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Reseach Paper: Cardiovascular Risk Profile of Apparently Healthy Workers in a Tertiary Hospital in Nigeria

Arinola Esan[1], Jokotade Adeleye[1], Taoreed Adegoke Azeez[1*]

1. Department of Medicine, University College Hospital, Ibadan, Nigeria.

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Running Title Cardiovascular Risk Profile Of Hospital Workers

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ABSTRACT

Background: Cardiovascular disease incidence is rising in Nigeria. This study was done to identify cardiovascular risk factors and assess the 10-year cardiovascular risk score of healthcare workers of a tertiary hospital in south-western Nigeria.

Materials & Methods: In this cross-sectional study, apparently healthy workers of a tertiary hospital in Nigeria were studied. Fifty-two individuals were recruited into the study. Anthropometric measures, blood pressure, fasting lipid profile and HbA1c were obtained using the standard protocols. QRISK3 score was also calculated.

Results: The Mean±SD age of participants was 44.9±8.1 years. Dyslipidaemia was the most common risk factor among apparently healthy healthcare workers, while glucose intolerance was the least common. Also, 48.1% of the subjects had at least one cardiovascular risk factor and 15.4% had 3 or more cardiovascular risk factors. The 10-year cardiovascular risk using QRISK3 was moderate in 3.8%. There was no statistically significant difference in the 10-year cardiovascular risk score between the clinical and non-clinical healthcare workers (P=0.313; t=0.819). However, male participants had a significantly higher 10-year cardiovascular risk score compared with the females (3.50 vs. 1.56; P<0.001; t=3.741).

Conclusion: Cardiovascular risk factors are prevalent among health workers and closer attention needs to be paid to these factors by the hospital management to mitigate cardiovascular disease among the staff.

Keywords: Cardiovascular risk factors; Health workers; Tertiary hospital; Nigeria

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* **Corresponding Author:**
Taoreed Adegoke Azeez, MBChB, MSc, MWACP.
Address: *Department of Medicine, University College Hospital, Ibadan, Nigeria.*
Tel: *+23 (4703) 5728747*
E-mail: *adegokegalaxy@yahoo.com*

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1. Introduction

Cardiovascular disease is ranked top on the list of global health problems by the World Health Organization (WHO) [1]. Risk is defined as the probability of an event occurring over a specific period of time [2] and is a complex phenomenon difficult to evaluate. Therefore, it is often necessary to consider factors associated with a particular risk, otherwise, they are called risk factors. O'Donnell et al. defined risk factors as quantifiable characteristics associated with increased frequency of disease and as an independent predictor of the occurrence of a disease [3].

Payne classified cardiovascular risk factors into classic unmodifiable factors (such as age, gender, and family history), modifiable factors (such as blood pressure, lipid profile, and glucose intolerance), behavioral risk factors (such as smoking, excessive alcohol consumption, and sedentary lifestyle) and novel risk factors (such as C-reactive protein, adipokines, and homocysteine) [1]. It is recommended that cardiovascular disease management should be based on the utilization of objective risk scores, which are often computed from cardiovascular risk factors [4].

The various documented and validated cardiovascular risk scores include Framingham risk score, QRISK score, Systematic Coronary Risk Evaluation (SCORE), Prospective Cardiovascular Munster (PROCAM), and Atherosclerotic Cardiovascular Disease (ASCVD) [5, 6]. The QRISK score is a cardiovascular risk algorithm approved by the United Kingdom's National Health Services and adopted by the National Institute of Health and Care Excellence (NICE) for primary prevention of cardiovascular disease [7] The updated QRISK 3 is the latest validated edition of the algorithm [8] and classifies the risk as low (<10), intermediate (10-20), and high (>20) [9].

Assessment of cardiovascular risk factors and cardiovascular risk scoring is important because they evaluate the risk of developing cardiovascular disease and guide appropriate preventive and therapeutic strategies [9]. Commencement of statin, for example, for primary prevention is dependent on the cardiovascular risk score. Also, cardiovascular disease is gradually becoming a major cause of morbidity and mortality among adults in Nigeria. Adegoke et al. reported that 51% of out-of-hospital deaths in Lagos, a cosmopolitan city in Nigeria, were due to cardiovascular-related causes [10]. Therefore, in a nation like Nigeria, where there is a limited health workforce, assessing cardiovascular risk is important to steer efforts at preventing cardiovascular disease and death among the personnel. Additionally, the limited health manpower is concentrated in the urban areas where cardiovascular risk tends to be relatively higher [11, 12]. Therefore, the objectives of this study were to identify cardiovascular risk factors among the workers of the University College Hospital, Ibadan, and estimate and stratify their 10-year cardiovascular risk.

