

Anthropometric and Physiological Profiles of Football Players in Tigray Region, Ethiopia

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Abstract

The objective of the study was to compare Anthropometric and physiological profiles of different playing position football players in the Tigray region, Ethiopia. From a total of 200 Tigray region football players, 101 different playing positions (Gk, DF, MF, and SK) were selected with purposive sampling technique. Descriptive cross-sectional design and quantitative research method were employed to compare physiological variables Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean arterial pressure (MAP), and resting heart rate (RHR) of players. To determine the significant difference between different club football players one-way analysis of variance (ANOVA). The result showed that there were no significant differences between age, BMI, Systolic blood pressure, diastolic blood pressure, mean arterial pressure, and resting heart rate. But, there were significances different on height and weight of Goalkeepers, Defenders, Midfielders and Strikers football players $P < 0.05$. It was concluded that there was no significant difference between SBP, DBP, MAP, and RHR of different position football players. Coaches and sport science experts take into consideration factors, height, weight, Body mass index, and position of football players during evaluating physiological tests.

Keywords: Football, Physiology, Blood pressure, playing position.

Introduction

Modern soccer is the most popular sport worldwide and originated from United Kingdom, England. It played by both teams of eleven players within ninety minutes of 15 mints break time. ^[1]Most elite African soccer players migrated to English premier league clubs and Spanish league. Football is governed by the worldwide federation international football association (FIFA). ^[2]Training youth football players important for developments of sport at national and international levels. ^[3]Modern football games greatly demand physiological profiles Vo2Max, heart rate, blood, and physical fitness of the players.

Physiological characteristics have a positive relationship with the playing ability of soccer players. ^[4]Soccer requires agility, speed, tactical, technical, physical fitness, and physiological profile players, and studies are useful to identify the performance and talents of Ethiopian premier league soccer players. ^[5]Soccer is the most spectacular team sport that needs systematic investigations on scientific training with different playing positions of players.

^[6]Football helped in nation-building of different societal values and cultures. 270 million people were involved in soccer developments from Africa, Brazil, and Russia. ^[7]Physiological evaluation of football training refers to the measurement of anatomical, physiological, biochemical, and functional changes of the target to effects of training. Also, physiological assessments are very important to researchers and coaches to identify talents, performance, and modify training intensities and durations.

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Aerobic capacity of soccer players affected by

Anthropometric conditions of participants. Similarly, physical and physiological parameters affected by the player's position and mental ability of players during competition season.^[8]As the researcher recommended that during planning, training program coaches, football players, and sport managers consider positional differences. Therefore, football coaches have to give appropriate specific training based on formation and player positions.

Study on physiological parameters of between American professional soccer players during a competition session, sedentary population, and long-distance runners' results of the study concluded that^[9] American soccer players have high cardio-respiratory endurance (Vo₂ max) as compared with that of the sedentary population but low compared with that of long-distance runners. Also, there is a significant difference in body mass index (BMI) among professional soccer players and sedentary populations.

^[10]Soccer is influenced by Anthropometric characteristics, physiological, psychological, tactical, and technical and biochemical conditions of football players. Improving the physical fitness and aerobic capacity of soccer players has significance for team success. Physiological tests are important for players and referees. Based on physiological data coaches can determine performances and screen out the best players .

^[11]Various studies have been conducted on the assessment of the physical performance of football players, but very few studies were conducted based on playing position, especially in Africa. Ethiopian premier league soccer players problems that affect effectiveness clubs were lack of sports facilities, finances, and highly qualified professional players.^[12] Ethiopian sport development and challenges as compared with that of other countries scholars suggest that^[13]Ethiopian soccer players need to develop physical, technical, tactical, and psychological skills. Coaches better to give training based on the player's position and consider players' soccer ability. Concluded that players should consider playing position is influenced by height, weight, and age of players.

Physiological profiles are helpful to measure the effect of exercise training on performance and the health condition of soccer players. Tigray region clubs are Tigray wuha sera F.C, Dedabit F.C, Shire Endaselassie F.C, Mekelle 70 Enderta F.C, and Welwallo Adigrte University football clubs are newly emerging and

participated in the Ethiopian premier league, super league, and national first league. But, more physiological research was not done before due to these reasons, researchers believe that the study has a significant base of filling the scientific knowledge gap on anthropometric and physiological profiles of different playing position Tigray region football players.

