# ORIGINAL RESEARCH

## IDENTIFYING RISK FACTORS FOR CARDIOVASCULAR DISEASE DURING A MEDICAL MISSION OUTREACH

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## ABSTRACT

### Background

Cardiovascular diseases (CVD) contribute 17.3million to global mortality annually. With increasing urbanization, sedentary lifestyle, obesity and other worsening social indices, incidence of CVD has continued to rise in Nigeria and other third world countries, ultimately worsening already poor economic and clinical outcomes. Medical missions when properly designed and executed can serve as an important avenue for identifying gaps in patient care and promotion of pharmacist-cognitive services.

The objective of this study was to identify CVD risks in volunteers during a medical mission outreach.

### Method

The study was an exploratory study. Volunteers were sampled from respondents at a medical mission at Festac town, Amuwo Odofin, Lagos State. A total of 224 volunteers were interviewed

by pharmacists to obtain demographic data and medical history. The weights, height and blood pressure were measured in accordance with JNC7 guidelines. Laboratory tests (Random Blood Sugar or Fasting Blood Sugar and total cholesterol) were conducted by licensed laboratory scientists. Informed consent was taken as decision to participate after the participants were addressed.

**Results**

The mean weight was 75.4Kg ±12.9) with 42.9% of the total sample obese and 35.7% overweight. Mean BMI between sexes was different (Male 26.9±4.5 and Female 30.92± 4.6) and higher in females (t-test, $p< 0.0001$). Using the waist circumference measure, 54% of patients had a higher risk of CVD. Both BMI and waist circumference were significantly related to age (F-test, $p= 0.001$). More than half of the volunteers (57.1%) had systolic blood pressure (SBP) elevated above 140mmHg and 19.6% having diastolic blood pressure elevated above 90mmHg. SBP was significantly higher in males (151.4mmHg±20) than females (140.8mmHg ±20.4) (t-test, $p< 0.0001$).

**Conclusion**

Medical missions are an important resource in identifying gaps in the healthcare sector and solutions to such problems can be designed at that level. There is currently a huge gap in patient care in Nigeria and pharmaceutical care can be the platform for bridging the gap in care.

**KEY WORDS:** Medical missions, Hypertension, Pharmaceutical Care, BMI and Waist Circumference.

## INTRODUCTION

Cardiovascular diseases (CVDs) are the number one cause of death globally[1]. More than three quarters of deaths from CVDs occur in low- and middle- income countries like Nigeria [2, 3]. Some of the risks for CVD are modifiable others are not modifiable. Non-modifiable risk factors include: age (>55 years), family history of early heart disease or stroke and ethnicity [4]. Modifiable risk factors include raised blood pressure (BP), body Mass Index (Overweight/Obese category), current smoking, increasing sedentary lifestyle, diet, excessive alcohol consumption, high low density lipoproteins ($LDL_C$), low high density lipoproteins ($HDL_C$), high total cholesterol ($Chol_t$), impaired blood glucose and diabetes [1, 3, 4]. The risk of a cardiovascular disease event is dependent on the blood pressure level, presence or absence of sub-clinical target organ damage and other associated cardiovascular risk factors in individual patients [5-7]. The relationship between cardiovascular disease risk and hypertension is graded, predictable and independent of any other risk factors[1, 8]. Lewinton et al [8] also showed that hypertension increased the aggregate risk in the presence of other risk factors.

The World Health Organization (WHO) has reported that for countries like Nigeria, low- and middle-income countries, the healthcare system does not offer integrated primary health care programmes that allow prevention, early detection, management of chronic disease and amelioration of risk factors compared to people in high-income countries [3]. The WHO has identified two types of interventions: population-wide and individual, which are recommended to be used in combination to reduce the greatest cardiovascular disease burden[3]. At the individual level, for prevention of first heart attacks and strokes, individual health-care interventions need to be targeted to those at high total cardiovascular risk or those with single risk factor levels above traditional thresholds, such as hypertension and hypercholesterolemia. The former

approach is more cost-effective than the latter and has the potential to substantially reduce cardiovascular events[3, 5] . These interventions are feasible at primary healthcare level in low-resource settings like Nigeria, and can be facilitated by non-physician health workers [3].

In many societies in Nigeria, medical missions have been undertaken severally to ameliorate the health system gaps [9-12]. Medical missions when properly designed and executed can serve as an important avenue for promotion of pharmacist-cognitive services.

The objective of this study was to identify CVD risks in volunteers during a medical mission outreach.

**METHOD**

Study was an exploratory study. Volunteers were sampled from respondents at a medical mission to commemorate the 25$^{th}$ anniversary of Victory Drugs (an independent community pharmacy) located in Festac town, Lagos State, Nigeria.