2. Materials and Methods

In this cross-sectional study, 52 apparently healthy workers of a tertiary hospital in Nigeria were studied after obtaining informed consent. The workers were divided into two categories: clinical workers (doctors, nurses, physiotherapists, and pharmacists) and nonclinical workers (administrative and security personnel).

Inclusion criteria for the participants

Apparently healthy members of staff of a tertiary hospital in Nigeria who gave consent to participate in the study were included.

Exclusion criteria for the participants

Apparently healthy hospital workers who refused to consent and/or who an acute illness or an acute decompensation of a chronic illness were excluded from the study. Also, pregnant women and individuals who had been admitted for an illness in the preceding 3 months as well as workers already diagnosed with a stroke, myocardial infarction, heart failure, or peripheral artery disease were exempted from the study.

Data collection and analysis

Structured and pre-tested questionnaires were administered to the participants to obtain the sociodemographic data. Weight was measured in Kilograms (to the nearest 0.1 kg) using a D-339 Detecto Eye-level Physician Beam Scale (made in the USA). Height was measured in meters (to the nearest 0.01 m) using a portable stadiometer. Body Mass Index (BMI) was calculated using the Formula 1 [13]:

1. $BMI = Weight\ (kg)/Height^2\ (m^2)$.

BMI of 18.5-24.9 kg/m^2 was considered normal and 25-29.9 kg/m^2 and greater than or equal to 30 kg/m^2 were considered as overweight and obese, respectively [14]. Waist circumference was measured in centimeters (to the nearest 0.1 cm) using a standard technique as described

by the WHO in the technical report on obesity with a flexible inelastic tape measure [15]. Values greater than or equal to 94 cm in males and greater than or equal to 80 cm in females were considered as truncal obesity [15].

Blood pressure was measured after the patient sat for about 5 minutes with a mercury sphygmomanometer (Accoson brand, made in England) following a standard technique as described by the European Society of Hypertension [16]. Three readings were taken and the average of the last two readings was recorded. Hypertension was taken as systolic blood pressure ≥ 140mmHg and/or diastolic blood pressure ≥ 90mmHg or being on treatment for hypertension [17].

Participants had a blood sample collected following an overnight fast of about 8 – 12 hours. Fasting plasma glucose was determined by glucose oxidase enzymatic method using Dialab glucose assay kit. Total cholesterol, total Triglyceride (TG), and High-Density Lipoprotein cholesterol (HDL-C) was determined using the enzymatic method with the Dialab Kit. Low-Density Lipoprotein-Cholesterol (LDL-C) was calculated using the Friedewald equation provided that the TG was not more than 400mg/dl Formula 2 [18].

2:

$$\text{LDL-C} = \frac{\text{Total cholesterol} - \text{HDL-C} - \text{total triglycerides}}{5}$$

Total cholesterol greater than 200 mg/dl and/or total TG greater than 150 mg/dl and/or HDL-Cholesterol less than 40 mgldl in males or less than 50 mg/dl in females is considered as dyslipidemia. HbA1c was determined using the ion-exchange high-performance liquid chromatography method.

QRISK3 score was calculated using the appropriate online calculator [19]. The 10-year cardiovascular risk is considered low, intermediate, and high when the QRISK3 score is <10%, 10-20%, and > 20%, respectively [20].

The data collected was scrutinized for errors as soon as collected. They were coded and entered into Microsoft Excel datasheet before they were transferred to the program for data analysis. Data analysis was carried out using the Statistical Package for Social Sciences software (SPSS) version 22. Quantitative variables were presented as Mean±Standard Deviation or median (where deemed appropriate). Categorical variables were presented as frequencies or proportions. A comparison of the mean values was done using the Student's t-test. A P-value less than 0.05 was considered to be statistically significant.

