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Physical Fitness Status as a Function of Age and Players` Positions: the Case of Females` Premier Soccer League in Addis Ababa City

[*]Hizbayesh Ambaw[1], Dr.Sisay Mengistu [2]
Department of Sport Science, Jimma University, Ethiopia
Department of sport science, Hawassa University, Ethiopia)
Corresponding Author: Dr.Sisay Mengistu[2]

ABSTRACT: The present study investigated the effects of age and playing position on the physical fitness performance of female soccer players in Ethiopian females` football premier league and also the standing of Ethiopian female soccer players against the world`s established standards. Eighty five representative players from 5 females` football premier leagues in Addis Ababa were selected randomly and tested for their body mass index, sit and reach, Illinois, push up and sit up fitness performances in relation to age, position and against the world`s and other established standards. The physical fitness status in relation to age demonstrated statistically significant difference among the players in four different age groups (15-17; 18-20; 21-23 and 24-26 years old) against the world`s standard. There was no statistically significant difference among the players in different positions. Recommendation was given for the national football federation to replicate the same study involving the entire females` football premier league in the country in order to create a more reliable working document in football.

Keywords: Physical Fitness, players, league, Position.

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I. INTRODUCTION

Soccer is one of the most popular sports nowadays. This can be explained by the fact that more women have been interested in becoming the professional athletes in this kind of sport. For example, 40,000 female soccer players were registered in Sweden, which constituted 20% of all registered soccer players in that country (Sporis, Canaki & Barisic, 2007). In the last 10 years, number of females participating in soccer has also increased among collegiate institutions in the United States (Krustrup, Mohr, Ellingsgaard & Bangsbo, 2005). There are several factors that could influence the female soccer players' performance. Among these factors, physical fitness of players is mentioned frequently in the literatures. Physical fitness is hence defined as the ability to perform daily activities willingly and actively. Regular physical activity prevents or limits weight gain, and gain in body mass index (BMI) (Kyle, Gremion, Genton, Slosman, Golay & Pichard, 2001.). Method

Every person has a different level of physical fitness which may change with time, place of work, situation and there is also an interaction between the daily activities, and the fitness of an individual, the point if where to put the level of optimum fitness. From the physiological point of view physical fitness may say to be ability at the body to adopt and recover from strenuous exercise (Chaudhary, 1998).Reilly and Secher (1990) addressed that body composition played an important role in fitness of a soccer player. According to Martens (2004), overall female professional soccer players were more mesomorphic than endomorphic non-players, but also less ectomorphic. Another finding by Can, Yilmaz and Erden (2004), demonstrates that female soccer players had significantly different body fat percentages and lean body weights, but the differences in overall absolute fat were not significantly different from non-athletes. Body weight and fat are part of the physiological makeup of a soccer player, but this is less apparent in women than it is with men, specifically with regard to body fat. Juric, Sporis and Mihacic (2007) suggested that the morphological characteristics of female soccer players did not differ significantly according to their team positions.Therefore, the current study tried to assess differences on physical fitness status according to players' position and age and furthermore the study pinpointed the standing of female soccer players in the premier league against established standards.

II. METHODS

2.1 Subject of the study

To achieve the objective of the study eighty five female football players were selected using random sampling technique from Ethiopian Coffee, Electric, Ethiopian Insurance, Saint George, and Tirunesh Dibaba female football clubs.

2.2 Data collection Instrument and procedure

The data were collected using the following measurements;

***Body Mass Index measurement*: BMI** was calculated from the body height and weight ratio. It was calculated as the weight in kilograms divided by the square of the height in meters; in other words the unit is kg/m^2.

Push up test: Each player was subjected to perform push up. The players were told to do as much push `up as they can. Then the maximum push up they did was recorded adopted from (Golding, et al. 1986).

Illinois test: A 10meters by 5meters area was established and four cones were used to mark the start, finish and the two turning points. Another four cones were placed down at the center an equal distance apart. Each cone in the center was spaced 3.3 meters apart.

The players were supposed to lie on their front (head to the start line) and hands by their shoulders.

On the 'Go' command the stopwatch was started, and the athlete got up as quickly as possible and run around the course in the direction indicated, without knocking the cones over. At the finish line, the stop watch is stopped (Davis et al. 2000).