Methodology

Study Area: The research study was conducted in northern parts of Ethiopia Tigray region, Mekelle, Adigrate, and shire town representing clubs who had played in the Ethiopian premier league, Ethiopian super league, and National league competition program formats.

Research Design: Descriptive Cross-sectional design and quantitative research method were employed to test and compare the physiological variables of different club soccer players.

Sample and Sampling Technique: To obtain the required data soccer players were selected through purposive sampling techniques based on the player's position from a total of 200 Tigray region football players 101 players such as fifteen goalkeeper, twenty seven defenders, thirty six mid fielders, and twenty three strikers' players.

Administration of the physiological test: The researcher has given orientation and detailed procedures of the study for football players. Informed consent was signed before sample collection on a consent form. Hospital nurse was recorded the blood pressure of soccer players' by using Digital Blood Pressure Monitor. Height of players measured at standing position and body weight in kilograms measured with the digital weighing machine. Similarly, body mass index (BMI) was calculated with kg/m²) conversion formula.

Statistical Analysis: The data obtained from football players' physiological variable test was first collected, organized, tabulated, and coded in SPSS version 21. Descriptive statistics mean and standard deviation are used to analyze basic information and distribution of scores. The data collected through physiological tests were summarized and analyzed quantitatively, then, analyzed by one-way analysis of variance (ANOVA) to conclude the differences between different playing position soccer players. Multiple comparison test was done by *posthoc* test (LSD) at the significant alpha value of (P<0.05)

Results

Table 1. Comparison of Anthropometrics and physiological variables of different position soccer players

| Variables | N | GK | N | DF | N | MF | N | SK | N | All Positions |
|--------------------------|----|-------------|----|-------------|----|--------------|----|--------------|-----|---------------|
| | | Mean±SD | | Mean±SD | | Mean±SD | | Mean±SD | | Mean±SD |
| Age (Years) | 15 | 24.2±3.32 | 27 | 24.67±3.187 | 36 | 23.69±3.64 | 23 | 23.83±3.70 | 101 | 24.06±3.46 |
| Height (Cm) | 15 | 1.80±0.08 | 27 | 1.74±0.05 | 36 | 1.75±0.06 | 23 | 1.71±0.06 | 101 | 1.74±0.06 |
| Weight (Kg) | 15 | 75.87±5.80 | 27 | 68.07±6.37 | 36 | 69.42±8.29 | 23 | 66.52±7.18 | 101 | 69.36±7.70 |
| BMI (Kg/M ²) | 15 | 23.42±2.27 | 27 | 22.32±1.67 | 36 | 22.65±2.29 | 23 | 22.55±1.81 | 101 | 22.65±2.03 |
| SBP (Mm Hg) | 15 | 119.53±7.65 | 27 | 118.56±8.85 | 36 | 120.58±11.84 | 23 | 122.39±10.32 | 101 | 120.3±10.15 |
| DBP (Mm Hg) | 15 | 75.93±6.64 | 27 | 73.52±9.78 | 36 | 74.42±11.34 | 23 | 78.43±10.13 | 101 | 75.32±10.10 |
| MA P (mmHg) | 15 | 90.34±5.47 | 27 | 86.66±10.24 | 36 | 89.65±9.77 | 23 | 92.96±9.31 | 101 | 89.71±9.43 |
| RHR(B/min) | 15 | 68.2±19.81 | 27 | 61.89±16.38 | 36 | 61.14±9.43 | 23 | 61.39±8.38 | 101 | 62.45±13.31 |

M-Mean, SD-Standard Deviation, GK-Goal Keeper, DF-Defender, MF Midfielder, SK-Striker, BMI- Body Mass Index, SBP-Systolic blood pressure, DBP-Diastolic blood pressure, MABP-Mean Arterial pressure, RHR-Resting heart rate

