Annals of Health Research
Volume 3, Issue No. 1
Jan - June 2017

ORIGINAL ARTICLE

Cardio-metabolic risk factors and metabolic syndrome: A study of the prevalence and level of awareness of related risk factors among school teachers in Ogbomoso, South West Nigeria

Akintunde AA*[1,3], Saka WA[2], Adeniyi DB[2], Salawu AA[4], Opadijo OG[1]

[1]Cardiology Unit, Department of Medicine, Ladoke Akintola University of Technology (LAUTECH) & LAUTECH Teaching Hospital, Ogbomoso, Nigeria

[2]Department of Physiology, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

[3]Goshen Heart Clinic, Osogbo, Nigeria

[4]Chemical Pathology Department, Ladoke Akintola University of Technology (LAUTECH) & LAUTECH Teaching Hospital, Ogbomoso, Nigeria

Abstract

Background: The overall health of school teachers is closely related to the performance of children in school and life generally.

Objectives: This study aimed to describe the prevalence of cardiovascular risk factors and metabolic syndrome among school teachers in Ogbomoso, Nigeria.

Methods: Two hundred secondary school teachers were randomly selected from all the secondary schools in the two local Governments in Ogbomoso, Nigeria. Relevant laboratory investigations and electrocardiography were performed. Metabolic syndrome was defined using the Joint Scientific Statement on Harmonising the Metabolic Syndrome Criteria.

Results: Metabolic syndrome (MS) was identified among 44(22.0%) of study participants. It was more common among females 33(28.2%) compared to males 11(13.3%) [p = 0.002]. The prevalence of some cardiovascular risk factors were as follows: visceral obesity 108(54.0%), low HDL 105(52.5%), hypertension 58 (29.0%), BP > 130/85 mmHg, 76(38.0%), impaired fasting blood glucose 49(24.5%) and hypertriglyceridaemia 14(7.0%). Only a small fraction (39; 19.5%) demonstrated good level of knowledge about the cardiovascular risk factors.

Conclusion: Cardiovascular risk factors were common among school teachers in Ogbomoso, south-west Nigeria in addition to a low level of awareness and poor control of the risk factors.

Keywords: Cardiovascular risk factors; Hyperlipidaemia; Metabolic syndrome; Teachers; Nigeria.

Introduction

Cardiovascular disease (CVD) is the largest contributor to mortality and morbidity worldwide, accounting for up to 17 million deaths in the year 2013 alone. [1, 2] These diseases are often preceded by risk factors and progress at variable rates over time. [2, 3] Adequate education and awareness about the risk factors for cardiovascular diseases is an important tool in cardiovascular prevention worldwide. [4, 5] School teachers are important parts of the society being stakeholders in delivering quality education for the general populace. The level of awareness of risk factors for CVD among teachers adequately mirrors that of the larger society. [5,6] Identifying common medical problems among teachers can help optimise their health status to improve work efficiency and productivity as this will ultimately improve the quality of education. [6]

School teachers constitute the largest group of

***Correspondence:**
Dr A.A. Akintunde
P.O. Box 3238, Osogbo
Nigeria.
Tel: +234-8033932076
Email: aaakintunde@lautech.edu.ng

government employees in most parts of Nigeria. A healthy population of teachers is, of course, going to positively impact on students' academic performance and general wellness of the populace. Teachers also have a direct influence on students' perception of health matters with consequent indirect impact on the perception of parents and guardians about health issues. The knowledge of teachers about CVD and its risks has been shown to be very low at Ibadan as previously reported by Familoni *et al*. [7]

Indeed, Africans are on the verge of a rapid epidemiologic transition, and there is a need for increasing awareness for CVD risk assessment and prevention. [8] Therefore, it is expedient to determine the burden of CV risk factors and the level of knowledge of CV risk factors among teachers. This step may identify knowledge gaps to be addressed in achieving a higher standard of community awareness for CVD and its risk factors. This better level of knowledge may be useful in identifying targets for interventions in the CVD prevention programs in the community. Other researchers have reported varying levels of knowledge of teachers concerning ischaemic heart disease, epilepsy and school health programs from different community settings. [9-11]

