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RISK OF DEVELOPING CARDIOVASCULAR DISEASE AND ASSOCIATED DEATH RISK IN SOME PATIENTS AND HEALTHY SUBJECTS: A COURSE FOR PHARMACISTS' INTERVENTION PROGRAMMES

***[1]John David Ohieku and [2]A. C. Oparah**

[1]Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, University of Maiduguri PMB 1069, Maiduguri, Borno State.

[2]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin-City, Edo State, Nigeria.

***Corresponding Author: John David Ohieku**

Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, University of Maiduguri PMB 1069, Maiduguri, Borno State.

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ABSTRACTS

Background: Risk estimates in cardiovascular diseases are desired to identify high risk individuals that require primary or secondary preventive measures. **Objectives**: To identify high risk individuals that may develop cardiovascular events, assess the variation in the risk predictive values of various age strata; and to compare the risk values between patients and healthy volunteers. **Methods:** The determinant risk factors of cardiovascular disease (CVD) such as blood pressure, fasting blood cholesterol as well as glucose concentrations were determined and values obtained were used to predict 5 and 10 years of individual risks through Global Risk Assessment Measurement. Information involving the family and smoking histories as well as the demographic data of subjects were obtained through questionnaire. Chi square tests were used to determine significance difference between two variables and ANOVA Post Hoc analyses were performed to compare specific significant risk differences between age strata. **Results:** The risk strata for healthy subjects are 14.0%, 19.8%, 38.4%, 26.7% and 1.1% respectively for optimal risk, non-optimal risk, elevated risk, one major risk, and two and above major risks. The values for patients' group are 2.0%, 16.3%, 12.2%, 38.8% and 32.7% respectively. The 5-years risk for developing cardiovascular disease events between healthy male subjects and male patients are significantly different ($P<0.001$) from each other. Significant difference among the two subjects was also observed in subjects in the female category ($P<0.001$). Similarly, the 10-year risk of developing cardiovascular disease also vary significantly ($P=0.001$) between healthy subjects and patients for male subjects but not for female subjects ($P=0.167$). The 10-years risk of death from cardiovascular disease indicated 14.3% of subjects in their sixth decades of life as having high risks and no other age stratum is at risk. **Conclusion:** Many individuals with abnormal levels of BP, cholesterol and blood sugar levels have varying levels of risks. Patients have higher risk of developing CVD events than healthy subjects. The risk of death from the two conditions is also higher among the patients' group than healthy subjects. These risks are also higher in both patients and healthy subjects who are above 50 years of age.

KEYWORDS: Cardiovascular disease, death risk, healthy subjects, 10-years predictive risk.

INTRODUCTION

The prevalence of some cardiovascular conditions like rheumatic heart disease, hypertensive heart disease, ischaemic heart disease and inflammatory heart diseases are well recognized.[1] Rheumatic heart disease result from rheumatic fever in children that may be caused by streptococcal infection and which damages the heart valves but hypertensive heart diseases may involve aneurysm associated with high blood pressure, atherosclerosis arising from thickening and stiffening of arteries wall due to build-up of fatty deposits, peripheral artery disease and high blood pressure. Among the ischaemic heart diseases, angina, atherosclerosis, coronary artery disease, heart attack and sudden death are common. Conditions like atherosclerosis, cardiomyopathy, pericardial disease and valvular heart disease constitute an inflammatory heart disease.[1]

Cardiovascular disease (CVD), has been identified as the underlying cause of death in some regions, accounting for close to a million deaths with the occurrence rate of 1 of every 3 deaths according to 2016 statistics in that region.[2] The disease is said to claim more lives each year than all forms of cancer and Chronic Lower Respiratory Disease combined.[2]

Atherosclerotic CVD which affect majority of people who have passed the age of 60 years is common globally and is rated as the number one cause of death globally. Some reports in some quarters have more people die

annually from CVDs than from any other cause. World Health Organization (WHO) report indicated that the total number of deaths due to cardiovascular diseases was 17.6 million in 2016 and is being projected to rise to 23.6 million by 2030.[3] Global statistics indicated that mortality rate arising from CVD amounted in Africa amounted to 1.254 million in 2016.[1] Over three quarters of CVD deaths were reported to take place in low- and middle-income countries. Furthermore, out of the 17 million premature deaths (under the age of 70) due to non-communicable diseases in 2015, 82% are in low- and middle-income countries, and 37% are caused by CVDs.[4]