Table 2. One Way Analysis of variance (ANOVA) results of GK, DF, MF and ST football players of Tigray region, Ethiopia

| | | Sum of Squares | Df | Mean Square | F | Sig. |
|--------------------------|----------------|----------------|-----|-------------|-------|-------|
| Age | Between Groups | 16.3 | 3 | 5.433 | 0.445 | 0.721 |
| | Within Groups | 1183.343 | 97 | 12.199 | | |
| | Total | 1199.644 | 100 | | | |
| Height (M) | Between Groups | 0.068 | 3 | 0.023 | 5.218 | 0.002 |
| | Within Groups | 0.42 | 97 | 0.004 | | |
| | Total | 0.488 | 100 | | | |
| Weight (KG) | Between Groups | 865.094 | 3 | 288.365 | 5.515 | 0.002 |
| | Within Groups | 5072.074 | 97 | 52.289 | | |
| | Total | 5937.168 | 100 | | | |
| BMI (Kg/M ²) | Between Groups | 11.924 | 3 | 3.975 | 0.959 | 0.416 |
| | Within Groups | 402.15 | 97 | 4.146 | | |
| | Total | 414.074 | 100 | | | |
| SBP (mmHg) | Between Groups | 194.461 | 3 | 64.82 | 0.622 | 0.603 |
| | Within Groups | 10116.628 | 97 | 104.295 | | |
| | Total | 10311.089 | 100 | | | |
| DBP (mmHg) | Between Groups | 345.785 | 3 | 115.262 | 1.133 | 0.34 |
| | Within Groups | 9868.076 | 97 | 101.733 | | |
| | Total | 10213.861 | 100 | | | |
| MAP (mmHg) | Between Groups | 499.921 | 3 | 166.64 | 1.923 | 0.131 |
| | Within Groups | 8406.962 | 97 | 86.67 | | |
| | Total | 8906.884 | 100 | | | |
| RHR(B/min) | Between Groups | 592.1 | 3 | 197.367 | 1.117 | 0.346 |
| | Within Groups | 17138.85 | 97 | 176.689 | | |
| | Total | 17730.95 | 100 | | | |

GK-Goal Keeper, DF-Defender, MF-Midfielder, SK-Striker, BMI- Body Mass Index, SBP-Systolic blood pressure, DBP-Diastolic blood pressure, MABP-Mean Arterial pressure, RHR-Resting heart rate, P<0.05.

As the ANOVA comparison Table, 2 showed that there were no significant differences between in Age, BMI, Systolic blood pressure, diastolic blood pressure, mean arterial pressure, and resting heart rate. But, there were significances different on height and weight of different playing position Goalkeepers, Defenders, Midfielders and Strikers football players $P < 0.05$.

Discussions

The results of the study showed that no significant difference between goalkeepers, defenders, midfielders and striker football players in physiological profiles. But, there were significant differences in the height and weight of football players. Another study examined the physical fitness, physiological and Anthropometric parameters of Indian different club soccer players. 150 soccer players from six Indian different clubs participated in the study. The results of the study showed that there were significant differences in age, height, weight, body fat %, flexibility, agility, and Vo2 max. [14] Concluded that heredity factor and physical fitness levels may be the major cause of differences in playing position, physiology, fitness, and Anthropometric variables of Indian football players as compared to international standards of Americans, Europeans, and Austrian football players.

Assessed the physical and physiological profiles of a soccer player in the pre-competition session. A total of 270 professional soccer players' goalkeepers, midfielders, defenders, and forwards involved in the study and (ANOVA) were used to determine their significance differences. [15] The results of the study showed that there was a strong relationship between body composition, aerobic fitness, aerobic powers, and playing positions. However, there were also significant differences between blood lactate, maximum oxygen consumption, and body compositions. Coaches and medical stressed on specific playing positions and physiological profiles during designing scientific training programs for soccer players.

[16] English premier league professional soccer players' physical performance was high due to high-intensity training such as sprinting, jumping, talking, and covering lots of distance .FIFA world cup 2010 held in South Africa a total of 443 different position players such as goalkeepers, external defenders, central defenders, midfielders, and forward players distanced covered by players were analyzed. There were significant differences in the distance covered by different position

soccer players . [17] Football sport requires excellent fitness levels, high endurance training, and aerobic and anaerobic energy production mechanisms. [18] Aerobic high-intensity training and speed endurance training are elements of fatigue resistance training which increase soccer player's fatigue resistance.

Modern times much research has been carried out on a scientific training, nutritional strategies, and matches the performance of soccer players. But, more research not did on the physiological function of soccer players. [19] The contemporary research report described that 70 % of players perform a low-intensity activity, heart rate, and body temperature. Some players perform high-intensity exercise during a much which leads to muscle glycogen, oxidation of fat, fatigue, and tiredness. High-intensity speed training helps to improve the performance and playing ability of soccer players. Thus, coaches should-have to give high-intensity speed training for football players.