Definition of terms

Clinical health workers: Health workers that interact directly with patients and patients' care, such as doctors, nurses, physiotherapists, dentists, and pharmacists.

Non-clinical workers: Health workers who do not interact directly with patients and patients' care, such as administrative staff members and security operatives.

Glucose intolerance: Glycated haemoglobin ≥5.7% - 6.4% [21].

Dyslipidaemia: Fasting total cholesterol >200mgldl and/or fasting TG >150 mg/dl and/or LDL-C >130 mg/dl and or HDL-C <40 mg/dl (in males) or 50mgldl (in females) [22].

Hypertension: Systolic blood pressure ≥140 ng/dl and/or diastolic blood pressure ≥90 mg/dl or being on antihypertensives [23].

Obesity: Body mass index ≥30 kg/m^2 [24].

Overweight: Body mass index of 25-29.9 kg/m^2 [24].

Central obesity: Waist circumference ≥94 cm in males or 80 cm in females [25].

3. Results

Fifty-two apparently health workers were recruited into the study who met the eligibility criteria. The age range was 30-58 years while the Mean±SD age was 44.9±8.1 years. Table 1 indicates the gender and occupational distribution of the participants and Figure 1 shows the frequency of cardiovascular risk factors among this cohort. Dyslipidaemia was the most common risk factor among apparently healthy healthcare workers, while glucose intolerance was the least common. Figure 2 shows the number of risk factors present in the participants. Almost half of the participants had at least one cardiovascular risk factor and 15.4% of the participants had 3 or more cardiovascular risk factors.

In terms of 10-year cardiovascular risk using QRISK3 score, none of the participants had high risk, 3.8% had moderate risk, while the rest had low risk. There was no statistically significant difference in the 10-year cardiovascular risk score between the clinical and non-clinical

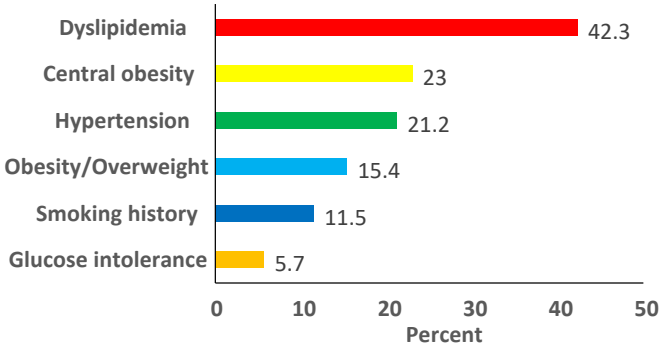

Figure 1. Frequency of traditional cardiovascular risk factors

health workers (P=0.313; t=0.819). However, male participants had a significantly higher 10-year cardiovascular risk score compared with the females (3.50 vs. 1.56; P<0.001; t=3.741) (Figure 3).

4. Discussion

This study documented a high prevalence of cardiovascular risk factors among apparently healthy healthcare workers in a tertiary hospital in Nigeria. In a similar study done among healthcare workers in a municipal hospital in Ghana, cardiometabolic risk factors were documented to be prevalent among apparently healthy participants [26]. Previous studies have shown that the prevalence of cardiovascular risk factors among healthcare workers is often comparable with those of their community despite the fact that healthcare workers are believed to be better equipped with knowledge of cardiovascular risk factors and their modification strategies [26-28]. Ike and Onyema have affirmed that the prevalence of cardiovascular risk factors among the Nigerian population is on the rise [29].

This study found the frequency of glucose intolerance among the participants as 7.9%. This is similar to the 10.5% that Lawal et al. documented in their cohort of employees in a tertiary hospital in Northern Nigeria [30]. Similarly, Bakari et al. reported a prevalence of 7.4% among the apparently healthy population of Nigerians [31]. The frequency of ex-smokers and present smok-

Table 1. Gender and occupational distribution of the participants (n=52)