One of the Global action plan for non-communicable disease calls for 25% reduction in the global prevalence of raised blood pressure, which is one of the leading risk factor for cardiovascular disease. The global prevalence of raised blood pressure (defined as systolic and/or diastolic blood pressure more than or equal to 140/90 mmHg) in adults aged 18 years and over was around 24.1% in men and 20.1% in women in 2015. The number of adults with raised blood pressure increased from 594 million in 1975 to 1.13 billion in 2015, with the increase largely in low- and middle-income countries.[4]

The warning signs that will raise index of suspicion are sometimes vague and where they exist, these signs are either often congruent with some other conditions or are often not given serious attention by most sufferers. These events may occur in both previously diagnosed and undiagnosed individuals. Several individuals may notice these events for the first time in their life leaving them with little or no chances for medical intervention that would have improved their quality of life (QOL) and longevity. They are adjudged as one of the leading causes of death in developing countries.[5]

Being a non-smoker who engaged in physical activity and accustomed to healthy diet not a controlled body weight, and control of cholesterol, blood pressure, and blood sugar are factors that can impact positive control of CVD. There are also many non-modifiable risk factors including those of gender, age, family history and ethnic origin. Being a male confers higher risk of heart disease than pre-menopausal woman but at post-menopausal age, there is equal risk of cardiovascular disease between both genders.

Advance age is a risk factor for cardiovascular disease and it is estimated that the risk of stroke doubles every decades after age 55. Family history is considered a non-modifiable risk factor since first degree blood relative that has had coronary heart disease or stroke before the age of 55 years for male relative or 65 years for female relative increases risk. However ethnic origin also plays a role in cardiovascular risk factor since people with African and African ancestry are at higher risk of developing cardiovascular disease than other racial groups. The more risk factors one has, the more likely the chances of developing heart attack.[6]

OBJECTIVES

To identify high risk individuals that may develop cardiovascular disease events and quantify death risks from cardiovascular diseases in the near future; assess the variation in the risk predictive values of various age strata and gender; and to compare the risk values between patients and healthy volunteers.

MATERIAL AND METHODS

The study was conducted at the University of Maiduguri, Borno State, Nigeria. The city lies between latitudes 11.5N and 13.5E in the Sudan Savannah. The study designed was experimental and convenience sampling method of 135 subjects comprising 86 healthy subjects and 49 patients was adopted. There were no biases in subject selection in terms of gender, educational status, smoking, alcohol consumption, and family history of cardiovascular diseases but subjects who are below 30 years are excluded from the study. The determinant risk factors of cardiovascular disease (CVD) were evaluated and quantified in. Fasting blood sugar measurements were taken with Accu-Chek Active kits obtained from Roche diagnostic, Germany. Blood Pressure apparatus Kit was obtained from Omron Healthcare, Netherland and verified with Anaroid Sphygmomanometer kit obtained from Wuxi Medicals, China. Ultraviolet-Visible Spectrophotometer 754 model obtained from Hospibrand Company, USA Standard digital micro-pipette obtained from Thermo Fisher Scientific Company, Finland and Genemate^{R} Pipettor obtained from iscBioExpress, Utah, USA. Fasting blood cholesterol as well as glucose concentrations were determined and used to predict 5 and 10 years of individual risks through Global Risk Assessment Measurement. Information involving the family history and the demographic data of subjects were obtained through questionnaire and case note of patients. Chi square tests were performed to determine significance difference between two variables and ANOVA Post Hoc was performed to compare risk differences between age strata.

RESULTS

Table 1: Demographic Characteristics of Subjects.

Demography	Classification	Frequency	Percentage (%)
Age Range of subjects	30-39	23	17.0
	40-49	58	43.0
	50-59	35	25.9
	60-69	14	10.4
	70-79	5	3.7
	Total	**135**	**100**
Gender	Male	93	66.9
	Female	42	33.1
	Total	**135**	**100**
Type of subjects	Healthy subjects	86	63.7
	Patients	49	36.3
	Total	**135**	**100**

Table 2: Systolic Blood Pressure Status of Subjects.

