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Original Article

Diet and lifestyle habits: Association with cardiovascular disease indices in a Nigerian sub-population

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ABSTRACT

Background: There is inadequate evidence regarding the pattern of unhealthy lifestyle behaviours in Nigeria hence the aim of this study was to assess the pattern of lifestyle-related habits that predispose to risk of cardiovascular disease (CVD) indices in a Nigerian population.

Methods: A population-based cross-sectional study was carried out on 422 apparently healthy males and females ≥ 18 years old. The World Health Organisation (WHO) STEPwise questionnaire was used to collect information on tobacco use or smoking habits, alcohol consumption and dietary habits. Logistic regression analysis was employed.

Results: 22.8% and 30.2% of participants indicated that someone smoked in their home and/or in closed areas at workplace, respectively, in the past 30 days. 225/422 admitted to taking alcohol including 72% within the past 12 months. 52.8% of the participants consumed < 5 servings of fruits and/or vegetables each day. Results further showed that participants with < 5 servings of fruits and/or vegetables (OR: 1.06, CI: 1.01–1.13, $p = 0.028$) and high level of alcohol consumption (OR: 1.85, CI: 1.18–2.88, $p = 0.007$) were more likely to have hypertension.

Conclusions: The relatively high prevalence of alcohol consumption and apparent unhealthy diet are of huge concern given the increasing prevalence of CVD indices in the population.

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1. Introduction

Non-communicable diseases (NCDs) are chronic diseases resulting from a combination of genetic, physiological, environmental and behavioural factors [1]. According to report from the World Health Organisation (WHO) [1], about 17 million people die from NCDs each year before the age of 70. NCDs are now recognised as 'silent killers' propagating increased morbidity and mortality in low-middle-income countries (LMICs), where 87% of NCD related premature deaths occur [2]. This is due to the fact that most cases go undiagnosed until morbid conditions or death occurs. However, cardiovascular diseases (CVD) account for most NCD related deaths, which amounts to 17.7 million per annum, followed by cancers (8.8 million), respiratory diseases (3.9 million), and diabetes (1.6 million). The increasing prevalence of NCDs in LMICs in the sub-Saharan African (SSA) region has reached epidemic levels and an important component implicated for the high

morbidity and mortality in this region is the embrace of western pattern of life and high urbanisation [3].

Behavioural factors such as smoking, poor diet, and physical inactivity are the leading modifiable risk factors contributing to the global burden of CVD. According to the Global Burden of Disease Study 2013, 74.2% of the stroke burden (disability-adjusted life-years) was attributable to behavioural factors and a similar 72.4% attributable to constellation of metabolic factors (high blood pressure, high body mass index, hyperglycaemia and hypercholesterolaemia) [4]. Prevalence of CVD in Nigeria is not clear, but available evidence from archived death records suggest increase in CVD related deaths between the years 2000 and 2005 [5,6]. However, a systematic review found that 28.1% prevalence of cardio-metabolic syndrome compares to that identified in developed countries such as the United States of America and Australia [7]. In addition, the overall prevalence of hypertension is also high (28.9%) [8], and reports indicates that Nigeria has the third highest prevalence of diabetes in SSA [9].

The World Health Organisation (WHO) identifies unhealthy diet, physical inactivity, cigarette smoking/tobacco intake and

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heavy alcohol consumption as important behavioural factors driving the increasing prevalence of CVD risk factors globally [10]. The WHO report on global targets for 2025 to reduce the prevalence of unhealthy behaviours that propagates NCDs emphasises the need for countries to scale-up implementation of preventive measures following best available evidence. In spite of the recommendation, there is no working health policy, strategy or action plan to reduce unhealthy diet and/or promote healthy diets; reduce physical inactivity and/or promote physical activity; or reduce harmful use of alcohol and burden of tobacco use in Nigeria [11]. More so, there are inadequate epidemiological studies reporting pattern of unhealthy lifestyle behaviours in Nigeria. Understanding the patterns of distribution of diet and lifestyle habits, and their interplay with other cardiovascular indices would provide more needed evidence to plan intervention strategies and engage policy makers. The aim of this study was therefore to assess the pattern of lifestyle-related habits that predisposes to risk of cardiovascular disease indices in a Nigerian population.

2. Methods

2.1. Study design, population and ethical consideration

This study is a population-based cross-sectional study following a two stage cluster sampling technique as earlier published [12]. Of the 422 participants enrolled in the study, 77.3% were from the rural population and 22.7% were from the urban setting [13]. The study was approved by the Human Research Ethics Committee of Charles Darwin University, Australia (HREC Reference: H14003), Human Research Ethics Committee of Novena University and the Local Government Ministry of Health at Kwale, Delta State, Nigeria.

