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Knowledge of modifiable risk factors for cardiovascular diseases among university undergraduates in Ibadan, Nigeria

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ABSTRACT

Introduction. Undergraduates in many institutions live a lifestyle that could predispose them to non-communicable diseases (NCDs) including cardiovascular-related. Previous studies on modifiable risk factors (MRFs) against NCDs had focused mainly on adults, whereas young people should be prime targets for prevention programmes.

Aim. This study was aimed at investigating knowledge of MRFs against cardiovascular diseases (CVDs) among university undergraduates in Ibadan, Nigeria.

Material and methods. A descriptive cross-sectional design was adopted, where 500 undergraduates participated. Data were collected using Focus Group Discussion (FGD) guide and validated questionnaire. Data analyses were conducted using thematic approach and bivariate methods at 5% levels of significance, respectively.

Results. Mean age was 22.8 ± 3.0 years and 51.4% were females. The majority reported that their fathers (82.8%) and mothers (83.0%) had no hypertension history. The FGD revealed that students were knowledgeable of MRFs and preventive behaviours but still engaged in unhealthy lifestyle practices. The MRFs identified included excessive alcohol consumption (85.4%), unhealthy diet (77.6%), physical inactivity (75.2%) and smoking (70.2%). Respondents (56.4%) had good knowledge of MRFs against CVDs; 57.0% had fair lifestyle practices and 54.8% had good knowledge of preventive behaviour against CVDs.

Conclusion. Gender was significantly associated with knowledge of CVDs preventive behaviours. Institutional-based lifestyle modification programmes, using peer group education is suggested.

Keywords. cardiovascular diseases, knowledge, modifiable risk factors

Introduction

There has been a concern for the recent increase in incidence and prevalence of cardiovascular diseases (CVDs) among younger population in Nigeria as established in some of the recent surveys. Cardiovascular diseases have been considered mostly in the adult population

in the previous studies of non-communicable diseases.¹ These diseases are associated with unhealthy lifestyle driven by modifiable risk factors. These factors include smoking, lack of physical activity, low fruit and vegetable intake, high fat, caffeine overuse, improper sleeping habits, salt intake, and excess alcohol intake.²⁻⁴

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In Nigeria, as in many other developing countries, CVDs have a higher mortality rate than in the developed countries.⁵ The deaths resulting from CVDs are attributable to four common behavioural risk factors: low physical activity, tobacco use, the harmful use of alcohol and poor diet.⁶ The continuing enormous burden of CVD in developed countries, the increasing trends in cardiovascular risk profiles of adolescents and adults, and the emerging increases in CVD in developing countries underscore the crucial need to redouble prevention and treatment efforts.⁷ This is particularly important in Nigeria and by extension, Africa; where the healthcare expenditure per capita is 23 dollars (4.6% of total Gross Domestic Product).⁷

Although, CVDs are considered the diseases of the middle age or the elderly, evidence from previous studies have shown that the risk factors begin early in life.^{8,9} Behaviours of students are considered a temporary part of college life; however, unhealthy habits picked up at this stage of their lives grow up with them to adult life.¹⁰ University or college life is a crucial stage for individuals as at this time, and their behaviours are conducive to change. University and college arenas, therefore, represent an important opportunity for health education. Previous studies on knowledge of cardiovascular diseases risk factors have focused on older adults and patients at high risk of cardiovascular diseases.

Changes in lifestyle to modify cardiovascular disease (CVD) risk factors if taken early in life, helps to utilise the full prevention value of the change. Risk of CVD can be decreased by adherence to dietary and lifestyle modifications, which results in lower risk factor levels. Findings from this study can be used to design appropriate lifestyle modification programmes, which will help the young adult to adopt healthy behaviours while they are still young. In addition, findings may also be useful for policy dialogue on prevention of cardiovascular diseases, especially among the young adult generation, who will be the future leaders.

Aim

The aim of this study was to probe into the knowledge of modifiable risk factors of cardiovascular diseases among university undergraduates in Ibadan, Nigeria.

Material and method

The study was a descriptive cross-sectional survey conducted in a tertiary institution in an urban area. The protocol for the study was reviewed and approved by the University of Ibadan/University College Hospital Ethics Review Committee, Ibadan with assigned number: UI/EC/15/0159. This study was conducted at the University of Ibadan, Ibadan, Nigeria. The institution, occupying over 1,032 hectares of land, is located in Ibadan North Local Government Area. The University was ini-

tially established on 17 November 1948 as an external College of the University of London (then it was called the University College, Ibadan). The University became an autonomous University in 1962 and had a little over 2000 students. The site of the University was leased to the colonial authorities by Ibadan Chiefs for 999 years.¹¹ The University is a Federal Government institution, which runs undergraduate and postgraduate courses hence, the students are both undergraduate and postgraduate who are mainly young adults. The university is made of two campuses; the main campus and the College of Medicine campus, which is situated within the University College Hospital (UCH) premises – a teaching hospital for undergraduate and postgraduate medical students. The University has 12 faculties (there were only 12 faculties as at the time of this study. A new faculty was created from the faculty of the social sciences when this manuscript was been prepared), several centres and institutes. There are 13 halls of residence in the University; nine of these in the main campus are for the undergraduate students, while the only the one, Alexander Brown Hall (ABH) was located within the UCH premises mainly, for the medical students.

