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High Prevalence and Clustering Of Modifiable Cardiovascular Disease Risk Factors among Nurses in Nigeria: Implication for Translating Knowledge into Practice among Health Care Professionals

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Abstract

Objective: There is paucity of information on the prevalence of cardiovascular disease (CVD) risk factors among the working population in Nigeria, particularly among nurses. This study was thus conducted to investigate the prevalence of selected modifiable CVD risk factors and socio-demographic factors associated with them, among nurses in Nigeria.

Materials and methods: This study was a cross-sectional survey involving 316 (298 females and 18 males) nurses, purposively recruited from the largest teaching hospital in Nigeria. The International Physical Activity Questionnaire and the AUDIT- C Alcohol Screening Questionnaire were used to assess the physical activity and alcohol consumption levels of the participants respectively. Participants' height, weight, body mass index (BMI), waist and hip circumferences, waist-to-hip ratio and blood pressure were assessed using standard procedures. Data were analysed using descriptive statistics and inferential statistics of Chi-square at 0.05 level of significance.

Results: There was high prevalence and clustering of physical inactivity, obesity and pre-hypertension among the participants. Significant association was found between age and blood pressure ($p<0.001$), age and BMI ($p<0.001$), sex and physical activity level ($p=0.041$), sex and alcohol consumption ($p<0.001$), professional rank and blood pressure (0.038) and between professional rank and BMI ($p<0.001$).

Conclusion: Findings from this study showed high prevalence of CVD risk factors: obesity, pre-hypertension abnormal waist-hip ratio and insufficient physical activity levels among participants. These factors were variedly associated with participants' age, professional rank and sex. There is a need for an urgent intervention to ameliorate CVD risks among nurses in Nigeria.

Keywords: Cardiovascular disease • Cardiovascular disease risk factors • Nurses

Introduction

Cardiovascular disease (CVD) is a disease of the heart and blood vessels comprising [1], coronary heart disease (e.g. coronary artery disease and ischemic heart disease), peripheral arterial disease and stroke (American Heart Association, 2006) [2]. CVD remains a major cause of morbidity and a leading contributor to mortality worldwide [3], with its mortality cutting across age, gender and socio-economic background [4]. CVD claims more lives annually than all forms of cancers [5]. It is estimated that, about 60% of deaths in the world are caused by non-communicable diseases and about 17 million persons die annually from heart diseases, and the figure is projected to rise to 82 million in 2020 [6,7]. Developing countries now face the double menace of prevalent infectious diseases and increasing CVD, with projected epidemic proportions in the near future. CVD has become the number-one cause of death in the developing world, causing twice as many deaths as HIV, malaria, and tuberculosis combined [8]. This epidemic has the potential to place a large social and economic burden on developing countries, where CVD tends to strike those in their prime [9]. All CVDs have similar risk factors, and these are becoming rife in developing countries [2].

Risk factors for CVD have been categorised in two major groups: modifiable and non-modifiable risk factors [2,10]. Age, family history, race and gender have been indicated as non-modifiable risk factors for CVD. On the other hand, major modifiable risk factors of CVD include high blood pressure, abnormal blood lipids, tobacco use, physical inactivity, obesity, unhealthy diets and diabetes mellitus [10]. Other modifiable risks factors are depression, psycho-social stress, alcohol use, use of certain medications (oral contraceptives and hormone replacement therapy) and lipoprotein. According to a study, identification of the major risk factors and the implementation of control strategies (e.g. community education and target of high-risk individuals) contribute to fall in CVD mortality rates[3].

Earlier studies in Nigeria had sought to describe prevalence of risk factors for CVD in specific patients' populations like those with hypertension, diabetes and the aged [3,11]. Cardiovascular risk factors have been assessed in adolescents and adults [12,13]. These studies have identified prehypertension and hypertension, obesity, abnormal lipid levels, poor diets, alcohol use and physical inactivity as prevalent CVD risk factors among Nigerians. Unfortunately, CVD in Nigeria strikes the working population unlike what happens in developed countries where the elderly, 65 years above are the ones who are majorly affected by CVD. If CVD affects the working population, what about health care professionals who ought to offer medical care to the patients? Lifestyle risk factors can be controlled and modified for effective CVD prevention and it is expected that health care professionals who are equipped

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with this knowledge, should practice it first for themselves. Nurses are known to constitute the greatest percentage of health care work force and they play a major role in health education and promotion [14]. However, there is a paucity of literature about the distribution of lifestyle cardiovascular risk factors among health care personnel in Nigeria, particularly nurses who represent the largest health care profession, with about 56% nurses working in the clinical practice setting [15]. The present study was therefore aimed at determining risk factors of CVD among nurses in a tertiary hospital in Ibadan, Nigeria.