Subjects	BP Status*	Age Range of subjects (Yrs)					Total (%)
		30-39	40-49	50-59	60-69	70-79	
Healthy Subjects	Optimal BP	7 (50)	8 (18.2)	5 (20)	1 (33.3)	-	21 (24.4)
	Pre-HTN	5 (35.7)	27(61.4)	8 (32.0)	2 (66.7)	-	42 (48.8)
	Stage I HTN	2 (14.3)	7 (15.9)	10 (40)	0 (0)	-	19 (22.1)
	Stage II HTN	0 (0)	2 (5)	2 (8)	0 (0)	-	4 (4.7)
	Total	**14(100)**	**44(100)**	**25(100)**	**3(100)**	-	**86 (100)**
Patients	Optimal BP	3 (33.3)	1 (7.1)	2 (20)	0 (0)	0 (0)	6 (12.2)
	Pre-HTN	1 (11.1)	7 (50)	1 (10)	3 (27.3)	1 (20)	13 (26.5)
	Stage I HTN	2 (22.2)	1 (7.1)	3 (30)	2 (18.2)	1 (20)	9 (18.4)
	Stage II HTN	3 (33.3)	5 (35.7)	4 (40)	6 (54.5)	3 (60)	21 (42.9)
	Total	**9 (100)**	**14 (100)**	**10 (100)**	**11 (100)**	**5 (100)**	**49 (100)**

*BP is considered optimal when <120 mm Hg; Pre-Hypertensive if 120-139 mm Hg; Stage I HTN if 140-159 mm Hg and Stage II HTN if ≥160 mm Hg ( ).

Table 3: Fasting Blood Sugar Relative to Age Range and Types of subjects

Subjects	Fasting Blood sugar*	Age Range of Subjects (Years)					Total
		30-39	40-49	50-59	60-69	70-79	
Healthy subjects	Normal range	12(85.7)	37(84.1)	18(72)	3(100)		70(81.4)
	Impaired Glu Conc.	2(14.3)	6(13.6)	5(20)	0(0)		13(15.1)
	Diabetes Range	0(0)	1(2.3)	2(8.0)	0(0)		3(3.5)
	Total	**14(100)**	**44(100)**	**25(100)**	**3(100)**		**86(100)**
patients	Normal Range	7(77.8)	5(35.7)	4(40)	6(54.5)	4(80)	26(53.1)
	Impaired Glu Conc.	2 (22.2)	3 (21.4)	4(40)	1(9.1)	1(20)	11(22.4)
	Diabetes Range	0(0)	6(42.9)	2(20)	4(36.4)	0(0)	12(24.5)
	Total	**9(100)**	**14(100)**	**10(100)**	**11(100)**	**5(100)**	**49(100)**

*Normal range (3.5-5.6 mm/dL), IGC=Impaired glucose concentration (5.7-7.0mm/dL); DR=diabetes Range=(>7.0mm/dL) ( ).

Table 4: Total Cholesterol levels relative to Age Range and Subject Types.

Subjects	Cholesterol Status*	Age Range of Subjects					Total
		30-39 yrs	40-49 yrs	50-59 yrs	60-69 yrs	70-79 yrs	
Healthy Subjects	BNR	2 (14.3)	15 (34.1)	8 (32)	0 (0)		25 (29.1)
	WNR	3 (21.4)	16 (36.4)	9 (32)	3 (100)		31 (36)
	Borderline High	4 (28.6)	8 (18.2)	4 (16)	0 (0)		16 (18.6)
	High	5 (35.7)	5 (11.4)	4 (16)	0 (0)		14 (16.3)
	Total	**14(100)**	**44(100)**	**25(100)**	**3(100)**		**86(100)**
Patients	BNR	2 (22.2)	0 (0)	3 (30)	0 (0)	0 (0)	5 (10.2)
	WNR	5 (55.5)	10 (71.4)	5 (50)	9 (81.8)	4 (80)	33 (67.3)
	Borderline High	1 (11.1)	3 (21.4)	0 (0)	1 (9.1)	1 (20)	6 (12.2)
	High	1 (11.1)	1 (7.1)	2 (20)	1 (9.1)	0 (0)	5 (10.2)
	Total	**9 (100)**	**14 (100)**	**10 (100)**	**11 (100)**	**5 (100)**	**49 (100)**

Key: BNR= Below normal range WNR= Within normal range

Table 5: 5- year risk of developing cardiovascular disease.