Metabolic syndrome is a complex cluster of risk factors for CVD and diabetes mellitus. [12] These factors include hyperglycaemia, dyslipidaemia, hypertension and obesity. Individuals with the metabolic syndrome are at increased risk of developing diabetes mellitus and CVD as well as increased mortality from CVD and all causes. [12, 13] The syndrome is believed to affect at least one out of every five adults worldwide and carries a high risk of CVD. [3] The prevalence of metabolic syndrome among adults in the Nigerian population has been shown to be considerably high. [14,15]

Literature is scarce on the burden of CVD risk factors and the level of knowledge of school teachers on risk factors for CVD. Therefore, this study was aimed at determining the burden of cardiovascular risk factors and metabolic syndrome among secondary school teachers in Ogbomoso, south-west Nigeria. It also aimed at determining the level of knowledge of CV risk factors among school teachers.

Methods

This study had a cross-sectional design and was conducted between January and June 2014. Twenty secondary schools were selected by stratified random sampling of all the secondary schools in Ogbomoso North and Ogbomoso South Local Government Areas of Oyo State, Nigeria. Institutional ethical approval was obtained from the Ladoke Akintola University of Technology Teaching Hospital, Ogbomoso, Nigeria Research Ethics Committee. Each participant also gave a written informed consent.

In each of the selected schools, ten teachers were chosen by balloting making 220 participants overall. These selected participants were invited for a full cardiovascular examination and laboratory investigations on mutually- agreed dates when they were encouraged to observe an overnight fast and report to school the following morning fasting. Of all the 208 subjects invited for participation, 200 responded giving a response rate of 96%. Eight people initially declined participation following balloting, but they were substituted by the next willing random selection.

The demographic and clinical parameters of each of the participants were recorded according to the research proforma. The data obtained included the age as at last birthday, gender, highest education qualification, marital status, history of alcohol intake and/or cigarette smoking, family history of hypertension and/or diabetes mellitus and personal history of hypertension and/or diabetes mellitus. The body weight of participants was measured using the spring balance weighing scale to the nearest 0.5 kg; the height was measured in light clothing to the nearest centimetres. The Body Mass Index (BMI) was calculated using the formula: weight (kg)/height $(m)^2$. The waist circumference was determined at the midpoint between the lowermost rib and the anterior superior iliac spine while the hip circumference was measured across the greater trochanters. Three blood

pressure measurements were taken at intervals of at least five minutes using standardised protocols, and the average of the three values was recorded for each participant. [16] Hypertension and pre-hypertension were defined according to JNC VIII Council on Hypertension guidelines. [17]

The fasting lipid profile, fasting blood glucose, urinalysis and serum urea and creatinine were assayed in all study participants. The fasting lipid profile was measured using colorimetric method and Randox® United Kingdom lipid kits. Fasting plasma glucose was measured using the glucose oxidase method. Urea and creatinine were also measured using kit methods. All the study participants had 12-Lead Electrocardiography recording done with the aid of Schiller AT-2 machine®. Interpretation and validation were done independently of other data of the subjects by the lead researcher. The parameters determined in the ECG tracing included the heart rate, cardiac rhythm, axis of the ECG, PR interval (the duration from the beginning of P wave to the beginning of R wave), Voltage left or right ventricular hypertrophy using the Sokolow-Lyon criteria indices, QRS amplitude and wave pattern and the QTc duration (the duration from the beginning of Q wave to the end of S wave) among others. [16] The presence of atrial or ventricular ectopic beats and arrhythmias were also noted.

The Heart Disease Fact Questionnaire (HDFQ) was used to assess the level of knowledge of cardiovascular risk factors among the study participants. This questionnaire was a 25- item measure of heart disease knowledge assessing knowledge of risk factors for heart disease, the link between diabetes and heart diseases and how to reduce the risk for heart disease. [18] The participants were asked to mark True', 'false', or 'I don't know' on the HDFQ. The participants with a score of <50% were graded as the low knowledge group, those with a score of 50—69% were graded as the moderate knowledge group while those with score ≥70 % were ranked as the good knowledge group.