Methods

Design

This was a cross-sectional survey which involved consenting nurses purposively recruited from conveniently selected University College Hospital Ibadan, Oyo State, Nigeria. Pregnant nurses were excluded. Before commencement of data collection, the study was approved by the University of Ibadan/University College Hospital Ethics Review Committee. An informed consent form stating the purpose of the study as well as assuring participants of confidentiality and anonymity was attached to the questionnaire administered and informed consent was obtained prior to data collection. This study was conducted at the nurses' room of each ward at the University College Hospital, Ibadan. The socio-demographic characteristics of the participants were recorded. The research instruments were then used to collect data from the participants. The sample size for this study was calculated using the formula:

n= N/1+N (e)2

Where 'n' is the sample size recruited

'N' is the population size of the nurses in UCH (1500 nurses)

'e' is the level of precision=+5% which is usually expressed as a fraction (0.05)

n = 1500/1+1500(0.5)2= 315.7 ≈ 316

Instruments and Procedure

Short-form of International Physical Activity Questionnaire (IPAQ): This was used to assess physical activity level, including voluntary exercising effort throughout each day of the week among the participants. IPAQ is a generic scale that is made up of 7 items and 4 domains which include domestic and yard gardening activity, transport-related activity, leisure time activity and work-related activity. It records the activity of four intensity levels: vigorous-intensity activity, moderate-intensity activity, walking and sitting. The validity of this instrument has been proven over time by a lot of researchers with the most popular being the 12-country reliability and validity test [16]. Also, it has been recommended as a cost-effective method to assess physical activity [17]. The items in the short form of the IPAQ questionnaire are structured to provide scores on walking, moderate-intensity activity and vigorous-intensity activity. To compute the total score for the short form of the questionnaire, a summation of the duration (in minutes) and frequency (in days) of walking, moderate-intensity and vigorous activities was required. The scores were expressed in Metabolic Equivalent (MET)-minutes/week as defined below:

- Walking MET-minutes/week= 3.3 ×walking minutes×walking days
- Moderate MET-minutes/week=4.0×moderate intensity activity minutes×moderate days
- Vigorous MET-minutes/week=8.0×vigorous intensity activity minutes×vigorous intensity days
- Total physical activity MET minutes per week = Sum of walking + Moderate+ Vigorous MET minutes/week scores.

The participants' physical activity level was classified into low, moderate and high physical activity level.

The AUDIT-C alcohol screening questionnaire: This is a 3-item brief alcohol screen that reliably identifies individuals who are hazardous drinkers or have active alcohol use disorders (including alcohol abuse or dependence). The AUDIT-C is a modified version of the 10-question AUDIT instrument. The AUDIT-C is scored on a scale of 0-12. Each AUDIT-C question has 5 answer choices. Points allotted are: a = 0 points, b = 1 point, c = 2 points, d = 3 points, e = 4 points. In men, a score of 4 or more is considered positive, optimal for identifying hazardous drinking or active alcohol use disorders. In women, a score of 3 or more is considered positive (same as above). However, when the points are all from Question #1 alone (#2 & #3 are zero), it can be assumed that the individual is drinking below recommended limits and it is suggested that the care provider review the individual's alcohol intake over the past few months to confirm accuracy. Generally, the higher the score, the more likely it is that the individual's drinking is affecting his or her safety. The alcohol consumption status of the participants was classified into no drinking, moderate drinking and hazardous drinking.

Bathroom weighing scale: This was calibrated in kilogrammes (from 0-220kg), and was used to measure participants' body weight. The weight was measured by instructing the participant to stand erect while looking straight ahead with hands held by the side. Each participant put on light clothing, standing bare-footed on the weighing scale. The weight was read off to the nearest kilogramme and recorded.

