 20 (mean difference =7.40, p=0.005). however U15 and U 20 was not significantly different.

1.5.3. Blood Pressure

Blood pressure test measured the blood pressure (systolic and diastolic) of female football players of three different age groups. Means and standard deviations of systolic blood pressure of the Ethiopian youth sport academy female football players of U15 (109.75 ±11.43), U17 (109.27 ±10.10) and U20 (108.50 ±9.88) mmhg are presented in Table 1. Significant difference at the $p < .05$ level was not observed among Ethiopian youth academy female Football players of U15, U17 and U20 age groups. Therefore, female players significantly did not differ in their systolic blood pressure ($F (2, 98) = 0.93$, $p = .911$) as mentioned in Table 2.

Moreover the mean and standard deviation of Diastolic Blood Pressure of the Ethiopian youth sport academy female football players of U15 (76.75 ± 8.29), U17 (78.05 ± 8.13) and U20 (76.00 ± 6.81) mmhg of pressure are offered in Table 1. Significant difference at the $p < .05$ level was not identified among Ethiopian youth academy female Football players of U15,U17 and U20 age groups, thusthey did not differ significantly in their Diastolic blood pressure ($F (2, 98) = 0.521$, $p = .596$) as stated in Table 2.

1.5.4. Vertical Jump

This test measured the muscular power of lower extremes to investigate the explosive strength of leg of the female players. Means and standard deviations of vertical jump U15 (31.44 ±5.65), U17 (30.46 ±4.64) and U20 (37.50 ±3.90) age groups are presented in Table 1. Significant difference was happened at the $p < .05$ level between the three age groups female Football players of Ethiopian youth sport academy in their vertical jump ($F (2, 98) = 14.479$, $p = .001$) as revealed in Table 2. As well the effect size, calculated using eta squared, was 0.23, which has large effect. As a consequence there is a statistically significant difference across all age groups. As of Post-hoc comparisons using the Scheffe test indicated that U20 statistically significantly different both from U15 (mean difference = -6.0625, p=0.001) and U17 (mean difference =-7.0366, p=0.001). But U15 and U17 did not significantly different.

IV. Discussion

The purpose of the present study was to study the physiological characteristics of female football players in Ethiopian youth sport academy across three age groups. Data related to physiological characteristics of three different age groups (U15, U17 and U20) were analyzed and compared each other. According to Turner, A. et al. (2011) various physiological parameters have been shown to have strong correlations with football performance.

Result data of descriptive data of U15, U17 and U20 age groups Ethiopian youth academy female football players on VO2MAX, Resting heart rate, blood pressure and power of leg were observed different results. Result indicated that U17 has a little bit higher VO2MAX (50.827 ml/kg/min) than other two (U15=49.78 ml/kg/min; and U20= 49.84 ml/kg/min) age groups. Since female players are very young their VO2MAX is expected to less than 60 mL/kg/min. Junior football players have lower VO2max (<60 mL/kg/min) than seniors (Stolen, T., et al., 2005). In many countries around the world lack of sufficient oxygen probably observed. But in the horn of Africa such as Ethiopia and Kenya, living in high altitude (3500m) oxygen is not a problem. Because of this fact Ethiopian athletes were dominated long distance run in the world. Several reports indicate that African athletes possess specific functional features such as a greater running economy, a higher fractional utilization of oxygen (Weston AR et al, 2000). Many studies suggested that lower resting heart rate is more advantageous for footballers' as well as people of the world at different age groups. Resting heart rate of the U17 female football players (70±9.537) was higher and U20 female football players (62.60±4.684) have lower heart beat than U15 (65.03±7.654) female football players. As a result of this except few players, the majority are in an average condition as a standard of YMCA of the USA. This implies that the majority players are under good condition with compared to the standard that explained earlier by (Nieman, D., 2011) and (Heyward, 2002).In case of blood pressure of the Ethiopian youth sport academy football players mean value for female U15, U17 and U20 players was 109.75/76.75, 109.27/78.05 and 108.50/76 respectively. Most doctors agree that the ideal blood pressure is around 120/80mmHg. Therefore average blood pressure

wasnot more than120/80 mmHg; this implies that female players have a lower risk of heart disease and stroke. Hence, they will have a capacity to perform football activities without any difficulty. Regarding vertical jump, U20 age group of female football players (37.5±3.90) were have more power ability in comparison of U15 age group (31.438±5.654) and U 17 age group (30.463±4.634) female football players. Whereas age group U15female players higher than U20 age group. However, as it is stated by (Mackenzie B., 2015) the Ethiopian youth sport academy female players are in average standard. Results of ANOVA expressed the significant differences among Ethiopian youth sport academy female Football players of U15,U17 and U20 in their physiological characteristics such as resting Hear beat and explosive power of leg by their vertical jump performance. For muscular power and resting heart beat age groups are major dominant factors which make difference among female footballers in Ethiopian youth sports academy. Since these two parameters are very important in female football managers and coaches should work to improve their performance. Conversely Insignificant differences were observed among Ethiopian youth sport academy female Football players of U15, U17 and U20 age group in their VO2MAX and blood pressure (systolic and diastolic blood pressure), this perhaps because of similarity in training and coaching scopes as well as food contents. Therefore, age group cannot convey difference of VO2MAX and blood pressure for female football players in the academy.