Variable		No. (%)	Mean±SD
Age group (years)	30-40	22 (42.3)	
	41-58	30 (57.7)	
Gender	Male	25 (48.1)	
	Female	27 (51.9)	
Type of health workers	Clinical	25 (48.1)	
	Non-clinical	27 (51.9)	
BMI categories	Normal	39 (84.6)	
	Overweight	6 (11.5)	
	Obese	2 (3.8)	
Hypertension		11 (21.2)	
LDL-C (mg/dl)			123.27±21.76
HDL-C (mg/dl)			55.15±11.30
HbA1c (%)			5.01±0.61
Total cholesterol (mg/dl)			193.73±44.35

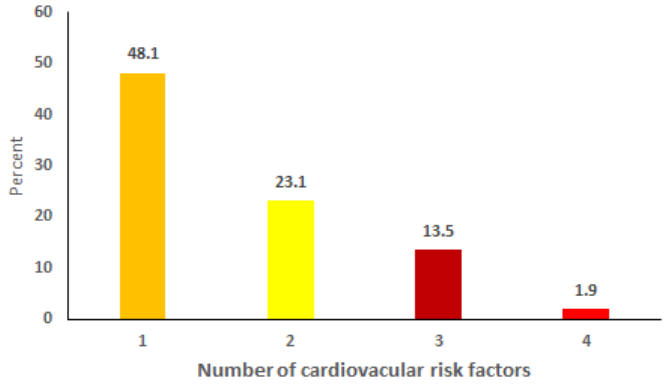

Figure 2. Number of risk factors present in the participants

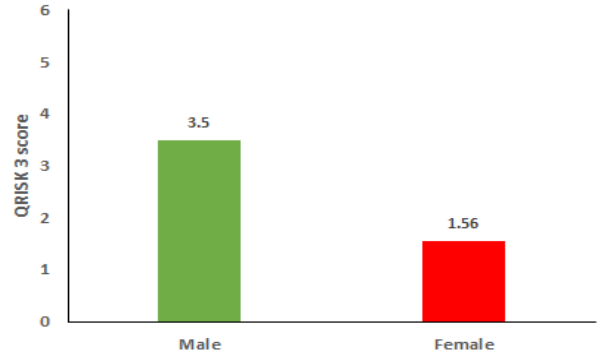

Figure 3. Comparing the QRISK 3 Score between males and females

ers was 11.5% in the present study. In a meta-analysis, Adeloye et al. reported the prevalence of current and ex-smokers amongst the general population in Nigeria as 17.7% [32]. Campaign against unhealthy living, including smoking cessation in health facilities, may account for the slightly lower prevalence in the present study compared with the general population.

Furthermore, among the outcomes of the study was a prevalence of central obesity of 23%. In a large population of apparently healthy Eastern Nigerian population, central obesity prevalence was reported as 21.7%, which is in accordance with the findings of the present study [33]. Interestingly, the frequency of overweight and obesity in this study (15.4%) would imply that some individuals with normal BMI had central obesity and their cardiovascular risk may be underestimated using BMI alone. Ijezie et al. reported the same observation in their cohort of apparently healthy Nigerians [33].

Additionally, among the participants in this study, 21.3% had hypertension. This is in keeping with the findings of Konin et al who reported the prevalence of hypertension among apparently healthy nursing staff of a hospital in Abidjan, Cote d'Ivoire as 17.5%; however, their subjects were largely female [34]. As regards dyslipidemia, its frequency in this study was 42.3%, similar to the study done among apparently healthy members of staff of a university in Southern Nigeria, which found a prevalence of 49.5% [35]. In the cardiovascular profiling of the participants in this study, clustering of cardiovascular risk factors was a prevalent finding. Other authors have reported clustering of cardiovascular risk factors among apparently healthy healthcare workers [28, 30, 34].

This study suffered from a limited sample size as this was a pilot study, which might make it difficult to draw conclusions. Therefore, it is recommended that further studies with a larger sample size be conducted to further characterize the frequency and pattern of cardiovascular risk factors among healthcare workers.

5. Conclusion

Cardiovascular risk factors are prevalent among healthcare workers just like the general population. There is a need to intensify efforts at prevention, early detection, and treatment of these cardiovascular risk factors among healthcare workers to mitigate the untoward effects of morbidity and mortality among them.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the University of Ibadan (Code: NHREC/05/01/2008a). All ethical principles are considered in this article. The participants were informed about the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information and were free to leave the study whenever they wished, and if desired, the research results would be available to them.

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Authors contributions

Both authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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