Height meter (SECA): This was calibrated in centimetres (cm) from 20-200 cm and was used to measure height of participants in centimetres but converted to metres and recorded to the nearest 0.1 metre. Height was measured by instructing each participant to stand erect, bare-footed, looking forward with foot together and back on a graduated height meter.

The body mass index was then calculated using the formula:

BMI= Body weight (kg)/Height (m2)

The body mass index of the participants was classified into underweight, normal, overweight and obese.

Automated sphygmomanometer: This was calibrated in millimetres of mercury (mmHg) and was used to measure participants' blood pressure. The automated sphygmomanometer with the appropriate cuff size was used. The machine was switched on and the blood pressure taken automatically. The International Forum for Hypertension Control in Africa recommends that, if the first blood pressure reading is larger than normal or if the blood pressure between the two readings differs by more than 5mm/Hg, 2 further consecutive readings would be taken on the following day and a week later [18]. Blood pressure was classified as recommended for subjects 15 years and older in sub-Saharan Africa as follows:

- Normal: <120/80 mm/Hg.
- Pre hypertension: 120 -139/80- 89 mm/Hg.
- Stage 1 hypertension: 140 -159/90- 99 mm/Hg.
- Stage 2 hypertension: ≥ 160-179/≥100.

Tape measure: This was calibrated in centimetres (from 0-150 cm) and was used to measure the waist circumference and hip circumference of the participants. The participant's waist circumference was measured just above the umbilicus while hip circumference was measured at the level of the greater trochanter. The ratio was calculated using the formula:

Waist- Hip Ratio (WHR) = Waist measurement (cm)/Hip measurement (cm)

The waist hip ratio of the participants was classified into normal and abnormal.

Data analysis

Data were analysed using Statistical Software for Social Sciences (version 21). Descriptive statistics of mean and standard deviation were used to summarise the data on systolic blood pressure, diastolic blood pressure, obesity, abdominal obesity. Prevalence of high blood pressure, obesity, abdominal obesity, alcohol consumption and physical inactivity was depicted using percentages. Chi-square test was used to evaluate the association

between the socio-demographic factors of age, sex and professional rank and each of the selected modifiable cardiovascular risk factors. Level of significance was set at 0.05.

Results

Profile of participants

A total of 316 nurses (5.7% males) with mean age of 41.49 ± 9.42 years participated in this study. Majority of the participants were married (86.4%) and below the age of 50 years (73.1%) (Table 1). All ranks in the nursing profession were represented with nursing officers being the most preponderant rank (30.7%) (Table 2). Nursing officers who are in the lowest rank had the highest proportion of participants while those in the directorate cadre, being the highest rank had the least proportion of participants. This distribution is expected as lower cadre nurses are needed to carry out nursing activities than supervisory role which is taken care of by high-ranking officers.

Table 1. Socio-demographic characteristics of the participants.

	Variable	Frequency	%
Age (years)	20-29	41	13
	30-39	93	29.4
	40-49	97	30.7
	50-59	84	26.6
	60 years and above	1	0.3
	Total	316	100
Sex	Male	18	5.7
	Female	298	94.3
	Total	316	100
Marital Status	Single	33	10.4
	Married	273	86.4
	Divorced	10	3.2
	Total	316	100
Religion	Christianity	282	89.2
	Islam	34	10.8
	Total	316	100

Table 2. Professional ranking of participants.

	Variable	Frequency	%
Rank	NO	97	30.7
	SNO	57	18
	PNO	57	18
	CNO	60	19
	ADN	45	14.2
	Total	316	100

NO: Nursing officer; SNO: Senior Nursing Officer; PNO: Principal NursingOfficer; CNO: Chief Nursing Officer; ADN: Assistant Director of Nursing

Modifiable CVD risk factors

Almost half (49.1%) of the participants had low level of physical activity with only 11% having high physical activity level (Figure 1). Ninety-nine per cent (99.1%) of the participants did not consume alcohol while the remaining (0.9%) were moderate drinkers. The mean systolic and diastolic blood pressures of the participants were 115.67 ± 12.61 mmHg and 73.44 ± 9.15 mmHg respectively. Sixty-one per cent of the participants had normal blood pressure, 33% had pre-hypertension while 6% were hypertensive. The mean BMI of the participants (29.32 ± 5.46 kg/m2) was within the range for overweight (Figure 2). The mean waist-hip ratio of participants was 0.8414 ± 0.51. 56 % of the participants had normal waist-hip ratio.