Sampling, Instrument and Procedure for Data Collection

Multistage sampling technique was adopted to select a sample size of 500 samples through a proportionate method from the selected halls of residence (male and female), students' hostel blocks and rooms were selected using systematic random sampling. The sampling interval for systematic sampling was determined by dividing the sample size by the total population of students in the halls. A sampling interval ($k = N/n$; $500/125 = 4$); therefore, the sampling interval determined was 4. A number was randomly picked by balloting from 1 to 4 to determine the first number to be picked from the list of students. Four was subsequently added to the first number picked and this continued until 500 students were recruited. Respondents were not recruited through the faculties and faculties did not have equal number of respondents. The respondents could not be recruited into the study from this medium because they were not all available for selection. Hence, halls of residence was used as the location for selection of the respondents because it was the best medium to reach out to them in their natural settings in their rooms. Other locations in the university including the faculties, departments and sport centres could not be used because respondents were not stable for the interviews due to lectures and other engagements. Halls of residence was the most suitable environment to make random selection of respondents that would represent the entire population of the university undergraduates. Based on the varying degrees of students' population from different faculties (selection using proportionate method), bivari-

ate statistical analysis to compare the fields of study with the knowledge of modifiable risk factors for cvd was not assessed.

Measures

Mixed methods of data collection, which involved qualitative approach using Focus Group Discussion [FGD] guide, with ten open-ended questions and quantitative method, using questionnaire were used to collect data. The contents of the both instruments were based on the themes from the study objectives. These included open-ended questions on knowledge of modifiable Cardiovascular Diseases (CVD) risk factors, lifestyle practices, preventive behaviours and source of information about modifiable CVD risk factors among undergraduates for the qualitative. The quantitative instrument was a validated, self-administered semi-structured questionnaire. The questionnaire was divided into five sections, namely socio-demographic characteristics of respondents, knowledge of modifiable risk factors for cardiovascular diseases measured on a 26-point knowledge scale. The knowledge of preventive behaviours against cardiovascular diseases was measured with a 24-point knowledge scale, lifestyle practices associated with modifiable cardiovascular disease risk factors measured on a 24-point practice scale and in addition, sources of information available to respondents on modifiable risk factors for cardiovascular disease.

Procedure for data collection

Visits were made to all the undergraduates' halls of residence four research assistants (RAs) to establish rapport with hall wardens, porters and students and to intimate them with the study objectives before data collection. Four Focus Group Discussion (FGD) sessions were conducted among consented participants (each session comprising of eight participants) by four trained research assistants. The FGD sessions were held in a location devoid of interference within the halls of residence. The FGD participants were excluded from questionnaire interviews to avoid bias data. The quantitative aspect involved the administration of the questionnaire, which was done by the researcher and the four RAs. The questionnaire was self-administered, respondents were approached, and a brief introduction about the study was made. Written informed consent was obtained from the respondents who indicated their willingness to participate in the survey after detail information was provided. They were informed that the data would be used for research and publication alone, that participation was voluntary, and that data collected will be kept confidential. The questionnaire was completed within an hour, and the completed ones were checked immediately to ensure that no aspect of the instrument was omitted.

Data analysis

Results from the FGDs were analysed through the use of the thematic approach. Close and open-ended questions were coded, and the data were fed into the computer using the IBM/Statistical Package for Social Sciences (IBM/SPSS Version 20). The data were analysed using descriptive and inferential statistics with the p-value set at 0.05. The results were presented in tables and charts.

Results

Demographic characteristics of the respondents

More than half (51.4%) of the respondents were females, 96.2% were singles, and the mean age was 22.8 ± 3.0 years (Table 1). Most respondents, 24.8% and 24.2% were in 200 and 300 levels, respectively, and most (20.0%) were students from the Faculty of the Social Sciences (Figure 1). The majority pointed out that their fathers and mothers (82.8% and 83.0%, respectively) had no history of hypertension. Also, more than half (53.8%) indicated that none of their family members had history of hypertension (Table 1). It was also recorded that 7.6%, 8.4% and 26.2% of respondents stated that they did not know if their fathers, mothers and any members of their family, respectively had history of hypertension.

Table 1. Socio-demographic characteristics of the respondents (N=500)

Variable	N ^o	%
Age		
<20 years	62	12.4
20–29 years old	423	84.6
≥30 years old	15	3.0
Sex		
Male	243	48.6
Females	257	51.4
Level of study		
100	109	21.8
200	124	24.8
300	121	24.2
400	58	11.6
500	28	5.6
Marital status		
Single	481	96.2
Married	19	3.8
Fathers' history of hypertension		
Yes	48	9.6
No	414	82.8
Don't know	38	7.6
Mothers' history of hypertension		
Yes	43	8.6
No	415	83.0
Don't know	42	8.4
Family members' history of hypertension		
Yes	100	20.0
No	269	53.8
Don't know	131	26.2

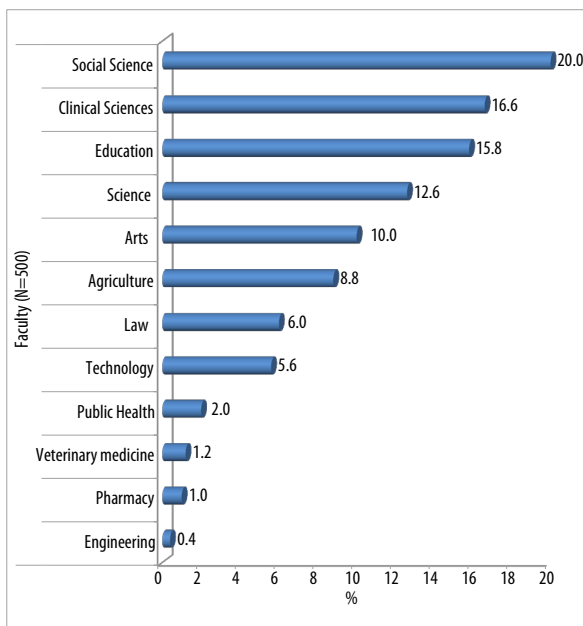


Fig. 1. Respondents' faculty of study

Knowledge of cardiovascular diseases (Heart diseases)

Participants' knowledge of the modifiable risk factors for cardiovascular diseases varies. Some stated it as diseases that affect the heart or causes failure to breathe. Moreover, most mentioned hypertension, heart failure, cardiac arrest and stroke as examples of cardiovascular diseases. Some the participants pointed out that heart diseases could affect parts of the body like the lower part of the heart, coronary vessels, heart muscles and blood vessels. According to one of the female participants,

"Heart diseases are directly called cardiovascular diseases; they are diseases that affect the heart and blood vessels" (Female A participant from Queen Idia Hall).