Sit and reach test: The player took off her shoes and sat on the floor with her knees fully extended, feet shoulder-width apart and soles of feet held flat against the end of the box (or mats).

With hands on top of each other, palms down, and legs held flat, the player was supposed to reach along the measuring line as far as possible. After three practice reaches, the fourth reach was held while the distance is recorded.

Sit up Test: The player lied on a carpeted floor with her knees bent at approximately right angles, with feet flat on the ground while her hands are resetting on her thighs (Davis et al. 2000). The participants subjected to a 10 minutes warm up exercises before going to the actual test. All of the measurements were done from 2pm to 5 pm in the afternoon. A thorough discussion was made with the coaches and the players for awareness creation before the measurement. Health check like blood pressure, history of injury and resting heart rate was tested first while the person is fully rested in order to ensure the appropriateness of the subjects for the tests.

2.3 Data analysis

Statistical Package for Social Studies SPSS (version16.0. was used to analyze the raw data. Mean ± SE; Mean ±SD were used to report the physical fitness status of the players. One sample t test was also used to compare physical fitness status of the female players against the established criteria. Moreover, one-way ANOVA was used to examine if differences exist between four positions: strikers, midfielders, fullbacks and goalkeepers and age of the players. The statistical significance was set at $p<0.05$.

III. RESULTS

3.1 Female soccer players' physical fitness status of BMI

As indicated in the table 1 below the maximum mean score for BMI according to the players age groups was 21.3±2.0 for age groups 15-17 years old and the minimum mean score was 19.96 ±1.98 which was found in the players of age group 18-20 years old . According to WHO classification system for body mass index, subjects were distributed in the normal range of BMI. The one sample t test indicates that the BMI level of the country`s females football premier league players in all age ranges was significantly less than the BMI score of the world standard for female football players $t(23,43)= -8.9, -16.6$, $p<0.05$.

Table:1. Female soccer players' physical fitness status of BMI

AGE	No_	Mean	Std. Deviation	World Standard	T value	df	Sig<0.05
15-17	24	21.3	2.0	24.9	-8.9	23	0.000**
18-20	44	19.96	1.98	24.9	-16.6	43	0.000**
21-23	14	20.8	2.6	24.9	-5.9	13	0.000**
24-26	3	21.1	1.4	24.9	-4.9	2	0.039*

3.2 Female soccer players' physical fitness status of Illinois

It is clear from Table 2 that there was the maximum mean score of Illinois test of Ethiopia`s female football premier league players was found in the age range of 21-23 years old (18.24±0.54) and the minimum mean Illinois test score lies in the age range of 15-17 years old (17.5±0.55) respectively. The world`s standard

for excellent Illinois test score is <17.0 seconds. As indicated in table 6 below, the one sample t test shows that the agility performance of Ethiopia`s female football premier league players was significantly less than the world`s standard at t (13, 23) =8.53, 4.5, p<0.05.

Table: 2. Female soccer players' physical fitness status of Illinois

AGE	No_	Mean	Std. Deviation	World Standard	T value	df	Sig<0.05
15-17	24	17.5	0.55	17.0	4.5	23	0.000**
18-20	44	17.9	0.8	17.0	7.6	43	0.000**
21-23	14	18.24	0.54	17.0	8.53	13	0.000**
24-26	3	17.8	0.88	17.0	1.7	2	0.242NS

3.3 Table 3: Female soccer players' physical fitness status of Push up

The analysis in table 3 shows that the maximum mean push up value was recorded in the age range of 15-17 (36.2±8.8) and the minimum mean push up score was (29.7±9.4) recorded in the age range 21-23 years old. The one sample t test revealed that the push up performances of Ethiopian female premier league soccer players in the age ranges of age groups 15-17; 18-20 and 24-26 years old were not significantly different from the world standard at t(23)= 0.64, t(43)= 0.5 and t(2)= -0.44 respectively at P<0.05. However, the players in the age range of 21-23 years old performed significantly less than the world standard at t (13) = -2.5, p<0.05.

Table 3: Female soccer players' physical fitness status of Push up

AGE	No	Mean	Std. Deviation	World Standard	T value	df	Sig<0.05
15-17	24	36.2	8.8	35	0.64	23	0.523NS
18-20	44	35.3	14.96	35	0.5	43	0.888NS
21-23	14	29.7	9.4	36	-2.5	13	0.027*
24-26	3	30.7	21.1	36	-0.44	2	0.705NS

3.4 Mean Difference between BMI and playing position

As indicated in figure 1 below, the maximum mean score body mass index was recorded in the goal keepers' position (21.36±0.47) and the minimum in the midfield position (19.98±0.37). However, the mean score of body mass index of players in all positions was categorized under normal range (18.5-24.9).

