

Prevalence of Hypertension and Pre-hypertension in Male Adolescent Football: A Cross-Sectional Cohort Study of Nigerian Players

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Abstract Background: Hypertension (HTN) has been reported as the most common cardiovascular (CV) disorder observed in competitive athletes. However, information on the prevalence of HTN and pre-HTN among adolescent male football players is not well documented. This study assessed the prevalence of point and sustained HTN and pre-HTN in male adolescent footballers in Lagos, Nigeria. The distribution of CV risk factors among players was also evaluated. **Methods:** A cohort of 706 male adolescent players of a youth football league in Lagos, Nigeria were studied. Their blood pressures and anthropometric indices were measured using standard protocols at a pre-participation screening. Players identified as hypertensive (i.e. point HTN – defined as HTN based on 1 assessment derived from the mean of two measurements) were invited for follow-up assessment a week after initial assessment to detect sustained HTN. Data were presented using descriptive statistics. **Results:** The mean age of players was 17.7 ± 1.1 years (range = 14 – 19 years). The prevalence of point HTN and pre-HTN was 24.8% and 47.3% respectively, while the prevalence of sustained HTN and pre-HTN was 13.9% and 51.7% respectively. Hypertension (24.8%) and family history of a CV disease (5.1%) were the most prevalent CV risk factors among players at the pre-participation screening. **Conclusion:** This study reveals that HTN and pre-HTN are prevalent among male adolescent Nigerian footballers. Urgent public health action is needed to address the situation in order to fore-stall or attenuate the implications of adolescent HTN in these competitive athletes.

Keywords: hypertension, Cardiovascular Risk Factors, youth football, pre-participation screening

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1. Introduction

Hypertension (HTN) is a prevalent disease worldwide. Studies have revealed that HTN may begin in adolescence and tracks into adulthood [1,2]. Hypertension in adolescents often goes undiscovered because adolescents are generally healthy and visit a physician only when they are very ill. For this reason, the measurement of blood pressure (BP) even among adolescents has been recommended [3].

Hypertension is the most common cardiovascular (CV) condition observed in competitive athletes, many of whom are adolescents [4]. Physically active individuals and professional athletes including football players are not risk free for developing HTN. Football players are perceived as the epitome of health, owing to their unique lifestyle and extraordinary physical achievements. However, participation in football exposes the players not only to musculoskeletal injuries but also CV risks. A small, but notable proportion of players have been reported to die suddenly while participating in vigorous sports [5,6]. Elevated blood pressure (BP) is one major risk factor that

has been documented to have a continuous and consistent relationship with CV events and is independent of other risk factors [7]. Furthermore, HTN is associated with an increased incidence of all-cause and CV mortality, sudden death, stroke, coronary heart disease, heart failure, atrial fibrillation, peripheral arterial disease and renal insufficiency [8].

The impact and prevalence of HTN as a disease in adolescent youth football is not well known. A study conducted on adolescent athletes in various sports (age: 16 ± 4 years) over a decade ago revealed that 41 athletes out of 410 (10%) were detected as having point HTN at a pre-participation screening (PPS); however, only 18 athletes (4.4%) were detected as having HTN after 2 or more BP measurements [9]. In another study, almost 80% of adolescent athletes with an elevated BP of $> 142/92$ mm Hg during a sports pre-season screening examination were found to eventually develop sustained HTN [10]. Hence, it is essential that BP is closely monitored in adolescent athletes irrespective of the level of physical fitness. Yet, this appears not to be a regular practice in adolescent football.

The effects of HTN on an undiagnosed and untreated adolescent footballer going by the aforesaid cannot be ignored. However, information on the prevalence of HTN and pre-HTN among adolescent male football players is not well documented. This study assessed the prevalence of point and sustained HTN and pre-HTN in male adolescent footballers in Lagos, Nigeria. The study also evaluated the prevalence of CV risk factors in the cohort of adolescent football players.

2. Methods

2.1. Study Population

A cross-sectional study was conducted on all registered top division team players (706 players from 36 teams) of a male youth football league in Lagos, Nigeria. This analysis is a part of a larger study on players' pre-season physical fitness in which all the players registered for the 2012/2013 league season were invited to a mandatory PPS programme.

2.2. Measurements

Players' height and weight were measured prior to the BP measurements. Height was measured (to the nearest 0.5 cm) using a non-elastic measuring tape, fastened to a vertical wall, with the players standing on bare feet. Weight was measured (with the players on bare feet and with their team jerseys on) using an (Omron) electronic weighing balance, to the nearest 0.1 kg. Body Mass Index (BMI) was calculated using the formula $BMI = \text{Weight (kg)} / [\text{Height (m)}]^2$.

All the players had their BP measured during a PPS after resting (seated) for at least 5 minutes in a chair, with feet on the floor, and the right arm supported at heart level [11]. The main outcome measure for this study was prevalence of point HTN and pre-HTN – defined as systolic BP ≥ 140 mmHg and ≥ 120 mmHg respectively based on 1 assessment derived from the mean of two measurements during the PPS. In order to detect sustained HTN among players, a follow-up BP assessment was done (a week after the first) for players who had point HTN. All measurements were obtained by an automated, digital Omron M6 device. For both assessments, two BP measurements were taken from the right upper arm, separated by about 5 min intervals and the mean of the readings was taken as player's BP [3,11]. Blood pressure readings were classified according to the recommendations of the National Blood Pressure

Education Programme of the United States of America: Pre-HTN – systolic BP $\geq 90^{\text{th}}$ but $< 95^{\text{th}}$ percentile or ≥ 120 mmHg; HTN – systolic BP $\geq 95^{\text{th}}$ percentile for players age [11]. A CV risk factor screening based on physical characteristics, individual medical and family history of players was also done. Data were consistently recorded on assessment forms administered by 2 assessors duly trained for the study.