Other female participants noted:

"Heart diseases are diseases that affect the muscles of the heart and vessels of the heart, any structure of the heart" (Female A participant from Alexander Brown Hall)

"I would buy the idea of sickness or disease of the heart that will make the heart not to perform or function normally as it is supposed to" (Female G participant from Queen Idia Hall).

A male participant added that:

"Heart disease is when somebody has heart failure" (Male B participant from Sultan Bello Hall)

Other qualitative findings show a varying level of knowledge of modifiable risk factors that predispose people to cardiovascular diseases. These factors, as mentioned included smoking, alcohol intake, stress, fatty food intake, hereditary, lack of exercise, obesity, age, gender, race and diabetes. According to a male participant, *"Smoking, eating foods that are not well prepared, not well cooked"* (Male A participant from Sultan Bello Hall).

Participants from two female halls added that, *"They said too much of alcohol is not good; it is not good in the*

sense that it dries up the lungs and if the lungs are dried up, it would surely affect the heart and the kidney" (Female B participant from Queen Elizabeth Hall).

"Too much of stress can cause heart disease, and I think stress could lead to heart diseases" (Female AA participant from Queen Idia Hall).

According to another male participant, *"Well, there are several factors; they could be modifiable or non-modifiable. The non-modifiable factors are the age factor, as you grow older; the vessels of the heart tend to reduce in size, so the volume of blood that passes through them reduces too. Then gender factor, it is common in the male gender, then family history, some families are more predisposed to heart disease, then the race, I think it is more in blacks than in whites"* (Male A participant from Kuti Hall).

Quantitative data based on the 26-point knowledge of modifiable risk factors for cardiovascular diseases rating; showed the knowledge score was 19.3 ± 4.3 , and most respondents, 56.4%, had good knowledge (Tables 2 and 3).

Table 2. Respondents' knowledge of modifiable risk factors for cardiovascular diseases (N=500)

Statement	True N° (%)	False N° (%)
Majority of heart diseases can be prevented	447 (89.4)*	53 (10.6)
The most commonly known risk factor for stroke is hypertension	428 (85.6)*	72 (14.4)
Excessive alcohol intake can increase the risk of heart disease	427 (85.4)*	73 (14.6)
Hypertension increases the risk of getting heart disease	410 (82.0)*	90 (18.0)
Being overweight or obese increases a person's risk of developing heart disease	390 (78.0)*	110 (22.0)
Diets high in animal fat predispose people to heart disease	388 (77.6)*	112 (22.4)
Physical inactivity increases the risk of developing heart disease	376 (75.2)*	124 (24.8)
Individuals with diabetes are more likely to have hypertension	296 (59.2)*	204 (40.8)
Young adults are not predisposed to having heart disease	179 (35.8)	321 (64.2)*
People always know when they have heart disease	178 (35.6)	322 (64.4)*
Stress is not a risk factor for heart disease	174 (34.8)	326 (65.2)*
Smoking is not a risk factor for heart disease	149 (29.8)	351 (70.2)*
There is no relationship between fatty food consumption and heart disease	134 (26.8)	366 (73.2)*

* Correct answer

Table 3. Knowledge score on modifiable risk factors for cardiovascular diseases (N=500)

Knowledge score	N°	%
Poor knowledge	42	8.4
Fair knowledge	176	35.2
Good knowledge	282	56.4
Total	500	100.0

Knowledge of cardiovascular diseases preventive behaviours

There were similarities in the participants' responses to questions on the preventive practices against cardiovascular diseases. The majority pointed out that avoiding foods that contain high fat and cholesterol could reduce a person's vulnerability to cardiovascular diseases. According to some participants, "We should minimise high-fat intakes like eating much of fried foods, hydrogenated fats like margarine, butter and other types of fats from animals, and we should amend how we take all these fatty foods" (Male A participant from Bello Hall).

"All these chickens you buy outside, for example, from 'Tantalizers' (name of a local fast food eatery), they are not good for our health. For proper diet, eat a lot of vegetables. Vegetables should be half of your plate, and then the solid food should be small, 'amala' or any swallow food should be ¼ size of the plate and the meat (not too much). You should divide your plate into 4, ½ part should contain vegetable then small portion should contain the swallow then the meat and fruits. Then the kind of palm oil you use, palm oil that is so light don't use the type that is very thick and settles a lot at the bottom of the container those contains fats too much" (Female G participant from Alexander Brown Hall).

Findings also showed that participants pointed out that regular exercise is one of the ways to prevent cardiovascular diseases. A male participant stated that:

"I will say that we should take at least 30 minutes of exercises, but even though sometimes we don't have that time, I think we should walk, trek to replace daily exercise. For me I trek from my hostel to my department, from my department back to my hostel, then to market and church, I think that's a better way to exercise" (Male H participant from Independence Hall).

A few participants have a different view on the preventive behaviours against cardiovascular diseases; they believe that regular check-ups are a useful means of preventing cardiovascular diseases. A female participant stated that:

"I think check-up is generally good for the body but for student or generally youth it's not easy for us to go to the hospital for a general check-up because we all know what we are to do. We have this regular schedule from class to home to fellowship, now going to the nearest hospital for a check-up is somehow, some people are even afraid of going for a check-up. If there is a body probably an NGO that can be going from one house to another for backup support to the Federal Government of Nigeria, doing the check-up free of charge for youth if not for any other group of people. It will be the best, so people can know the status of their heart and act fast if there's any problem" (Female Q participant from Queen Elizabeth Hall).