2.2. Measurement of behavioural factors

Lifestyle-related factors were collected with the aid of the World Health Organisation (WHO) STEPS questionnaire comprising core and expanded questions on tobacco use, alcohol consumption and diet. One-on-one interviews were engaged with participants by trained research personnel and their responses to the core and expanded questions were recorded.

2.3. Cardiovascular disease indices

CardioChek® Professional Analyser (Polymer Technology Systems, Inc, IN, USA) was used to measure blood glucose level and lipid profile according to manufacturer's instructions. Participants fasted for at least 8 h to qualify for fasting blood sample collection. The following cut-off values were used; 100–125 mg/dL (5.6–6.9 mmol/L) (impaired fasting glucose), ≥ 126 mg/dL (≥ 7 mmol/L) (diabetes) and ≥ 100 mg/dL (≥ 5.6 mmol/L) (hyperglycaemia). For lipid profile, the cut-off values were ≥ 200 mg/dL (5.17 mmol/L) (hypercholesterolemia), ≥ 150 mg/dL (≥ 1.69 mmol/L) (hypertriglyceridemia), ≤ 40 mg/dL (≤ 1.03 mmol/L) (low HDL-C in men) and ≤ 50 mg/dL (≤ 1.30 mmol/L) (low HDL in women). Three readings of the systolic (SBP) and diastolic blood pressures (DBP) were taken using Omron® (Australia) digital sphygmomanometer. The mean of 2nd and 3rd readings was used to ascertain the blood pressure of study participants. Systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg were used to categorise hypertension [14].

2.4. Statistical analysis

Summary statistics were performed to determine mean and standard deviation for continuous anthropometric and biochemical variables. Gender difference between days per week that participants ate fruits, vegetables and or meals outside of home was assessed using Mann-Whitney U Test.

Cross-tabulation between dichotomous variables of diet-related habits, such as frequency of tobacco smoking, alcohol consumption, vegetable intake, etc and gender were generated to assess their prevalence rates. The level of significance was tested using Pearson chi-square.

Logistic regression analysis was applied using fruits and/or vegetables consumption, smoking and alcohol consumption status (as independent variables) to predict occurrence of risk factors of CVD (outcome variables). Age, gender, exposure to second-hand smoke and physical activity status were fitted into the regression model as independent covariates, to adjust for confounders and generate adjusted odds ratio. Level of significance is set at 0.05, except otherwise indicated. Statistical analysis was performed using the Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY).

Table 1
Descriptive statistics of cardiovascular disease indices^a.

Category	Overall population		Male		Female		p-value [*]
	N	Mean \pm SD	N	Mean \pm SD	N	Mean \pm SD	
Age (years)	418	39.9 \pm 20.7	148	42.9 \pm 20.7	270	38.3 \pm 20.5	0.006
SBP (mmHg)	417	123.0 \pm 30.8	146	123.8 \pm 21.9	271	122.5 \pm 34.7	0.219
DBP (mmHg)	417	73.2 \pm 20.1	146	72.6 \pm 12.7	271	73.5 \pm 23.1	0.774
TC (mg/dL)	382	191.8 \pm 81.4	142	174.4 \pm 76.6	240	202.0 \pm 82.5	0.001
TG (mg/dL)	382	125.0 \pm 57.0	142	136.1 \pm 61.6	240	118.5 \pm 53.2	0.004
HDL (mg/dL)	382	63.3 \pm 20.3	148	72.0 \pm 25.3	234	71.4 \pm 23.0	0.698
RBG (mg/dL)	120	96.7 \pm 27.3	28	103.2 \pm 29.5	92	94.7 \pm 26.4	0.027
FBG (mg/dL)	266	91.4 \pm 46.9	114	95.6 \pm 48.1	152	88.3 \pm 45.8	0.181
		n (%)		n (%)		n (%)	p-value ^{**}
Hyper TG	382	93 (24.3)	142	46 (32.4)	240	47 (19.6)	0.005
Hyper TC	382	150 (39.3)	142	48 (33.8)	240	102 (42.5)	0.093
Low HDL-C	382	69 (18.1)	142	32 (22.5)	240	37 (15.4)	0.081
Hypertension	417	148 (35.5)	146	55 (37.7)	271	93 (34.3)	0.495
Hyperglycaemia	385	41 (10.6)	142	21 (14.8)	243	20 (8.2)	0.044
Diabetes	385	28 (7.3)	142	16 (11.3)	243	12 (4.9)	0.021

SBP = systolic blood pressure, DBP = diastolic blood pressure, TC = total cholesterol, TG = triglycerides, HDL = high density lipoprotein cholesterol, RBG = random blood glucose, FBG = fasting blood glucose.

^{*} Values are from Mann-Whitney U Test analysis.

^{**} Values are from Pearson's chi-square analysis.

^a The prevalence of risk factors presented here were as previously published [12].

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