Clustering of risk factors

Eighty-four per cent (83.5%) of the participants had at least one CVD risk factor. The participants also had multiplicity of risk factors ranging from two to four risk factors. 53.48% had two, 5.38% had three while 2% had four risk factors.

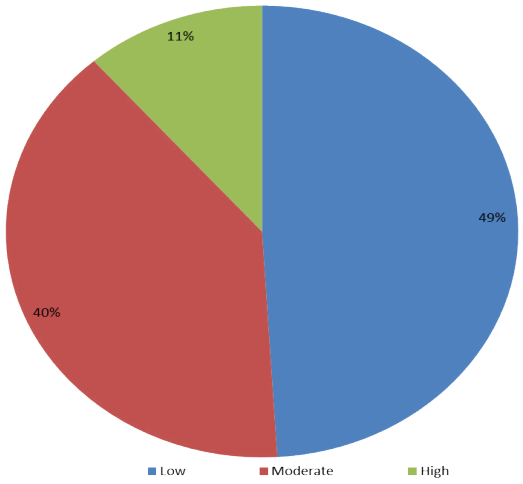

Figure 1. Physical activity level of participants.

Table 3. Association between age and each of blood pressure and Body Mass Index.

Blood pressure		Norm%	PH%	HBP%		Total%	X^2	df	p value
Age	20-29	11.39	1.58	0		12.97	38.412	8	<0.001
	20-39	21.45	7.89	0		29.34			
	40-49	16.46	11.71	2.53		30.7			
	50-59	12.03	11.08	3.48		26.59			
	60 & above	0.32	0	0.32		0.64			
	Total	61.39	32.59	6.012		100			
BMI		UW%	NW%	OW%	OB%	Total %			
Age	20-29	0.14	6.96	3.48	2.22	12.98	75.477	12	<0.001
	20-39	1.27	8.86	11.39	7.91	29.43			
	40-49	0	3.48	13.29	13.92	30.69			
	50-59	0	2.22	6.01	18.35	26.58			
	60 & above	0	0	0	0.32	0.32			
	Total	1.58	21.52	34.12	42.59	100			

Norm=Normal; PH=Pre-hypertension; HBP=hypertension; UW=underweight; NW=normal weight; OW=overweight; OB=obese

Association between socio-demographic variables of age, sex and rank and each of the modifiable CVD risk factors

Chi-square analysis revealed a significant association between participants' age and each of their blood pressure (p<0.001) and body mass index (p<0.001) (Table 3). However, there was no significant association between age and each of physical activity level (p=0.775), alcohol consumption (p= 0.145) waist-hip ratio (p= 0.72) of the participants.

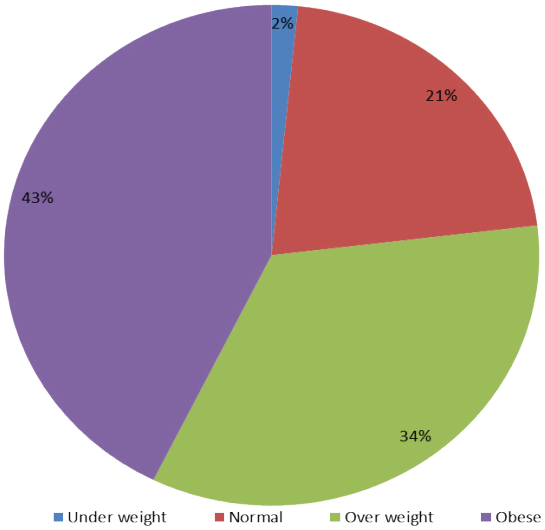

Figure 2. BMI of participants.

Table 4. Association between sex and physical activity level and alcohol consumption.