Quitting smoking and alcohol was another strategy suggested by the participants, which can be adopted

to lower the risk of developing cardiovascular diseases. One of the discussants remarked that:

"Smoking is the common avenue to heart problem, so to prevent the problem; one must not even near smokers let alone smoke. Smoking affects the CVS, it is going to affect the lungs of smokers definitely, and the major function of CVS is to pump blood, oxygenated blood to the body tissues, when the lungs are affected, the lungs can no longer exchange carbon dioxide for oxygen, then there is less oxygen in the blood circulation, if there is less oxygen in the blood circulation, the major function of CVS is to deliver oxygen to body tissues, it will affect the body tissues" (Male AY participant from Kutu Hall).

Some other participants noted:

"Yes, we should all avoid smoking (chorus answer)" (Female participants from Queen Hall)

Table 4. Respondents' knowledge of cardiovascular diseases preventive behaviours (N=500)

Statement	True N ^o (%)	False N ^o (%)
Checking one's blood pressure regularly to ensure it is within the normal range can reduce the risk of heart disease	466 (93.2)*	34 (6.8)
Eating foods high in animal fat cannot predispose one to heart disease	145 (29.0)	355 (71.0)*
A person who stops smoking will lower their risk of developing heart disease	414 (82.8)*	86 (17.2)
Engaging in regular physical activity will lower a person's risk of heart disease	412 (82.4)*	88 (17.6)
Only exercising at a gym or in an exercise class will lower a person's chance of developing heart disease	162 (32.4)	338 (67.6)*
Eating fruits and vegetables regularly is not good for the heart	118 (23.6)	382 (76.4)*
Eating a lot of red meat decreases heart disease risk	177 (35.4)	323 (64.6)*
Checking one's blood sugar level regularly to ensure it is within the normal range can reduce the risk of developing heart disease	430 (86.0)*	70 (14.0)
Cutting down salt intake can sometimes help to reduce hypertension	417 (83.4)*	83 (16.6)
Taking alcoholic drinks excessively increase the risk of heart disease	405 (81.0)*	95 (19.0)
Relaxing during your leisure time can help reduce stress	411 (82.2)*	89 (17.8)
Reducing weight, if overweight or obese will not help in reducing the risk of heart disease	205 (41.0)	295 (59.0)*

* Correct answer

Table 5. Overall knowledge scores on cardiovascular disease preventive behaviours

Knowledge score	N ^o	%
Poor knowledge	58	11.6
Fair knowledge	168	33.6
Good knowledge	274	54.8
Total	500	100.0

Respondents' knowledge of cardiovascular diseases preventive behaviours were assessed on a 24-point knowledge scale (Table 4). The majority (93.2%) indicated that regular blood pressure check could reduce the risk of developing cardiovascular diseases while 71.0% opposed to the notion that eating foods high in animal fat cannot predispose one to develop cardiovascular diseases. A majority (82.8%) agreed with the idea that a person who quits smoking lowers his or her risk of developing cardiovascular diseases and 82.4% affirmed that engaging in regular physical activity reduces a person's risk of developing cardiovascular diseases. Most respondents indicated that eating fruits and vegetables regularly (76.4%) and reduction in eating lots of red meat (64.6%) are some of the means of reducing the risk of developing cardiovascular diseases. Also, the majority (86.0%) noted that regular checking of one's blood sugar level could reduce the risk of developing (Table 4).

The score for respondents' knowledge of cardiovascular disease preventive behaviours was 18.6 ± 4.5 , more than half, 54.8%, had good knowledge of cardiovascular disease preventive behaviours (Tables 4 and 5).

Lifestyle practices associated with modifiable risk factors for cardiovascular diseases

Findings on lifestyle practices related to modifiable risk factors for cardiovascular diseases showed that the majority of the female participants visited fast food centres than the male counterpart. The primary reason given was that they could not prepare their food themselves, especially whenever examination is approaching and when they just resumed session (when they still have much money on them). According to some participants, "I eat some junks, and the kind of vegetable oil I use is this kind of oil they generally sell at the market with very high cholesterol. Then, exercise is not that adequate only the one we do every day we climb the third floor, go toward etc. that's what I do every day" (Female FY participant from Alexander Brown Hall) "I like fried eggs a lot, so the fat is not too good for me, and I am a bit lazy even though I am a girl I don't like jumping around, and my exercise is not that adequate I don't exercise frequently, but I tried to eat less so I try to balance like that" (Female L participant from Alexander Brown Hall) "I don't exercise, and I eat lots of chocolates and fatty foods....." (Female B participant from Queen Elizabeth Hall)

Some discussants admitted that eating fatty foods or foods high in cholesterol could predispose someone to heart disease. According to some female participants:

"If I take too much of fatty food, it can lead to heart disease" (Female A participant from Queen Elizabeth Hall).

"It is this cholesterol issues o, because I eat lots of egg and I heard that egg contains a lot of cholesterol" (Female BB participant from Queen Idia Hall)

One participant expressed her opinion on the consumption of junks and foods that contained high fat which has become part of her lifestyle due to her body frame. According to her, "Eating of fatty food, I always take too much of it without any fear because you can see me that I'm slim, I don't have any fear for it and fried food" (Female S participant from Queen Idia Hall).