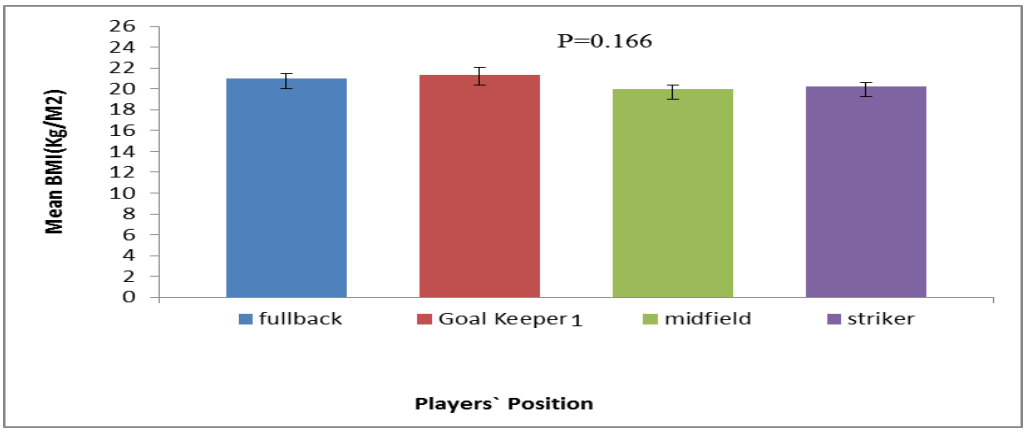

Figure 1: Mean score of BMI & playing position of female soccer players

To check whether there were significant mean differences on BMI among players who played in different positions, one way ANOVA was conducted. The test revealed that there was no statistically significant mean difference on BMI test of the players in the different positions

Table: 4.ANOVA Summery for body mass index (BMI)

	SS	Df	MS	F	Sig.
Sum Square between	23.242	3	7.747	1.739	0.166NS
Sum square within	360.898	81	4.456		
Sum square total	384.140	84			

3.5 Mean score of BMI and Age

With respect to the mean score on body mass index (BMI) for the different age groups , the maximum mean score on BMI recorded in the players whose age was 15-17 years old (21.3±2.1) and the minimum mean score was found in the players of age 18-20 years old (19.96±1.98)

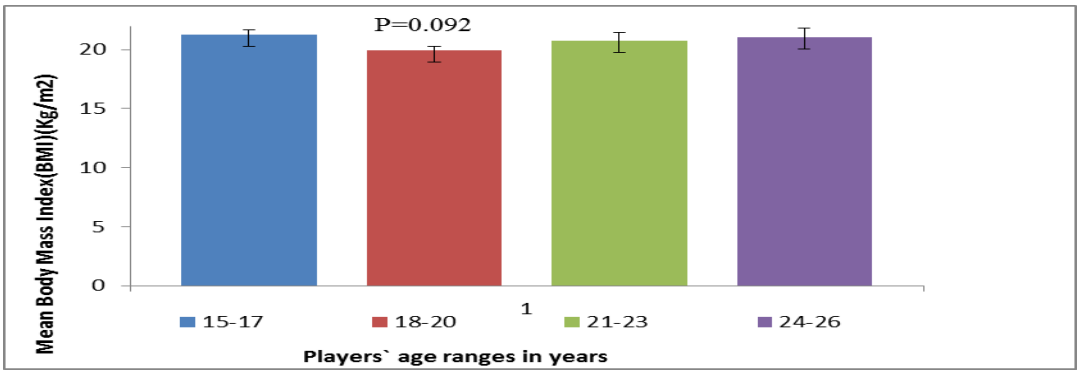

Figure 2: Mean score of BMI & Age of female soccer players

To check whether there were statistically significant differences in the mean BMI among players in different ages , one way ANOVA was conducted and the test revealed that there was no statistically significant difference in mean BMI of the players in the different positions at alpha (α) =0.05

Table 5. ANOVA Summery for BMI according to age groups

	SS	Df	MS	F	Sig.
Sum Square between	29.226	3	9.742	2.223	0.092^{NS}
Sum square within	354.915	81	4.382		
Sum square total	384.140	84			

SS: sum of square; Df: degree of freedom; MS: mean square; Sig: significance.