Metabolic syndrome was defined according to the Joint Scientific Statement on Harmonising the Metabolic Syndrome Criteria and the National Cholesterol Education Program Adult Treatment Panel III. [15, 19] This definition was based on the presence of at least three of the five cardiovascular risk factors as specified in the appropriate guideline. The demographic and clinical correlates associated with the cardio-metabolic syndrome were also studied. Statistical analysis was done with the aid of the Statistical Package for Social Sciences, SPSS Chicago Ill, Version 20.0. Numerical data were summarised as frequencies and percentages while quantitative data were summarised as means and standard deviation. Student's t-test and Chi-square test were used to test for differences between quantitative and qualitative data respectively. $P<0.05$ defined statistical significance.

Results

Two hundred school teachers completed the study. The age of the participants ranged between 21 years and 59 years with a mean of 43.4 ± 8.4 years. There were more females than males [117 (58.5%) vs 83 (41.5%) respectively]. Males were relatively older than the females (45.7 ± 8.2 years vs. 41.7 ± 8.3 years respectively; $p<0.05$). Most of them were married (186; 93%) and had tertiary education (193; 96.5%). A very small proportion of the participants were aware of diagnosis of hypertension and diabetes mellitus before the onset of this study. Only about a third (36.2%) who were subsequently diagnosed to have hypertension had a previous knowledge of the diagnosis and 67% of them were not on treatment before this time.

The males were more likely to smoke and use alcohol when compared to their female counterparts (12.0 vs. 0% for smoking and 51.8% vs. 12.8% for alcoholism; p = 0.000 in each case). There was no significant difference in the number of participants with positive family history of hypertension (18.1% vs. 23.1%; p = 0.585) and diabetes mellitus (7.2% vs. 12.0%; p = 0.414) between the male and female groups.

Visceral obesity was significantly more common among females than males (77.8% vs. 20.5%, p = 0.000). The mean body mass index was

significantly higher among females than males (27.4 ± 5.3 vs. 24.4 ± 3.4 kg/m^2; p = 0.000. The prevalence of low HDL-cholesterol was also significantly higher among the females (63.2% vs. 37.3%; p = 0.000 respectively). Metabolic syndrome occurred more frequently among females in this study compared to males (28.2% vs. 13.3%, p = 0.012).

However, the prevalence of hypertension and impaired fasting blood sugar were higher among the males but did not reach statistical significance. The mean systolic and mean diastolic blood pressures were also higher among the males than the females (135.4 ± 19.8 mmHg vs. 127.9 ± 21.4 mmHg and 81.0 ± 11.2 mmHg vs. 78.8 ± 12.2 mmHg respectively). Only the difference between the systolic blood pressures was statistically significant. The mean serum lipid values were similar for both gender except that of low HDL cholesterol which was significantly higher among females compared to the males (1.20 ± 0.41mmol/l vs. 1.08 ± 0.28mmol/l respectively; p = 0.028).

The mean score obtained from the use of the Heart Disease Fact Questionnaire was lower among females but without statistical significance as depicted in Table I. Table II shows the relative prevalence of various categories of hypertension according to the Joint National Council on Detection, Evaluation, Treatment and Prevention of Hypertension (JNC VII) Council when each of the systolic and diastolic bleed pressures were taken independently. Pre-hypertension was predominant among study participants. Hypertensive emergencies/urgencies associated with severely elevated blood pressure with/without ongoing target organ damage was found in a remarkable proportion of participants in the study as shown in Table II.

Table III shows the various electrocardiographic abnormalities detected among the study participants. These included ST-segment abnormalities (34%), left atrial abnormalities (28.5%), left ventricular hypertrophy (23.5%), abnormal QT intervals (20.5%) and left axis deviation (14.0%). Other abnormalities included atrial or ventricular premature complexes, prolonged PR interval (1st-degree heart block), right ventricular hypertrophy and right atrial abnormalities.

The pattern of some of the cardiovascular risk factors and components of metabolic syndrome were determined with age groups as shown in Table IV. Metabolic syndrome was commoner among the elderly (>56 years of age) followed by the age group of 36-45 years. Hypertension and impaired fasting glucose were associated with increasing age.