Justifying reasons for consuming food high in fat and cholesterol, some participants were of the view that living on high fat or cholesterol content food could not be avoided even though it is confirmed as a predisposing factor to heart disease. They expressed that, "I don't prevent it at all, but I know I increase the measures because I know of taking a lot of butter, meats, etc. that has fat. But I only prevent it through exercise, which is trekking from Queen Elizabeth Hall to Faculty of Education, from Queen Elizabeth Hall to Bodija market etc. So, I make sure I eat what I like and enjoy my life. People that used to prevent heart disease will they not die? I 'kuku' (better) know that one day, anyhow one will 'kuku' die, something has to kill us, why don't we 'kuku' enjoy our life, this very life we are. I've seen some people not putting Maggi (common Nigerian food seasoning) into their soup, how will such soup taste, please eat enough Maggi, eat enough meat and whatever that pleases you, so after enjoying your life die and go" (Female D participant from Queen Elizabeth Hall).

"I don't consider myself preventing any heart disease, as you can see, I'm slim, and I eat anything I feel like eating. Moreover, I exercise a lot, like trekking is what I do mostly, and I think it's very good exercise. Stress is another factor, but I don't stress myself at all, and if I should stress myself, I make sure I relax a lot and eat so well" (Female BBY participant from Queen Idia Hall).

Respondents' lifestyle practices associated with modifiable risk factors for cardiovascular diseases

Respondents' lifestyle practices related to modifiable risk factors for cardiovascular diseases were assessed on a 26-point scale. Most respondents (73.2%) indicated that they occasionally eat fast foods, and 59.4% sometimes choose to eat low-salt and low-fat meals. More than half, 55.2%, affirmed that they eat beef or fried foods and included vegetables in their meal occasionally. Those who included fruits in their daily meal and hardly exercise were 54.8% and 51.6%, respectively. Only 6.6% of respondents mentioned they smoked always but the frequency of smoking and the number of cigarettes smoked per day was not captured in this study. Most (78.6%) indicated that they never smoked nor exposed themselves to cigarette smoke, and 64.8% never took alcoholic drinks. Some respondents (59.4%)

attested that they always walked for at least 30 minutes daily to get to and from places and 51.4% never ate out. Occasionally, 53.4% of the respondents took soft drinks or sweetened beverages. The respondents who slept up to 8 hours daily and observed leisure time or engaged in recreational activities occasionally were 47.6% and 49.0%, respectively (Table 6). Respondents' score on lifestyle practices associated with modifiable risk factors for cardiovascular diseases was 16.5 ± 2.7 , and the majority, 82.2%, had fair lifestyle practices (Tables 6 and 7).

Table 6. Respondents' lifestyle practices associated with modifiable risk factors for cardiovascular diseases (N=500)

Statement	Always N ^o (%)	Occasio- nally N ^o (%)	Never N ^o (%)
Consumption of fast food	120 (24.0)	366 (73.2)	14 (2.8)*
Choosing low-salt and low-fat meals	163 (32.6)*	297 (59.4)	40 (8.0)
Eating beef or fried foods	216 (43.2)	276 (55.2)	8 (1.6)*
Adding vegetables in daily meal	216 (43.2)*	275 (55.0)	9 (1.8)
Including fruits in the daily meal	208 (41.6)*	274 (54.8)	18 (3.6)
Exercising regularly	217 (43.4)*	258 (51.6)	25 (5.0)
Smoking or exposing oneself to cigarette smoke	33 (6.6)	74 (14.8)	393 (78.6)*
Walking for at least 30 minutes daily to get to and from places	297 (59.4)*	193 (38.6)	10 (2.0)
Eating out	257 (51.4)	200 (40.0)	43 (8.6)*
Consuming alcoholic drinks	43 (8.6)	133 (26.6)	324 (64.8)*
Taking soft drinks or sweetened beverages	226 (45.2)	267 (53.4)	7 (1.4)*
Sleeping for 8hrs daily	227 (45.4)*	238 (47.6)	35 (7.0)
Observing leisure time or engaging in recreational activities	238 (47.6)*	245 (49.0)	17 (3.4)

* Good lifestyle practice

Tab. 7. Lifestyle practices score (N=500)

Lifestyle practice score	N ^o	%
Poor practice	30	6.0
Fair practice	411	82.2
Good practice	59	11.8
Total	500	100.0

Age was not statistically significant to the knowledge of modifiable risk factors for cardiovascular diseases among the respondents ($p=0.237$) (Table 8). Likewise, there no significant relationship between the gender of the respondents and their level of knowledge of modifiable risk factors for cardiovascular diseases ($p=0.135$,

Table 9). A significant relationship was found between respondents' sex and knowledge of prevention of cardiovascular diseases ($p=0.027$, Table 10).

Table 8. Relationship between respondents' age and knowledge of modifiable risk factors for cardiovascular diseases

Variable	Knowledge about modifiable risk factor for cardiovascular diseases			Total (N=500)	Chi-square
	Poor knowledge (n=42)	Fair knowledge (n=176)	Good knowledge (n=282)		
Age (in years)					
<20	2 (3.2)	18 (29.0)	42 (67.7)	62 (12.4)	$f = 5.188$
20-29	39 (9.2)	154 (36.4)	230 (54.4)	423 (84.6)	$p = 0.237$
>29	1 (6.7)	4 (26.7)	10 (66.7)	15 (3.0)	

f – Fisher's exact test

Table 9. Relationship between respondents' sex and knowledge of modifiable risk factors for cardiovascular diseases

Variable	Knowledge of modifiable risk factor for cardiovascular diseases			Total (N=500)	Chi-square
	Poor knowledge (n=42)	Fair knowledge (n=176)	Good knowledge (n=282)		
Gender					
Male	23 (9.5)	94 (38.7)	126 (51.9)	243 (48.6)	$\chi^2 = 4.002$
Female	19 (7.4)	82 (31.9)	156 (60.7)	257 (51.4)	$df = 2$
Total	42 (8.4)	176 (35.2)	282 (56.4)	500 (100.0)	$p = 0.135$

Tab. 10. Relationship between respondents' sex and knowledge of cardiovascular diseases prevention

Variable	Knowledge of cardiovascular diseases prevention			Total (N=500)	Chi-square
	Poor knowledge (n=42)	Fair knowledge (n=176)	Good knowledge (n=282)		
Gender					
Male	29 (11.9)	95 (39.1)	119 (49.0)	243 (48.6)	$\chi^2 = 7.225$
Female	29 (11.3)	73 (28.4)	155 (60.3)	257 (51.4)	$df = 2$
Total	58 (11.6)	168 (33.6)	274 (54.8)	500 (100.0)	$p = 0.027^*$

* Significant at $p < 0.05$

Findings also showed that there was no significant relationship between knowledge of modifiable risk factors for cardiovascular diseases and lifestyle practices ($p=0.275$, Table 11). There was no significant relationship between knowledge of cardiovascular diseases preventive behaviours and lifestyle practices ($p=0.308$, Table 12).