IV. DISCUSSSION

The body mass index (BMI) status of Ethiopian female football premier league players has been compared to the world standard and found to be in the normal body mass index distribution. The world health organization (WHO) sets a minimum body mass index of 24.9kg/m^2 for players to be considered as under normal weight, height proportion and the maximum body mass index of Ethiopian female soccer players was 21.3kg/m^2 and the minimum was 19.96kg/m^2; both values lie under the normal body mass index distribution. The maximum body mass index (21.3 kg/m^2) was scored by the players in the age range of 15-17 years old and the minimum was in the age range of 18-20 years old. Indeed most of the players lie in the age range of 18-20 years old (44 players) and the least number of players lie in the age range of 24-26 years old (3 players).

The research also compared the mean push up performance of Ethiopian female football premier league players to the established world standard. Players aged from 15-17 and 18-20 years old demonstrated an excellent push up performance scoring 36.2 and 35.3 mean push up respectively. The players aged from 21-23 and 24-26 years old were in a good physical fitness push up performance. According to this study, the players in the age ranges of 18-20 years are found to be better in flexibility; sit and reach test performance (18.1±6.8). The players in the age range of 21-23 years performed the flexibility similarly with the players in the age ranges 18-20 years old. Vescovi, Brown, & Marques (2010) carried out a study to check the physical performance characteristics of high-level female soccer players of age between 12-21 years old. These authors demonstrated that the agility test score was lower in the very young players (12 years old) compared to the other age ranges. A study made by the Tehran University of Medical Sciences (2012) sho wed that the BMI increases linearly with age whereas; our study revealed a contradicting result demonstrating n o consiederable difference in BMI among the different age ranges. Our result is in agreement to the findings of Vescovi et al.(2010) demonstrating that the agility (Illinois) score in the age ranges of 15-17 is the lowest compared to the other age ranges(18-20; 21-23; and 24-26) years old. All together, the findings confirm that Illinois (agility) performance of players is improved with an increase in age. We have also tested the effects of different players` position on the physical fitness performance of female soccer players. The findings of this research are different from the previous studies. In this research the goalkeepers have the largest body mass index and the midfielders have the smallest. Our finding is in contrary to the findings of Markovic & Mikulic, (2011) where they demonstrated that goalkeepers have the smallest body mass index. However, Sporiš, et al. (2007)have found the maximum BMI in the goalkeepers which is in agreement with our finding. This is anticipated owing to the fact that the goal keepers manage to run short distances approximately 4000 meters during games according to Krustrup, et al. (2005) and the midfielders on the contrary cross an average of 10,000 meters according to Krustrup, et al. (2005). The study by Malina et al. (2000) concludes that the goal keepers are the heaviest and taller whereas; the strikers are the lightest and taller. However, a study by the same authors in contrary demonstrated that playing position did not affect the BMI of players. The heaviness and tallness of the goal keepers helps them in physical duels allowing them to defend their goals (Gill, et al. 2007).

V. CONCLUSION

The present study investigated the role of age and position on the physical fitness performance of female soccer players. In line with the age and positional roles on the physical fitness status, the standing of Ethiopian females` football premier league players body mass index, sit and reach, Illinois, push up and sit up fitness status against the world`s and other established standards was clearly demonstrated. Female soccer players from 5 premier leagues in Addis Ababa tested under the same condition using the same method revealed a difference in body mass index, Illinois test, sit and reach, sit up and push up fitness in relation to age against the world`s established standards. Although a pronounced difference was detected in terms of Illinois test among the players in relation to age, we did not detect prominent difference in the other physical fitness tests among the players in relation to age and position. The physical fitness status of Ethiopian females` premier league players was considerably better than the world`s standards in terms of body mass index, sit up and push up tests whereas; it was poor in terms of agility and sit and reach tests. A considerable attention should be given by the Ethiopian football federation to bring players to the world`s standards in terms of agility and sit and reach fitness. The national football federation should replicate the study involving the entire females` football premier league in the country in order to document a reliable working material for further use by other upcoming researchers in the area.

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