The mean systolic and mean diastolic blood pressure appeared to rise significantly with age as shown in Table IV. Similarly, total serum cholesterol also increased significantly with increasing age. However, low HDL was commoner among the younger age groups 21-45 years compared to the elderly participants. Age had no significant effect on the level of knowledge of the participants about CVD risk factors using the HDFQ scores. The proportion of participants with good knowledge was very low across the age groups. The proportion of participants with low, moderate and good level of knowledge, based on the estimation done using the Heart Disease Fact questionnaire, were 101 (50.5%), 60 (30.0%) and 39 (19.5%) respectively.

Discussion

School teachers constitute a group of educated and enlightened part of the society with direct and indirect impact and influence on their students and their families which form a large part of their community.Even though they may be exposed to a variety of physical and occupational hazards including prolonged standing, intensive verbal communication among others, they are often actively and physically engaged. [20] Whether their level of activity protects them from cardiovascular diseases, for which physical inactivity is a major risk factor, is not well known among African school teachers.

The present study showed that cardiovascular diseases and the risk factors were common

Table I: Clinical, demographic and laboratory characteristics of study participants

Variables	Frequency/Mean (S.D)	Males (n = 83)	Females (n = 117)	*P* value
Mean age (years)	43.4± 8.4	45.7±8.2	41.7±8.3	0.034*
Married (n)	186(93%)			
Tertiary level of education (n)	193(96.5%)			
Past history of hypertension (n)	21(10.5%)	7 (8.4%)	14 (12.0%)	0.422
Past history of diabetes mellitus (n)	5(2.5%)	0	5 (4.3%)	0.056
History of use of alcohol (n)	58(29%)	43 (51.8%)	15 (12.8%)	0.000*
Smoking (n)	10 (5%)	10 (12.0%)	0	0.000*
Positive family history of HTN (n)	42(21%)	15 (18.1%)	27 (23.1%)	0.585
Positive family history of DM (n)	20(10%)	6 (7.2%)	14 (12.0%)	0.414
Overweight/obesity (n)	78(39.0%)/36(18.0%)			
Visceral obesity (n)	108(54.0%)	17 (20.5%)	91(77.8%)	0.000*
Impaired FBS, FBS > 100 mg/dl (n)	49(24.5%)	26 (31.3%)	23 (19.7%)	0.059
Low HDL (n)	105(52.5%)	31 (37.3%)	74(63.2%)	0.000*
Elevated creatinine (n)	45(22.5%)			
Proteinuria (n)	25(12.5%)			
Metabolic syndrome (n)	44(22.0%)	11(13.3%)	33(28.2%)	0.012*
BP >130/85 mmHg (n)	76(38.0%)	36 (43.4%)	40(34.2%)	0.187
BMI (kg/m²)	26.1± 4.8	24.4±3.4	27.4±5.3	0.000*
[illegible]	3.92 ± 1.68	4.3± 1.8	3.64 ±1.57	0.005*
Creatinine (mmol/l)	99.0±36.3	111.6±38.5	90.0±31.9	0.000*
Mean SBP (mmHg)	131.01±21.0	135.4±19.8	127.9±21.4	0.012*
Mean DBP (mmHg)	79.7±11.8	81.0±11.2	78.8±12.2	0.181
Total Cholesterol (mmol/l)	4.80±0.98	4.80±1.07	4.80±0.92	0.959
TG (mmol/l)	0.90±0.53	0.90 ±0.43	0.90±0.59	0.953
HDLC (mmol/l)	1.15±0.37	1.08±0.28	1.20±0.41	0.028*
LDLC (mmol/l)	3.25±0.96	3.31±1.02	3.2±0.91	0.424
FBS (mmol/l)	5.14±1.35	5.12±0.93	5.2±1.6	0.862
Waist Circumference (cm)	87.52±12.1	85.9±12.6	88.7±11.5	0.108
HDFQ Score (%)	44.7±27.1	48.0 ± 27.7	42.3± 26.5	0.144

HTN-hypertension, DM-Diabetes Mellitus, FBS-fasting blood sugar, HDL-high-density lipoprotein, LDL-low density lipoprotein, BP-Blood pressure, BMI- body mass index, SBP-systolic blood pressure, DBP-diastolic blood pressure, TG-Triglycerides, HDFQ- Heart Disease Fact Questionnaire.