Discussion

The majority of respondents were young adults and they were ideal targets for prevention interventions against CVDs because they are in the process of establishing lifestyle habits, which track forward into adulthood.¹² According to Zachariah and Alex, physical inactivity is a modifiable risk factor for cardiovascular diseases, and respondents in the study appear to be active and engage in some measure of walking.¹³ This finding was similar to that of Oyerinde et al., Mustapha and Sanusi.^{14,15} A majority also reported that their parents and family members had no history of hypertension. This finding was in contrast to that of George and Andhuvan where they found that majority of the respondents were not aware of the association between age and family history with cardiovascular disease (like hypertension) when in fact these risk factors are early predictors for the same.¹⁶

Table 11. Relationship between respondents' lifestyle practices and knowledge of modifiable risk factors for cardiovascular diseases

Variable	Lifestyle practice			Total (N=500)	Chi-square
	Poor practice (n=30)	Fair practice (n=411)	Good practice (n=59)		
Knowledge of modifiable risk factors for cardiovascular diseases (CVD)					
Poor knowledge	3(14.3)	16(76.2)	2(9.5)	21(4.2)	f = 4.839
Fair knowledge	10(4.2)	195(82.6)	31(13.1)	236(47.2)	p = 0.275
Good knowledge	17(7.0)	200(82.3)	26(10.7)	243(48.6)	

f – Fisher's exact test

Table 12. Relationship between respondents' knowledge of cardiovascular diseases preventive behaviours and lifestyle practice

Variable	Lifestyle practice			Total (N=500)	Chi-square
	Poor practice (n=30)	Fair practice (n=411)	Good practice (n=59)		
Knowledge of preventive behaviours for cardiovascular disease					
Poor knowledge	5(8.6)	47(81.0)	6(10.3)	58(11.6)	$\chi^2 = 4.803$
Fair knowledge	7(4.2)	135(80.4)	26(15.5)	168(33.6)	Df = 4
Good knowledge	18(6.6)	229(83.6)	27(9.9)	274(54.8)	p = 0.308

Knowledge of modifiable risk factors for cardiovascular disease

The majority of the respondents was able to define heart disease from a general knowledge point of view and could even mention some examples of cardiovascular diseases. This finding corroborated that of George

and Andhuvan.¹⁶ Some of the participants who were studying non-directly health-related courses showed a reduced level of knowledge of cardiovascular diseases. This finding was similar to that of Ammouri et al. and Bucholz et al., where coronary heart disease-related knowledge was found to be particularly low among the study population.^{17,18}

Smoking, excessive alcohol consumption, stress, fatty food intake, hereditary, lack of exercise, obesity, age, gender, race and diabetes were among risk factors that predispose people to heart diseases as mentioned by the respondents. This finding corroborated the previous studies where risk factors for CVDs included alcohol dependency, which has greater potential to compound comorbid heart disease.¹⁹ In a Nigerian study; habitual alcohol consumption had been documented among 9.0% of patients with cardio-vascular diseases.²⁰

Eating an unhealthy diet, overweight and sedentary lifestyle, smoking, ineffective management of stress, uncontrolled blood pressure or high blood cholesterol levels, physically inactive are common among Nigerians and unfortunately, many do not know the signs of CVDs.⁶ A WHO report revealed that approximately 3.2 million people die each year due to insufficient physical activity and people who do not take enough exercise have a 20 to 30 per cent increased risk of dying prematurely.^{20,21} However, some other studies indicated that between 30.3% and 74.6% of Nigerian children and youth aged 5-25 years, respectively engaged in some form of physical activity daily.^{14,22}

The current study identified smoking as a modifiable risk factor for cardiovascular diseases. It, therefore, corroborated a previous study that showed that about 80% of university students started smoking before the age of 18 years.²³ Smokers' chances of developing coronary heart disease are 2-4 times higher than that of non-smokers and people who smoke a pack of cigarettes a day have more than twice the risk of heart attack than people who have never smoked.²⁴

Knowledge of cardiovascular disease preventive behaviours

Qualitative findings show that avoiding foods that contain high fat and cholesterol could reduce the chances of developing any form of heart disease. This finding was similar to previous studies, which found that knowledge of making healthy food choices can reduce the risk of getting CVD. According to the WHO, foods people eat directly have an impact on other controllable risk factors like cholesterol, high blood pressure, diabetes, and being overweight. Low fruits and vegetable intake is estimated to cause 31% of coronary heart disease and 11% of stroke worldwide. Arts and colleagues reported that dietary lifestyle formed early in life will develop into adulthood and are strongly associated with risk of cardiovascular diseases.

es.^{12,25} The change from adolescence to young adulthood is usually seen as a high-risk period because of low intake of quality diets and gain in body weight.²⁶ According to Arts and colleagues, this period of transition is crucial when students are entering higher institutions; living away from home for the first time with increased freedom or independence and responsibility for food choices. If adolescents or young people go through this transition period with unhealthy diets or poor quality diets, the chances of making positive changes in their diets without any intervention are slim.¹²