2.3. Data Analysis

Data were analysed using descriptive statistics on SPSS version 15.0 (SPSS Inc. Chicago IL). Values were expressed as means (\pm standard deviation) for age, weight, height, BMI and frequencies for BP. Prevalence of BP categories and CV risk factors were presented in percentages.

3. Results

The mean age of players was 17.67 ± 1.11 years (range = 14 – 19 years). Blood pressure distribution among players is as presented in Table 1. From the cohort of players, 175 players (24.8%) had point HTN (23.5% with stage I HTN and 1.3% with stage II HTN) while 334 players (47.3%) had point pre-HTN. On re-assessment (follow-up) of the 175 players previously categorised as hypertensive, 24 (13.9%) players had sustained HTN; either stage I or II HTN while 91 (51.7%) players had pre-HTN. Figure 1 presents the distribution of CV risk factors among players. Hypertension (24.8%) and family history of a CV disease (5.1%) were mostly prevalent.

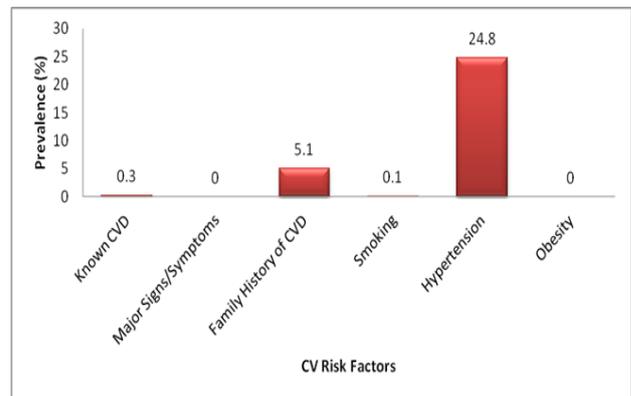


Figure 1. Distribution of Cardiovascular Risk Factors among Players Based on the PPS

Table 1. Blood Pressure Distribution among Adolescent Youth Football Players in Nigeria

	Normal		Pre-HTN		Stage I HTN		Stage II HTN		Total HTN (Stage I & II)	
	n	Prev (%)	n	Prev (%)	n	Prev (%)	n	Prev (%)	n	Prev (%)
Point HTN (n = 706)	197	27.9	334	47.3	166	23.5	9	1.3	175	24.8
Sustained HTN (n = 175)	60	34.4	91	51.7	21	12.2	3	1.7	24	13.9

HTN – Hypertension
Prev – Prevalence

4. Discussion

The prevalence of point HTN (24.8%) (stage I and II) and pre-HTN (47.3%) among the players is notably high

and this is of great concern. In order to critically evaluate the extent of the problem and rule-out “white-coat” HTN and the limitations of 1 time BP assessment that may be associated with the setting adopted for the PPS, a follow-up assessment was carried out a week after the PPS

programme on players initially identified as hypertensive. Twenty four (13.9%) of these players were found to have sustained HTN and up to half (51.7%) still had pre-HTN. This indicates that regular assessment of BP is imperative even in adolescent footballers. The American Academy of Paediatrics has recommended that temporary activity restriction should be ensured in young athletes who have Stage II HTN at first assessment until normal BP is achieved [12]. However, diagnosing HTN in players before restriction from participation or treatments must be carefully done. It suffices to suggest that final decision on whether a player with HTN at a PPS ie point HTN should be restricted from play and advised on treatment should only be based on follow-up BP assessments and further investigations on other CV risk factors.

A prevalence of 24.8% and 47.3% for HTN and pre-HTN respectively based on a 1-time BP assessment among players is comparable with the results from a similar study on male adolescent non-athletes from Kogi State, Nigeria [13]. The prevalence of point HTN (16.9%) and pre-HTN (29.2%) as documented in the aforementioned study is also considered high but not as much as recorded in our study. This suggests an emergent trend of elevated BP among Nigerian adolescents especially athletes.

Among the selected CV risk factors, HTN was recorded as the most prevalent. The figures from the BP assessment during the PPS showed that a significant proportion of male youth footballers - 1 out of 4 that were hitherto considered normotensive were actually hypertensive and 1 out of 2 were pre-hypertensive; hence at 'high risk' of developing HTN [3]. This is worrisome and calls for urgent attention. These high rates in BP may be due to a few factors that have been identified as major risk factors for CV diseases of which HTN is one. These factors include: unhealthy diet, tobacco use, drug and alcohol abuse. In reality, most of the players in the study population fall within the low socio-economic stratum. There are therefore strong possibilities that these young players are culturally exposed to unhealthy diets and may also indulge in anabolic steroids, diet pills, non-steroidal anti-inflammatory drugs, herbal supplements, energy drinks, alcohol and substance abuse. Since prohibited performance enhancing substances are not being monitored by the Nigeria Football Federation, it is likely that the players use these substances to boost their performance. Lifestyles that encourage unhealthy diets and habits have been established as risk factors for HTN and other chronic diseases [7,14]. This underlines the need for urgent public health actions in the study population to address the situation and its implications.

5. Conclusion

This study reveals that HTN and pre-HTN are prevalent among male adolescent Nigerian footballers. There is a need for further investigations on possible causative factors and regular PPS programmes including standardised BP assessments among male adolescent football players in the region. Furthermore, regular or seasonal enlightenment campaigns on HTN-preventive health related behaviours by football administrators at the

grassroots is solicited, in order to fore-stall or attenuate the implications of adolescent hypertension.

Disclosures

The authors declare no conflicts of interest in this study.

List of Abbreviations

BMI: Body Mass Index
BP: Blood Pressure
CVD: Cardiovascular Disease
HTN: Hypertension

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