among school teachers in Ogbomoso, south-west Nigeria. The study also suggested that clustering of risk factors was relatively common among teachers. This observation is possibly reflective of the national prevalence of hypertension and other cardiovascular risk factors. [21] The prevalence of metabolic syndrome in this study was similar to the findings previously in many parts of south-west Nigeria and other parts of Nigeria. [15] Therefore, it appears that despite the significant level of physical activity associated with classroom teaching, school teachers were not overtly protected from cardiovascular diseases and clusters of cardiometabolic risk

Table II: The prevalence of various categories of hypertension among study participants based on isolated systolic or diastolic blood pressure values

Blood pressure category	Systolic blood pressure category (n = 200)	Diastolic blood pressure category (n = 200)
Desired blood pressure (n)	63(31.5%)	113(56.5%)
Prehypertension (n)	80(40.0%)	50(25.0%)
Stage 1 HTN (n)	38(19.0%)	29(14.5%)
Stage 2 HTN (n)	12(6.0%)	4(2.0%)
Hypertensive emergency (n)	7(3.5%)	4(2.0%)

HTN- Hypertension

Table III: Electrocardiographic changes among study participants

Electrocardiographic abnormalities	Frequency (%)
Sinus bradycardia/ sinus tachycardia (n)	23(11.5%)/4(2.0%)
LAD/RAD (n)	28(14.0%)/6(3.0%)
Prolonged PR intervals (n)	9(4.5%)
Abnormal QTc duration (n)	41(20.5%)
Left atrial abnormalities (n)	57(28.5%)
Right atrial abnormalities (n)	4(2.0%)
RVH (n)	3(1.5%)
LVH (n)	47(23.5%)
ST Segment abnormalities (n)	68(34.0%)
Atrial/Ventricular Premature Beats (n)	2(1.0%)

LAD-left axis deviation, RAD-right axis deviation, RVH-right ventricular hypertrophy, LVH- left ventricular hypertrophy

factors similar to previous reports by many authors.[5,7,15] The prevalence of many cardiovascular risk factors, including hypertension, smoking and dyslipidaemia, was lower than the rates reported among school teachers in Cape Town, South Africa, where about half were reported to have hypertension.[22] However, the proportion of participants with the history of smoking, dyslipidaemia in the South African study was much lower than the finding in the present study. The high burden of CV risk factors may be related to significant occupational stress, duration of teaching experience and age. [23] The prevalence of hypertension in the present study was similar to that previously reported among school teachers in Bulgaria.[24] The differences noted in the pattern of CVD risk factors across the population might be related to environmental influence, genetic factors, dietary habits and some cultural practices.

The present study also revealed a remarkably low level of knowledge of risk factors for cardiovascular diseases, association of diabetes with CVD and knowledge of preventive mechanisms for CVD among the participants. Similar studies among school teachers in other climes had also revealed similarly poor knowledge of CVD. [7, 25] About one-fifth of this apparently healthy population had cardiometabolic syndrome, and females were more likely predisposed. The burden of cardiovascular diseases among teachers mirrors the larger community as they represent the middle class in most communities.

Metabolic syndrome is the clustering of cardiovascular risk factors, and it predisposes individuals to a higher risk of cardiovascular mortality and increased risk of developing diabetes mellitus. [15,26,27] This also comes with significant economic implications for its management will require higher cost and services. [8,16,17] The burden of metabolic syndrome observed in the present study was similar to what was demonstrated in other studies from different parts of Nigeria. [12,15,28] However, the finding of the present study was significantly higher than the prevalence of metabolic syndrome found among rural Yoruba southwestern Nigerians, where 2.1% of men and 2.7% of women were diagnosed to have had metabolic syndrome. [15,29] These were subjects with additional risk for cardiovascular diseases and death for which preventive strategies are desired.