The majority of the respondents indicated that regular exercise is a preventive behaviour against cardiovascular diseases. This was not fully in line with another study where it was reported that only 15% of the subjects recognised lack of exercise as a modifiable factor against heart disease.¹⁸ The majority also mentioned hypertension as the most common known risk factor for stroke. The finding was similar to the study conducted by Oladapo et al., where they found that hypertension was mentioned as one of the most common known risk factors for stroke.¹⁸ The findings also established that being overweight or obese increases a person's risk of developing heart disease. This corroborated other findings that show that obesity has been confirmed as one of the risk factors causing heart disease.²⁷ Obesity has been shown to increase morbidity and mortality and therefore, reducing life expectancy.²⁸ A majority of heart diseases could be prevented through diet and lifestyle modification.¹² Individuals can eat healthier food, rich in vegetables, fruits, and lean meats, along with a steady exercise routine.²⁹ Most respondents indicated that regular medical screening of one's blood pressure could reduce the risk of heart disease. This finding was in line with the statement from the Centers for Disease Control and Prevention, which stressed the importance of getting one's blood pressure checked regularly.³¹ According to this report; the cost of "high blood pressure and its adverse health outcomes constitute economic burden to many nations".³¹

Lifestyle practices associated with modifiable risk factors for cardiovascular disease

Findings from both qualitative and quantitative data were consistencies in terms of lifestyle of the study population. Qualitative data show that participants admitted eating fatty foods or empty calorie foods. Results from the quantitative data also showed that most respondents ate fast foods, though occasionally. These buttressed the findings of Arts and colleagues, where young adults reported consumption of solid fats, added sugars and sodium; in addition to inadequate intakes of fruits and vegetables.^{12,31,32}

Since the respondents are young population, they are in a high-risk phase of their future life development and unhealthy habits, especially unhealthy dietary pattern and

lifestyles that are formed during this period of life may be difficult to change when they enter adulthood stage.

Thus, young adults must change their behaviour to reverse the possible trend of increasing risk factor levels susceptible to cardiovascular diseases. Knowledge is a necessary condition for behaviour change because without knowledge, there is no motivation to change. Knowledge of the modifiable risk factors against cardiovascular diseases is a pre-requisite to achieving successful prevention and treatment goals. The findings from this study provide an insight into the fact that as much as knowledge is very essential in health promotion interventions programmes, it may not on its own bring the expected change. Effective intervention needs to consider behavioural change communication strategies and provision of the enabling environment that will encourage university undergraduates have a change of reasoning and adopt behaviour change that will foster healthy practices. These will include no smoking, healthy eating pattern and physical exercise. Environmental stimulus towards positive behaviour change may include using the students' meeting points and social media platforms of the university as points of engaging them within their institutional setting. These may include the use of recreation rooms/students' lounge and the university web-page to create more awareness on dangers associated with practices that may predispose to cardiovascular diseases. Peer group can be created to provide counselling to the undergraduates and health talk from the health workers from the university health center can be organised for evidence-based information from health practitioners that will focus on modifiable factors for cardiovascular diseases. The university General Study Program curriculum should contain information on healthy living and the course can be made compulsory to all the undergraduates. The course should focus more on add-on teachings, where undergraduates will be exposed to practical lessons on physical exercise, healthy diets, determination to quit smoking and consumption of alcohol among others, which will promote practice in addition to the basic knowledge on prevention of cardiovascular diseases.

Conclusion

The result of this study revealed that there was good knowledge of modifiable risk factors against cardiovascular diseases and knowledge of preventive behaviours among the undergraduates. However, some of these undergraduates still engaged in unhealthy dietary practices and lifestyles. Therefore, the findings from this study have supported the evidence that gaps exist among the respondents regarding translating knowledge to practice. This was revealed through poor dietary practices, smoking and consumption of alcohol and intake of fatty

foods, which negate healthy lifestyle practices; despite having the requisite knowledge.

Control measures against non-communicable diseases are possible with proper prevention and treatment strategies focusing on the modifiable environmental causes, and personal habits. This information can be applied to individuals and groups to improve health and to stall the anticipated epidemic of non-communicable diseases among the study population. Health promotion and education interventions, which target the modifiable risk factors for cardiovascular diseases, especially dietary intake and lifestyle modifications will go a long way in reducing the incidence and prevalence of cardiovascular diseases among this population.