V. Conclusions

1. Ethiopian youth sport academy female player have superior level of VO2MAX at these three age groups (U15,U17 and U 20).However age group of U17 female players VO2MAX is higher than U15 and U 20 age Groups.
2. The majority players of female players in Ethiopian youth sport academy are under good condition in resting heart rate with compared to the world standard. Nevertheless U20 age group players have lower heart beat than U15 and U 17.
3. Concerning blood pressurethe three age groups are under normal condition with compared to the standard which is set by American Heart association. In addition to that no significant difference across age groups.
4. Regarding vertical jump no one performed excellent performance rather they have average. Age groups are major determinant factor which make difference among players, hence age group U20 female players have better performance than U15 and U17 age groups of female football players in the academy.

References

[1] Arifi, F. and Alajand, I. (2015). Difference between Football Players and Non-Football Players in the Anthropometric, Motor Space and Situational Movements. *Research in Physical Education, Sport and Health; 4, (1)61-66.*

[2] Bickley LS. (2013). *Bates' Guide to Physical Examination and History Taking.*11th ed, Philadelphia: Lippincott Williams & Wilkins.

[3] Bloomfield J, Polman R, O'Donoghue. (2007) Physical demands of different positions in FA Premier League soccer. *Journal of Sports Science & Medicine.6 (1):63–70.*

[4] FédérationInternationale de Football Association (FIFA).(2014).2014 FIFA World Cup Brazil. *Retrieved from http://www.fifa.com/worldcup/news/y=2015/m=12/news=2014-fifa-world-cuptm-reached-3-2-billion-viewers-one-billion-watched--2745519.html*

[5] FIFA. (2011).FIFA Women's World Cup 2011: Technical Report and Statistics. Altstatten,Switzerland:FIFA.

[6] FIFA. (2012).Women's Football Development. FIFA,ed.

[7] FIFA. (2012).Women's football. *Available at: http://www.fifa.com/mm/ document/footballdevelopment/women/01/59/58/21/wf_backgroundpaper_200112.pdf; [accessed 07.24.2015].*

[8] FIFA.(2013). The History of Football. *Retrieved from http://www.usyouthsoccer.org/assets/1/3/History_of_the_Game_by_FIFA.pdf*

[9] FIFA.(2015).FIFA Women's World Cup Canada 2015.*Retrived from http://www.fifa.com/womensworldcup/news/y=2015/m=12/news=record-breaking-fifa-women-s-world-cup-tops-750-million-tv-viewers-2745963.html.*

[10] Haugen,T. &Seiler,S.(2015). Physical and Physiological Testing of Soccer Players: Why, What and How should we Measure?.*Sport science, 19, 10-26.*

[11] JasminaPluncevic-Gligoroska, LidijaTodorovska, BetiDejanova, VeselaMaleska, SanjaMancevska, & Slobodan Nikolic , (2014). Anthropometric Parameters In National Footballers In The Republic Of Macedonia. Contributions. *Sec. Med. Sci.;305(2):147-154*

[12] Jorge Aurélio, Eduardo Dias, Tiago Soares, Gonçalo Jorge, Mario André da Cunha Espada, Dalton Muller PessôaFilho, …Teresa Figueiredo.(2016). Relationship between Body Composition, Anthropometry and Physical Fitness in Under-12 Soccer Players of Different Positions. *International Journal of Sports Science, 6(1A): 25-30.*

[13] Kinfu, H., Abebe, Y., Beretta, E., &Miserocchi,.G.(2011). Correlation of Heart Rate and Anthropometric Parameters with Performance Scores Obtained From IAAF Tables in Elite Ethiopian Middle Distance Runners. *The Open Sports Medicine Journal, 5, 12-18.*

[14] Martinez-Lagunas V., Niessen, M., and Hartmann, U. (2014). Women's football: Player characteristics and demands of the game. *Journal of Sport and Health sciences; 3:258-272.*

[15] Randers M B, Mujika I, Hewitt A, Santisteban J, Bischoff R, Solano R, Zubillaga A, Peltola E, Krustrup P, Mohr M. (2010) Application of four different soccer match analysis systems: A comparative study. *Journal of Sports Sciences; 28(2) 171-182.*

[16] Redfame. (2016). Comparison of Speed, Agility, Anaerobic Strength and Anthropometric Characteristics in Male Football and Futsal Players. *Journal of Education and Training Studies, 4; 7.*

[17] Reilly, T. and Williams, A. (Ed.). (2003). *Science and Soccer*. 2nd ed. London. Routledge.

[18] Stolen T, Chamari K, Castagna C &Wisloff U (2005): Physiology of soccer: An update. Sports Medicine 36(6), 501-536.

[19] Svensson, M., &Drust, B. (2005). Testing soccer players. *Journal of Sports Sciences, 23, 601–618.*

[20] Turner, A., Walker, S., Stembridge, M., Coneyworth, P., Reed, G., Birdsey, L., …Moody, J. (2011). A Testing Battery for the Assessment of Fitness in Soccer Players. *Strength and Conditioning Journal, 33(5),29-39.*