Table IV: Prevalence of some cardiovascular risk factors and level of knowledge of heart disease based on age groups

Variables	21-35 years (n = 40)	36-45 years (n = 79)	46-55 years (n = 67)	56-65 years (n = 14)	ANOVA
Alcohol intake (n)	7 (17.5%)	20 (25.3%)	25 (37.3%)	6 (42.9%)	0.180
Frequency of Metabolic syndrome (n)	3 (7.5%)	27(34.2%)	8 (11.9%)	6 (42.9%)	0.000*
Smoking (n)	0 (0.0%)	2 (2.5%)	5 (7.5%)	3 (2.1%)	0.008*
Hypertension [BP ≥140/90 mmHg] (n)	4(10.0%)	23(29.1%)	22(32.8%)	9 (64.3%)	0.001*
Low HDL (n)	24(60.0%)	51 (64.6%)	24(35.8%)	6(42.9%)	0.004*
Impaired fasting glucose (n)	5 (12.5%)	20 (25.3%)	17 (25.4%)	7 (50.0%)	0.044*
Visceral obesity (n)	17 (42.5%)	50 (63.3%)	34 (50.7%)	7 (50.0%)	0.152
HFDQ Score good knowledge (n)	8 (20.0%)	17(21.5%)	13 (19.4%)	1(7.1%)	0.779
Mean systolic blood pressure (mmHg)	121.3± 15.8	130.0±19.9	133.6±20.0	152.5±27.5	0.000*
Mean diastolic blood pressure (mmHg)	75.7±10.7	78.7±11.5	82.0± 11.9	85.7±12.2	0.010*
Total cholesterol (mmol/l)	4.4±0.9	4.7±1.0	5.0 ±0.9	5.6±1.1	0.000*
Creatinine(μmol/l)	98.4 ±38.4	97.3±38.7	99.1±31.9	109.4±37.9	0.725
Urea (μmol/l)	3.74±1.6	3.99 ±1.92	3.92±1.44	4.11±1.75	0.863
HFDQ score	44.7±27.3	46.9±27.4	42.2±28.4	44.3±17.7	0.771

*** Statistically significant**

HDFQ-Heart Disease Fact Questionnaire, HDL-High density lipoprotein

Females were more likely to be associated with many cardiovascular risk factors in the present study. Obesity and low HDL were more likely to occur among females while elevated blood pressure, impaired fasting glucose, smoking and alcohol were more likely to be commoner among the male participants. Therefore, female teachers in this study were more likely to be at higher risk of many of the cardiovascular risk factors including a significant risk of cardiovascular risk factor clustering. This pattern is possibly based on the higher prevalence of obesity and low HDL among female teachers compared to their male counterparts. The higher proportion of females in the South African study might have contributed to the exceedingly high level of cardiovascular risk factors and its clustering in that study. Adeoye *et al*. also showed that women were more likely to be identified with metabolic syndrome when compared to men in a study among health workers in Ibadan, Nigeria. [30]

Abnormal phenotypical consequences of cardiovascular risk factors, such as abnormalities on electrocardiography, were also reportedly high in this study. This observation also highlighted increased cardiovascular risks for this group of subjects similar to that reported from other population. [16,17,22,24] Electrocardiographic abnormalities such as prolonged PR interval, QT interval abnormalities and left ventricular hypertrophy are associated with significant risk of cardiovascular morbidity and mortality. [17,31,32] A significant proportion of the participants even had diagnosis compatible with hypertensive urgencies/emergencies with episodes of severely elevated blood pressure with/without progressive target organ damage.

The impact of age on many of the cardiovascular risk factors is well noted in the literature. [2,16] The prevalence of hypertension and impaired fasting blood glucose were directly associated with increasing age. However, dyslipidaemia seemed to be commoner among the younger participants while metabolic syndrome seemed commoner among two age groups- the younger people (between 36-45 years) and those aged more than 56 years. It is likely that the driving force in the clustering of cardiovascular risk factors in these two group of people might be related to different entities. Only a third of individuals who were diagnosed hypertensive had been previously diagnosed before, and a significant proportion of them were not even on medication, or their blood pressure was not well controlled.