Gender	Risk category	Healthy Subjects (%)	Patients (%)	Total (%)	P-value
Male	Low Risk (0-10%)	62 (93.9)	18 (66.7)	80 (86.0)	P<0.001
	Intermediate Risk (10-20%)	4 (6.1)	5 (18.5)	9 (9.7)	
	High Risk (≥ 20%)	0 (0)	4 (14.8)	4 (4.3)	
	Total	66 **(100)**	27 **(100)**	93 **(100)**	
Female	Low Risk (0-10%)	20 (100)	20 (90.9)	40 (95.2)	P<0.001
	Intermediate Risk (10-20%)	0 (0)	2 (9.1)	2 (4.8)	
	High Risk (≥ 20%)	0 (0)	0 (0)	0 (0)	
	Total	**20 (100)**	**22 (100)**	**42 (100)**	

Table 6: 10- year risk of developing cardiovascular disease.

Gender	Risk category	Healthy Subjects (%)	Patients (%)	Total (%)	P-value
Male	Low Risk (0-10%)	50 (75.6)	11 (40.7)	61 (65.6)	P=0.001
	Intermediate Risk (10-20%)	12 (18.2)	6 (22.2)	18 (19.4)	
	High Risk (≥ 20%)	4 (6.1)	10 (37)	14 (15.1)	
	Total	66 **(100)**	27 **(100)**	93 **(100)**	
Female	Low Risk (0-10%)	20 (100)	8 (36.4)	29 69.0)	P=0.167
	Intermediate Risk (10-20%)	0 (0)	11 (50)	11(26.2	
	High Risk (≥ 20%)	0 (0)	3 (13.6)	3 (7.1)	
	Total	20 **(100)**	22 **(100)**	42 **(100)**	

Table 7: 10-year risk of death from cardiovascular disease.

Gender	Risk category	Healthy Subjects (%)	Patients (%)	Total (%)	P-value
Male	Low Risk (0-10%)	66 (100)	18 (66.7)	84 (90.3)	P<0.001
	Intermediate Risk (10-20%)	0 (0)	7 (25.9)	7 (7.5)	
	High Risk (≥ 20%)	0 (0)	2 (7.4)	2 (2.2)	
	Total	66 (100)	27 (100)	93 (100)	
Female	Low Risk (0-10%)	20 (100)	18 (81.8)	38 (90.5)	P=0.062
	Intermediate Risk (10-20%)	0 (0)	4 (18.2)	4 (9.5)	
	High Risk (≥ 20%)	0 (0)	0 (0)	0 (0)	
	Total	20 (100)	22 (100)	42 (100)	

Table 8: 10-year risk of developing cardiovascular disease relative to age range of subjects.

Age strata (Yr)	10-years Risk of developing cardiovascular disease (Risk class)			Total N (%)
	Low Risk (0-10%) n (%)	Intermediate Risk (10-20%) n (%)	High Risk (≥ 20%) n (%)	
30-39	22 (95.7)	1 (4.3)	0 (0)	23(100)
40-49	46 (79.3)	11 (18.9)	1 (1.7)	58(100)
50-59*	18 (51.4)	12 (34.3)	5 (14.3)	35(100)
60-69*	2 (14.3)	4 (28.6)	8 (57.1)	14(100)
70-79*	1 (20.0)	1 (20.0)	3 (60.0)	5 (100)
TOTAL	89 (65.9)	29 (21.5)	17 (12.6)	135(100)

*Post hoc ANOVA analysis showed sig diff (P<0.05) in risk value of 30-39 yrs from ≥50 yrs strata, 40-49 yrs from ≥50 strata, 50-59 yr from <50 yr and > 60 yrs, 60-69 yrs from <60 yrs, 70-79 from <60 yrs.