Comparative study of physiological variables among the cross river and Akwa Ibom state 20 football referees which were studied in a quasi-experimental design. [20] The results of the study showed that there are no significant differences between cross river and Akwaibom state football referees on physiological variables such as systolic blood pressure, diastolic blood pressure, and resting heart rate. [21] There is little scientific review literature in the area of performance and physiology of soccer sport based on the player's position to compare with international standards. As he concluded that there is a significant difference in Vo2 max among Indian national players on specific playing positions. [22] There was a significant change in the biological and physiological parameters of football players. Football sport needs strength, speed, tactics playing abilities, and high-intensity training before competitions.

The study aimed to analyze the body composition of male football players in Macedonia. 942 young male football players participated in the study. Results of study showed that height = 178.39 ± 6.11 cm; weight = 77.02 ± 7.57 ; Lean body mass = 65.65 ± 6.38 ; muscle mass percentage = 53.23 ± 2.78 ; body mass percentage = 17.05 ± 1.27 ; fat mass percentage = 14.58 ± 1.48 . [23] Based on the result of the study concluded it serves as references results for young football players of Mekodenia.

[24] The main objectives of the study were to evaluate the relationship between physiological variables and

playing ability of university soccer players. Based on the result of the study researcher concluded that there is a significant difference between playing ability of university soccer players and physiological variables such as systolic blood pressure, diastolic blood pressure, breath-holding time, and resting heart rate.

The purpose of the study was to test the physiological variables of South African university soccer players. 27 male soccer players participated in the study. There is no significant difference between defenders, goalkeepers, midfielders, and strikers in flexibility. But there is a significant difference between different playing positions on Vo₂ max, height, and weight. Based on the result of the study, researchers concluded that coaches and sports scientists can adjust and reshape programs according to playing position.

The study tested the physiological and skill, fitness levels of *Asante Kotoko* soccer players. 25 different soccer-playing positions such as defenders, mid-fielders, strikers, and goalkeepers were involved in this study. [25] The results of the study showed that except for muscular endurance all physiological and fitness variables such as body mass index, heart rate, blood pressure, 30 m dash, and agility have significant differences based on the players' position at $p < 0.05$.

Studied on problems that affect the physical performance and possible solutions of university soccer players. [26] Eleven soccer players with the age of 19-22 had participated in the study and training was given to players. Based on the results of the study researcher concluded that there are significant differences among university soccer players on Anthropometric and physiological variables in pre and post-test scores. Also, there are no significant differences observed in the pre-posttest on hematological and biochemical variables of university soccer players. The researcher recommended that further investigation is important in professional soccer players.

There is much review literature on the physiological variables of soccer players in different countries such as the U.S.A, Europe, but no more review on India and South Asia on the physical characteristics of soccer players. The study aimed to find out the physiological variables of elite soccer players in India. 22 professional soccer players were participating in this study. [27] The results of the study showed that due to lack of Indian soccer player's success height, weight, body fat %, Vo₂

max, forced vital capacity, anaerobic threshold, lactic power index, lactic work index were low as compared with that of other international competitive professional team in the world. The researcher recommended that to be successful in international competitions must improve the fitness and skill of players by giving scientific training.

Conclusion

There was no significant difference between SBP, DBP, MAP, and RHR on goalkeepers, defenders, midfielders, and strikers $P > 0.05$. Playing position has no effects physiological profiles of systolic blood pressure, diastolic blood pressure, mean arterial pressure and resting heart rate of football players; but there were significant differences in height and weight of football players in Tigray region during the preparatory season. Therefore, coaches and sport science experts should take into consideration height, weight, body mass index and playing position while testing and designing training programs.

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Conflict of Interest: Nil.

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Ethical Clearance: This research study paper does not affect the morals and health of soccer players. Soccer players participated in this research study and blood pressure measured with their consent. Club coaches aware of to whom it concerns the latter has written by the sports science department. The research was done based on national and international scientific guidelines of ethics approved Number of ERC-1376/2019 approved by Mekelle University, health research ethics review committee (HRERC).

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