The high prevalence of many cardiovascular risk factors and the high probability of its clustering coupled with low level of awareness of cardiovascular risk factors among school teachers should be a source of concern for the governing institutions of schools. This concern lies in the fact that the overall output of a public worker will be dependent on their health status and due to their influence, they may ultimately affect public perception and awareness of cardiovascular risk factors and diseases.

Conclusion

It is very expedient that regular health screening for CVD risk factors and diseases, appropriate therapeutic models including lifestyle modifications and focused health enlightenment may be necessary to combat the scourge of cardiovascular diseases among school teachers and the general population in south-west Nigeria. It will also increase teachers' effectiveness and quality of education delivered to the students.

Conflict of Interest: None declared.
Funding: Self-funded.
Authors' Contribution: AAA conceived and designed the study, analysed the data, drafted the manuscript and participated in the approval of the final version of the manuscript. SWA participated in

the conception and design of the study, data collection and final approval of manuscript. ADB participated in study design, conceptualization, data collection, statistical analysis and final approval of manuscript. OOG- participated in study design and final approval of the manuscript.

Publication History: Submitted 01 - March 2017; Accepted 28 - March 2017

References

1. Bansilal S, Castellano JM, Fuster V. Global burden of CVD: focus on secondary prevention of cardiovascular disease. Int J Cardiol 2015; 201(Suppl. 1): S1-S7.

2. Writing Committee, Smith SC Jr., Chen D, Chen D, Collins A, Harold JG, Jessup M, *et al*. Moving from political declaration to action on reducing the global burden of cardiovascular diseases: a statement from the global cardiovascular disease task force. Glob Heart 2013; 8(4): 383-386.

3. Harris MI, Flegal KM, Cowie CC, Cowie CC, Eberhardts MS, Goldstein DE, Little RR,*et al*. Prevalence of diabetes, impaired fasting glucose and impaired glucose tolerance in US Adults. The third National Health and Nutrition Examination Survey, 1988-1994. Diabetes Care 1998; 21: 518-524.

4. Altman R, de Ybarra JN, Villablanca AC. Community-based Cardiovascular Disease Prevention to reduce Cardiometabolic Risk inLatina Women: A Pilot Program. J Womens Health (Larchmt) 2014; 23(4): 350-357

5. Scheuch K, Haufe E, Seibt R. Teachers Health. Dtsch Arztebl Int 2015; 112(20): 347-356.

6. Akintunde AA, Akintunde TS, Opadijo OG. Knowledge of heart disease risk factors among workers in a Nigerian University: a call for concern. Niger Med J 2015; 56(2): 91-95.

7. Familoni IF, Familoni OB. Determinants and perception of cardiovascular risk factors among secondary school teachers in Oyo State, Nigeria. Afr J Med Med Sci 2011; 40(4): 339-343.

8. Mensah GA, Roth GA, Sampson UK, Moran AE, Feigin VL, Furouzanfar MH,*et al*. Mortality from cardiovascular diseases in sub-Saharan Africa, 1990-2013: a systematic analysis of data from the Global Burden of Disease study 2013. Cardiovasc J Afr 2015; 26(2 Suppl 1): S6-S10.

9. Ansa VO, Oyo-Ita A, Essien OE. Perception of ischaemic heart disease, knowledge of and attitude to reduction of its risk factors. East Afr Med J 2007; 84(7): 318-323.

10. Akpan MU, Ikpeme EE, Utuk EO. Teachers' knowledge and attitude towards seizure disorder: a comparative study of urban and rural school teachers in Akwa Ibom State, Nigeria. Niger J Clin Pract 2013; 16(3): 365-370.

11. Ofovwe GE, Ofili AN. Knowledge, attitude and practice of school health programme among head teachers of primary schools in Egor Local Government Area of Edo State, Nigeria. Ann Afr Med 2007; 6(3): 99-103.

12. Akintunde AA, Ayodele OE, Akinwusi PO, Opadijo OG. Metabolic syndrome: a comparison of occurrence using three definitions in hypertensive patients. Clin Med Res. 2011; 9(1): 26-31.

13. Isezuo SA. The metabolic syndrome: Review of current concepts. Niger Postgrad Med J 2006; 13(3): 247-255.

14. Akintunde A, Ayodele O, Akinwusi P, Peter J, Opadijo O. Metabolic syndrome among newly diagnosed non-diabetic hypertensive Nigerians: prevalence and clinical correlates. SA J Diabetes Vasc Dis 2010; 7: 107-110.