References

- Oguoma VM, Nwose EU, Ulasi II, et al. Cardiovascular disease risk factors in a Nigerian population with impaired fasting blood glucose level and diabetes mellitus. *BMC Public Health*. 2017;17:36.
- Feigin VL, Roth GA, Naghavi M, et al. Global burden of stroke and risk factors in 188 countries, during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet Neurol*. 2016; 15(9):913-924.
- Eyre H, Kahn R, Robertson RM. Preventing cancer, cardiovascular disease, and diabetes: a common agenda for the American Cancer Society, the American Diabetes Association, and the American Heart Association. *Diabetes Care*. 2004;27:1812-1824.
- Obasuyi OH, Agwubike EO. The promotion of cardiovascular wellness through Physical activities among bank workers in Benin City, Edo State, Nigeria; *European Journal of Educational Studies*. 2012;4(1):1-10.
- Adegoke O, Awolola NA, Ajuluchukwu JN. Prevalence and pattern of cardiovascular-related causes of out-of-hospital deaths in Lagos, Nigeria. *Afr Health Sci*. 2018;18(4):942-949.
- World Health Organization (WHO). Global Health Risks: Mortality and burden of disease attributable to selected major risks. 2009:1-62.
- Ogunmola OJ, Olaifa AO, Oladapo OO, Babatunde OA. Prevalence of cardiovascular risk factors among adults without obvious cardiovascular disease in a rural community in Ekiti State, Southwest Nigeria. *BMC Cardiovasc Disord*. 2013;13:89.
- Berenson GS. Cardiovascular Risk Begins in Childhood: A time for Action. *American Journal of Preventive Medicine*. 2009;37(1):1-2.
- Pencina MJ, D'Agostino RB Sr, Larson MG, Massaro JM, Vasan RS. Predicting the 30-year risk of cardiovascular disease: the Framingham heart study. *Circulation*. 2009;119(24):3078-3084.
- El Achhab, Y, El Ammari A, El Kazdough H. et al. Health risk behaviours amongst school adolescents: protocol for a mixed methods study. *BMC Public Health*. 2016;6:1209.
- Gazettes, University of Ibadan, Ibadan, Nigeria. 2009. No. 135 Jan-June. Vol. 35, No.1
- Arts J, Fernandez ML, and Lofgren I. Coronary Heart Disease Risk Factors in College Students. *American Society for Nutrition. Adv. Nutr*. 2014;5:177-187.
- Zachariah G, Alex AG. Exercise for prevention of cardiovascular disease: Evidence-based recommendations. *J Clin Prev Cardiol*. 2017;6:109-114.
- Oyerinde OO, Oyerinde OO, Oshiname FO, Ola OO. Knowledge of secondary school students in Ikenne LGA, Ogun State, Nigeria on physical activity as a means of health promotion. *Arabian Journal of Business and Management Review*. 2013;2(6):119-133.
- Mustapha RA, Sanusi RA. Overweight and obesity among in-school adolescents in Ondo State, South Western Nigeria. *African Journal of Biomedical Research*. 2013; 16 (3):2015-2210.
- George C, Andhuvan G. A population - based study on Awareness of Cardiovascular Disease Risk Factors; *Indian Journal of Pharmacy Practice*. 2014; 7(2):23-26.
- Ammouri AA, Tailakh A, Isac C, Kamanyire JK, Muliira J, Balachandran S. Knowledge of Coronary Heart Disease Risk Factors among a Community Sample in Oman: Pilot study. *Sultan Qaboos Univ Med J*. 2016; 16(2):e189-e196.
- Buchholz EM, Gooding HC, de Ferranti SD. Awareness of Cardiovascular Risk Factors in U.S. Young Adults Aged 18-39 Years. *Am J Prev Med*. 2018; 54(4):e67-e77.
- Ruan Y, Guo Y, Zheng Y, et al. Cardiovascular disease (CVD) and associated risk factors among older adults in six low-and middle-income countries: results from SAGE Wave 1. *BMC Public Health*. 2018;18:778.
- Iloh GU, Iro OK, Collins PI. Cardiovascular risk factors among geriatric Nigerians in a primary care clinic of a tertiary hospital in Southeastern Nigeria. *Arch Med Surg*. 2018; 3:11-18.
- World Health Organization (WHO). Fact sheet: the top 10 causes of death. 2011a. <http://www.who.int/mediacentre/factsheets/fs310/en/index2.html>. Updated 2018. Accessed November 5, 2019.
- Ojofeitimi EO, Olugbenga-Bello AI, Adekanle DA, Ademomi AA. Pattern and determinants of obesity among adolescent females in private and public schools in the Olorunda Local Government Area of Osun State, Nigeria: a comparative study. *Journal of Public Health in Africa*. 2011;e11:45-49.
- Donatelle RJ. Health: the Basics. Pearson 9th Edition. Green Edition. Published by Benjamin Cummings, San Francisco, CA: 2010:200-248. ISBN-13: 978-0321626400; ISBN-10: 0321626400. <https://www.amazon.com/Health-Basics-Rebecca-J-Donatelle/dp/0321626400>. Accessed February 21, 2019.
- Donald L, Adams RJ, Brown TM, et al. A Report from the American Heart Association. Women, Heart Disease and Stroke. American Heart Association Statistics Commit-

- tee and Stroke Statistics Subcommittee; 2009. *Circulation*. 2010;121:e46-e215.
25. Global Strategy on Diet, Physical Activity and Health. Promoting fruit and vegetable consumption around the world. Joint WHO/FAO Workshop on Fruit and Vegetables for Health. Kobe, Japan, 1-3 September 2004
26. <https://www.who.int/dietphysicalactivity/fruit/en/>. Accessed July 12, 2020.
27. Winpenny EM, Greenslade S, Corder K, van Sluijs EMF. Diet Quality through Adolescence and Early Adulthood: Cross-Sectional Associations of the Dietary Approaches to Stop Hypertension Diet Index and Component Food Groups with Age. *Nutrients*. 2018;10(11):1585.
28. Cercato C, Fonseca FA. Cardiovascular risk and obesity. *Diabetol Metab Syndr*. 2019;11:74.
29. Lung T, Jan S, Tan EJ, Killedar A, Hayes A. Impact of overweight, obesity and severe obesity on life expectancy of Australian adults. *Int J Obes (Lond)*. 2019; 43(4):782-789.
30. Brandhorst S, Longo VD. Dietary Restrictions and Nutrition in the Prevention and Treatment of Cardiovascular Disease. *Circulation Research*. 2019;124(6):952-965.
31. State Heart Disease and Stroke Prevention Program Addresses High Blood Pressure. National Center for Chronic Disease Prevention and Health Promotion, Division for Heart Disease and Stroke Prevention. June 16, 2016. https://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_state_hbp.htm. Accessed July 7, 2020.
32. Vos MB, Kaar JL, Welsh JA, et al. Added Sugars and Cardiovascular Disease Risk in Children: A Scientific Statement from the American Heart Association. *Circulation*. 2017;135(19):e1017-e1034.
33. Kabir R, Ozkaya A, Ozkaya S. Assessment of salt intake behaviour among undergraduate health care students studying in London. *Int J Community Med Public Health*. 2016; 3(10):2734-2739.