Sampled respondents were seated in a welcoming area and consent was obtained by decision to participate in the study. Volunteers were then interviewed by adequately trained pharmacists to obtain demographic data and medical history of the volunteers. The weights and heights were measured. The blood pressure was measured three times, at least five minutes apart.

Laboratory tests (Random Blood Sugar - RBS, Fasting Blood Sugar - FBS and total cholesterol $Chol_t$) were conducted by licensed laboratory scientists.

No identifying data was collected during the study and referrals were made for further evaluation when necessary.

**RESULTS**

A total of 224 adults participated in the outreach. Half of the volunteers seen were aged 60-69years (50.4%of sample) and more than half were female (53.1%). The mean weight in the sample was 75.4Kg (± 12.9) with 42.9% of the total sample obese and 35.7% overweight. Using the waist circumference measure, 54% of volunteers had a higher risk of CVD.

More than half of the volunteers (57.1%) had systolic blood pressure elevated above 140mmHg and 19.6% having diastolic blood pressure elevated above 90mmHg.

Most of volunteers (86.4%) who had a RBS test had a normal/expected blood sugar level while 35% of volunteers that had a Fasting Blood Sugar test (FBS) had impaired FBS. About 52% of volunteers required intervention in their total cholesterol levels.

Among the volunteers that presented, 52.7% were diagnosed hypertensive, 12.1% had diabetes and 15.2% had been diagnosed with hypercholesterolemia.

Systolic blood pressure was found to be higher in males [151.4 mmHg (± 20)] than females [140.8mmHg (± 20.4)] volunteers. For those with prior diagnosis of hypertension; more than 80% and 55% of those on antihypertensives had their BMI and waist circumference (respectively) above recommended levels for reduction of CVD risks. About 70% of those not on medication had their blood pressures elevated above pre-hypertensive values. Less than 30% of those on medication had their systolic blood pressure controlled (lower than 140) while 76% of those on medication had achieved recommended diastolic BP goals. Less than 5% had their RBS higher than recommended levels. About half of the volunteers (49.3%) had their total cholesterol above recommended levels.

TABLE 1: MEASURES AND SUMMARY STATISTICS

| MEASURES | SUMMARY STATISTICS |
|---|---|
| **AGE** | Modal age (50.4%) 60-69 years |

| | | |
|---|---|---|
| **SEX** | Male 46.1% female 53.1% | |
| **WEIGHT** | 75.4kg (± 12.99) | |
| **HEIGHT** | 1.612m (sd 0.081) | |
| **BMI*** | 29.02 (± 4.95)<br>Male 26.9 (± 4.5),<br>Female 30.92 (± 4.6)<br>t-test p< 0.0001 | Age 50-59 had highest BMI of 30.7 (± 5.9) |
| **WAIST**** | Mean 94.57 (± 10.91cm)<br>Male 93.1cm (± 11.8),<br>Female 95.9cm (± 9.9)<br>t-test p> 0.05 | 54% have higher risk (greater than recommended levels) of CVD |
| **BLOOD PRESSURE (SYSTOLIC)** | Mean 145.8mmHg (± 20.9mmHg)<br>Male 151.4 (± 20mmHg),<br>Female 140.8 (± 20.4mmHg)<br>t-test p< 0.0001 | 57.1% >140mmHg<br>20.1% prehypertensive 120-139mmHg<br>22.8% normal range |
| **BLOOD PRESSURE (DIASTOLIC)** | Mean 81mmHg (± 10.7mmHg)<br>Male 80.7 (± 11.1mmHg)<br>Female 81.3 (± 10.2mmHg)<br>t-test p> 0.05 | 48.2% normal range,<br>19.6% >90mmHg<br>32.1% 80-89mmHg |
| **PULSE** | Mean 74.5 (± 12.4) | |
| **FBS** | Mean 98.11g/L (± 12.1g/L)<br>Male 96 (± 8.4)<br>Female 99.6 (± 14.4)<br>t-test p> 0.05 | |
| **RBS** | Mean 99.5g/L (± 32.1g/L)<br>Male 97.8 (± 27.4),<br>Female 100.9 (± 35.7)<br>t-test p> 0.05 | 86.4% normal RBS,<br>2.5% at significant risk,<br>3.4% had impaired RBS,<br>7.6% low RBS |
| **TOTAL CHOL ($Chol_t$)** | Mean 204.63g/L (± 48.3g/L)<br>Male 195.6 (± 41.5)<br>Female 212.1 (± 52.4)<br>t-test p< 0.05 | 48.2% normal,<br>51.8% requiring intervention,<br>29.2% borderline high risk,<br>22.6% high risk |