15. Oguoma VM, Nwose EU, Richards RS. Prevalence of cardiometabolic syndrome in Nigeria: a systematic review. Public Health 2015; 129: 413-423.

16. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr.,*et al*. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA 2003; 289(19): 2560-2572.

17. James PA, Oparil S, Carter BL,Cushman WC, Dennison-Himmelfarb C, Handler J,*et al*. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eight Joint National Committee (JNC 8). JAMA 2014; 311(5): 507-520.

18. Wagner J, Lacey K, Chyun D, Abbott G. Development of a questionnaire to measure heart disease risk knowledge in people with diabetes: the Heart Disease Facts Questionnaire. Patient Educ Couns. 2005; 58(1): 82-87.

19. NCEP. Third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III) final report. Circulation 2002; 106: 3143-3421.

20. Greiw ASH, Gad Z, Mandil A, Wagdi M, Elneihoum A. Risk factors for cardiovascular diseases among school teachers in Benghazi, Libya. Ibnosima J Med Biomed Sci 2010; 2(4): 168-77.

21. Akinlua JT, Meakin R, Umar AM, Freemantle N. Current Prevalence Pattern of Hypertension in Nigeria: A Systematic Review. PLoS One 2015; 10(10): e0140021.

22. Laurence EC, Volmink J, Esterhuizen TM, Dalal S, Holmes MD. Risk of cardiovascular disease among teachers in Cape Town: Findings of the South African PaCT pilot study. S Afr Med J 2016; 106(10): 996-1001.

23. Deianov KH, Khadzhiolova I, Mincheva L. Chronic occupational stress and the cardiovascular risk in teachers. ProblKhig 1995; 20: 81-90.

24. Deyanov C, Hadjiolova I, Mincheva L. Prevalence of arterial hypertension among school teachers in Sofia. Rev Environ Health 1994; 10(1): 47-50.

25. Awosan KJ, Ibrahim MTO, Sabir AA, Ejimodu P. Awareness and prevalence of risk factors of coronary heart disease among teachers and bankers in Sokoto, Nigeria. J Med Med Sci 2013; 4(9): 337-342.

26. Udell JA, Steg PG, Scirica BM, Eagle KA, Ohman EM, Goto S,*et al*. Metabolic syndrome, diabetes mellitus, or both and cardiovascular risk in outpatients with or at risk for atherothrombosis. Eur J Prev Cardio 2014; 21(12): 1531-1540.

27. Ardern CI, Janssen I. metabolic syndrome and its association with morbidity and mortality. Appl Physiol Nutr Metab 2007; 32(1): 33-45.

28. Nalado AM, Musa BM, Gezawa ID, Muhammad H, Ibrahim DA, Uloko AE. Prevalence of metabolic syndrome among apparently healthy adults in a rural community, in North Western Nigeria. Niger J Med 2015; 24(4): 323-330.

29. Oladapo OO, Salako L, Sodiq O, Shoyinka K, adedapo K, Falase AO. A prevalence of cardiometabolic risk factors among a rural Yoruba south western Nigerian population: a population – based survey. Cardiovasc J Afr 2010; 21(1): 26-31.

30. Adeoye AM, Adewoye IA, Dairo PM, Adebiyi A, Lackland DT, Ogedegbe G,*et al*. Excess Metabolic Syndrome Risks Among Women Health Workers Compared to Men. J Clin Hypertens (Greenwich) 2015; 17(11):880-884.

31. Katholi RE, Couri DM. Left ventricular hypertrophy: Major Risk Factor in Patients with hypertension: Update and Practical Clinical Applications. Int J Hypertens 2011; 2011: 495349.

32. Akintunde AA, Oyedeji AA, Familoni OB, Ayodele OE, Opadijo OG. QT interval prolongation and dispersion: Epidemiology and clinical correlates in subjects with newly diagnosed systemic hypertension in Nigeria. J Cardiovasc Dis Res 2012; 3(4): 290-295.