Variables		Sex			X^2	df	p value
		Male%	Female%	Total%			
Physical activity	Low	1.58	47.47	49.05	6.374	2	0.041
	Moderate	2.53	37.02	39.55			
	High	1.58	9.81	11.39			
	Total	5.7	94.3	100			
Alcohol consumption	Not drinking	4.75	94.3	99.05	50.143	1	<0.001
	Moderate	0.95	0	0.95			
	Total	5.7	94.3	100			

Table 5. Association between professional rank and each of blood pressure and body mass index.

Blood pressure		Norm%	PH%	HBP%	Total%	X^2	df	p value
Rank	NO	21.84	8.54	0.32	30.7	16.312	8	0.038
	SNO	21.45	7.89	0	29.34			
	PNO	16.46	11.71	2.53	30.7			
	CNO	12.03	11.08	3.48	26.59			
	ADN	0.32	0	0.32	0.64			
	Total	61.39	32.59	6.012	100			
BMI		UW%	NW%	OW%	OB%	Total %		
Rank	NO	1.27	12.66	11.08	5.7	30.71	71.087	12	<0.001
	SNO	0.32	3.8	7.28	6.65	18.05			
	PNO	0	2.22	7.59	8.23	18.04			
	CNO	0	2.85	4.75	11.39	18.99			
	ADN	0	0	3.48	10.76	14.24			
	Total	1.58	21.52	34.12	42.59	100			

Norm=Normal; PH=Pre-hypertension; HBP=hypertension; UW=underweight; NW=normal weight; OW=overweight; OB=obese.

Chi-square analysis showed a significant association between participants' sex and each of physical activity level (p=0.041) and alcohol consumption (p<0.001) (Table 4). There was however, no significant association between sex and each of blood pressure (p=0.618), body mass index (p= 0.920) and waist-hip ratio (p= 0.597) of the participants.

Chi-square analysis showed a significant association between professional rank and each of blood pressure (p= 0.038) and body mass index (p= 0.000) of the participants (Table 5). There was no significant association between rank and each of physical activity level (p= 0.649), alcohol consumption (p=0.178) and waist hip ratio (p=0.525) of the participants.

Discussion

The present study was designed to determine the risk factors of CVD among nurses in a tertiary hospital in Nigeria. Majority of the participants in the present study were females, this is consistent with previous reports [19,20]. This may not be unexpected as gender bias and role stereotyping has been reported to exist in nursing educational programs due to preponderance of women in nursing faculties [19]. Lack of male models and mentors has also been reported as the reason for female domination of nursing profession [21]. Just one participant in this study was in the 60-and-above age category. This is not surprising as 60 years is the compulsory retirement age in Nigerian civil service. The mean age of the participants in this study is similar to that in a previous USA study but lower than what was reported in a Rwandan study and a previous Nigerian study [22-24]. Majority of the participants were nurses in the high echelon of their profession. This is in line with a previous report that nursing profession is made up of mainly ageing and high-cadre population [25].