*Decline noted from 50-59 (not less than 1.1 points for each decade, F-test p= 0.001)

**Increased up to 60-69years and reduces afterwards (F-test p= 0.001)

## DISCUSSION

The weight of volunteers was significantly related to age (F-test, p< 0.0001). Mean BMI between sexes (Male 26.9 (± 4.5), Female 30.92 (± 4.6)) was different and significantly higher in females (t-test, p< 0.0001). This finding is similar to studies conducted in other states in Nigeria [13-16] and among urban-dwelling Africans [17, 18] this is particularly worrying since in another study, it has been shown [14] that obese non-hypertensive Nigerian women may show signs of heart structure modifications that further increase risk of CVDs. Some of these modifications in obese non-hypertensive women include; higher left ventricular mass (LVM), left ventricular mass index (LVMI), wall thickness above normal weight than in non-hypertensive women and women who are obese and hypertensive seem to present more with eccentric hypertrophy significantly higher than in male obese hypertensive subjects[14]. This phenomenon is however absent in non-hypertensive obese men. These cardiac remodeling features are an added risk factor in hypertension, heart failure and cardiovascular morbidity and mortality [5, 19-21] and when the duo of the heart remodeling and obesity occur together, this may predispose to additive risk [14] and may be responsible for noted increases in incidence of other comorbidities [22]. To reverse this trend, measures must begin to take account of important evidence-based interventions [5]. Important benefits usually result when the interventions made take into account multiple risk factors present [23-25].

BMI and waist circumference (WC) were also found to be significantly related to age (F-test, p= 0.001). This was correlated to low High Density Cholesterol by Iloh *et al* [13] and to Triglyceride levels by Fasanmade *et al* [26] in similar sample. Okosun *et al* also found a correlation between increasing waist circumference quartiles to blood pressure and fasting blood sugar in a cohort of Nigerian women with gestational diabetes [27]. Kerenyi [28] in their comment to Okosun *et al* [27], also

found in this cohort that multiple linear regression showed a statistically significant association between WC, Waist-Hip ratio and BMI to systolic Blood pressure (SBP); but when adjusting for age and SBP, only the BMI had a significant statistical relationship with $HBA_{1C}$. Pre-pregnancy BMI higher than 25.2kg/$m^2$ in females without hypertension or diabetes had an OR of 3.45 (95% CI 1.25 – 9.55) for diabetes and OR of 4.29 (95% CI 1.74 – 10.62) for hypertension [28]. Hence interventions to improve BMI may prove to be significantly important in reduction of risk in these cohort and outcomes of treatment may also be improved with interventions targeting patients with BMI above cut-off points indicated in these studies [5]. Pharmacist intervention has been shown in RCTs to be effective in reducing BMI and other CVD risk factors associated with diabetes [29].

Systolic blood pressure was significantly higher in male than female volunteers (t-test, $p< 0.0001$). this difference was reversed in studies done in mild hypertensives (excluding obese volunteers and those with compelling indications [30, 31] but after adjusting for lean body weight, the observation was as in this study [31]. Similarly, blood pressure was also found to be significantly different for each age group and this is supported by findings in the WHO STEPs report [16].

For those diagnosed hypertensive; most of those on antihypertensives had their BMI and waist circumference (respectively) above recommended levels for reduction of CVD risks. This finding of multiple risk factors for CVD is similar to results in Benin [32] and studies in other urban population in Africa [33]. Pharmaceutical care interventions have been shown to improve outcomes through interventions targeting adherence to pharmacological [34-37] and some non-pharmacological therapies[34, 38-42].

The observed indices of fewer than 35% receiving treatment for their hypertension are supported by the PURE study[43]. Less than 30% of those on medication had their systolic blood pressure controlled (lower than 140) while most of those on medication had achieved recommended diastolic BP goals. A significant number however, have their total cholesterol above recommended levels. These are gaps that have been shown to be significantly ameliorated by pharmaceutical care interventions[44-46].

**CONCLUSION**

This study underscores the prevailing under-diagnosis of hypertension and the issues of unmitigated risk for CVDs in the population. Most of the volunteers that participated in the outreach had more than one associated risk factors for CVD and were not currently taking steps to correct their level of risk.

There is currently a yawning gap in patient care in Nigeria and pharmaceutical care can be the platform for bridging the gap in care especially in patients with two or more associated risk factors. Medical Outreach is an important resource in identifying this gap with a view to designing appropriate interventions.

It is, therefore, important that healthcare providers should regard as top priority the need to intensify their outreach programmes and aggregate data therefrom for the much-needed interventions.

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