Majority of the participants in this study had low to moderate physical activity level and very low prevalence of alcohol consumption. Low physical activity level has been previously reported among health workers [26]. The low level of physical activity recorded in this study may not be unconnected to the fact that nursing job is sedentary in nature and majority of the participants were high-cadre staff whose job descriptions are mainly supervisory, thus predisposing them to sedentariness at work. The low level of alcohol consumption recorded in this study is consistent with the low proportion of male participants in this study. In Nigeria, alcohol consumption is socially stereotyped to men. The fact that the few participants who reported moderate alcohol drinking in this study were males lays more credence to this assertion. Low alcohol consumption had been previously reported among Nigerian health workers [27]. The low alcohol consumption in this study may also be ascribed to the knowledge of nurses about negative health implications of high alcohol consumption. However, foreign reports suggest that the prevalence rates in alcohol consumption among nurses are similar to those found in the general population [28].The prevalence of hypertension, obesity and abnormal waist-hip ratio among the participants of this study was 6.0%, 43.0% and 44.0% respectively with majority having at least one (83.5%) or two (53.5%) risk factors of CVD. The prevalence of hypertension and the mean systolic and diastolic blood pressure in this study are much lower than what was reported in a systematic review of blood pressure among Nigerian general population [29]. This may suggest that nurses have better blood pressure than the general population. This result is understandable, considering the fact that nurses are usually at the forefront of assessing patients' vital signs. It is naturally expected therefore, that they would monitor and seek to control their blood pressure better than the general populace. The fact that the present sample did not include older adults (older than 60 years) might have also contributed to the less prevalence of hypertension recorded in this study, when compared to the general population. Low prevalence of hypertension (6.1%) had equally been reported among Taiwanese nurses [30]. However, pre-hypertension is prevalent among participants in this study and may lead to hypertension in the near future, especially because high BMI and abdominal obesity are also preponderant. The prevalence of overweight and abnormal waist-hip ratio recorded in this study is much higher than what is obtainable among the Nigerian general populace [31,32]. This is very concerning, as it clearly spells poor energy balance among nurses, characterised by high energy consumption with low physical activity. Unfortunately, we did not explore diet which could also be a big contributor to CVD risk. However, it is an obvious fact that obesity could be due to the poor level of physical activity reported among the participants as highlighted earlier. High prevalence of obesity had also been previously reported among female healthcare workers [33]. The proportion of participants in this study that had at least one risk factor is much higher than 30.1% as previously reported by a study among nurses [30]. This suggests that CVD epidemic predicted in developing countries is looming even among health workers, particularly nurses, as seen in this study. This calls for lifestyle changes among this working population in order to reduce the incidence of CVD among them.

Present results revealed that increasing age was significantly linked with increasing blood pressure. This result may not be unexpected as increasing age had been previously established to be associated with high blood pressure [34]. The fact that increasing age logically associates with higher professional rank might also explain the significant association between rank and blood pressure in the present study. Increasing age, likewise professional rank was significantly associated with body mass index. As previously pointed out, higher ranking (and logically older age) nurses might be more prone to sedentary lifestyles than more junior ones, and would logically have worse body fat indices due to poorer energy expenditure. This is buttressed by the significant association between professional rank and body mass index in this study. However, present result recorded no significant association between physical activity and age. This is contrary to some previous reports among nurses [23,35]. The participants' confusion between exercise and physical activity might have affected their report on their physical activity attainment. The lack of significant association between age and each of alcohol consumption and waist-hip ratio in this study is in line with a previous report [36].

There was a significant association between sex and each of physical activity and alcohol consumption levels, with males having higher scores than females. Male medical personnel had been previously reported to be more active than their female counterparts [37]. As previously explained, alcohol consumption is socio-culturally stereotyped to males in Nigeria. This might explain why males were found to significantly consume more alcohol than their female counterparts in this study. There was no significant association between sex and each of blood pressure, body mass index and waist-hip-ratio. The high disparity in male to female ratio in this study might have concealed any significant association between sex and these variables. It is possible that significant association might have been noticed if more male participants had been recruited.

The present study has some limitations; hence the results should be interpreted with caution. Although the study was conducted in the largest teaching hospital with nurses from various ethnic groups all over Nigeria, participants were predominantly southwestern Nigerians. It is a single-center study and might not have represented all Nigerian nurses. Furthermore, the high preponderance of female participants might have biased results of some statistical manipulations involving sex. However, there was little the researchers could do about this considering the fact that nursing is a female-dominated profession. Participants' physical activity level was assessed using a recall instrument which is highly dependent on participants' ability to recall information. This could have biased participants' responses on their physical activity attainments. However, an internationally-acclaimed, valid and reliable physical activity scale (IPAQ) was used in order to enhance the validity of the study.

Conclusion

This study has shown that majority of the participants had at least one CVD risk factor, with half of them having at least two risk factors. It is apparent therefore, that awareness of CVD risk factors does not necessarily translate into appropriate lifestyle modifications to avert the risks. A didactic approach is thus needed to ameliorate CVD risks among nurses. This may be in the form of seminars on lifestyle modifications, encouragement of active lifestyle and provision of opportunities for physical activity at work. Future studies should

explore the barriers and challenges of translating knowledge into practice among nurses.

Limitations

We note the limitation that the proportion of nurses in various ranks were not determined in relation to the overall sample size.

Acknowledgement

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Conflicts of Interest

We declare that we have no conflict of interest to disclose.

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