Table 9: 10-year risk of experiencing death from cardiovascular disease relative to age range of subjects.

Age strata (Yr)	10-years Risk of death from cardiovascular disease (Risk class)			Total N (%)
	Low Risk (0-10%) n (%)	Intermediate Risk (10-20%) n (%)	High Risk (≥ 20%) n (%)	
30-39	23 (100)	0 (0)	0 (0)	23 (100)
40-49	58 (100)	0 (0)	0 (0)	58 (100)
50-59	33 (94.3)	2 (5.7)	0 (0)	35 (100)
60-69*	7 (50)	5 (35.7)	2 (14.3)	14 (100)
70-79*	1 (20)	4 (80)	0 (0)	5 (100)
TOTAL	122 (90.4)	11 (8.1)	2 (1.5)	135(100)

*Post hoc ANOVA analysis showed no sig diff (P>0.05) in risk value of age strata <60 years. 60-69 yrs sig dif (P<0.05) from <60 strata and >70 years. 70-79 yr sig diff <70 years age strata.

Table 10: Distribution of overall Risk.**

Subjects	Age Range (Years)						Total (%)
		Optimal Risk (%)	Risk not Optimal (%)	Elevated Risk (%)	1 Major Risk (%)	≥ 2 Major Risks (%)	
Healthy Subject	30-39	3 (23.1)	1 (7.7)	4 (30.8)	5 (38.5)	0 (0)	13(100)
	40-49	5 (11.6)	12 (27.9)	18 (41.9)	7 (16.3)	1 (2.3)	43(100)
	50-59	3 (11.1)	3 (11.1)	10 (7.0)	11 (40.7)	0 (0)	27(100)
	60-69	1 (33.3)	1(33.3)	1 (33.3)	0 (0)	0 (0)	3 (100)
	Total (%)	**12 (14.0)**	**17 (19.8)**	**33 (38.4)**	**23 (26.7)**	**1 (1.1)**	**86(100)**
Patients	30-39	1 (11.1)	3 (33.3)	1 (11.1)	2 (22.2)	2 (22.2)	9 (100)
	40-49	0 (0)	3 (21.4)	1 (7.14)	4 (28.6)	6 (42.9)	14(100)
	50-59	1 (10)	1 (10)	1 (10)	3 (30)	4 (40)	10(100)
	60-69	0 (0)	0 (0)	1 (9.1)	7 (63.6)	3 (27.3)	11(100)
	70-79	0 (0)	1 (20)	1 (20)	3 (60)	0 (0)	5 (100)
	Total (%)	**1 (2.0)**	**8 (16.3)**	**5 (10.2)**	**19 (38.8)**	**16 (32.7)**	**49(100)**

*** Risk is considered to be optimal in non-diabetic and non-smoker subjects with SBP <120 mm Hg and total cholesterol (TC) of <180 mg/dL. Risk is not optimal if non-diabetic and non-smoker with SBP of 120-139 mm Hg and TC of 180-199 mg/dL. Elevated Risk occur in non-diabetic and non –smoker with SBP of 140-159 mm Hg and TC of 200-240 mm/dL. Risk is considered major if either diabetic or smoker or with SBP ≥ 160 or TC >240 mg/dL.*

The systolic blood pressure (SBP) status of patients and healthy subjects (Table 2) showed a profile indicating 22.1% and 4.7% of the healthy subjects being at stage I and stage II hypertension respectively. The corresponding values for those in patients' category are 18.4% and 42.9% respectively. The proportions of individuals with optimal BP are higher in healthy subjects than patients (being 24.4% versus 12.2% respectively). However, pre-hypertension occurred in 48.8% of healthy subjects compared to 26.6% of the patients' group.

The Fasting blood sugar result (Table 3) showed a higher distribution of subjects with normal glucose level in healthy subjects (81.4%) compared to 53.1% of the patient group. Also observed was the fact that there is more diabetes subjects in the patients' group (24.5%) compared to healthy subjects (3.5%). Impaired glucose concentration occurred in 15.1% of healthy subjects compared to the 22.4% of the patients' group.

The total cholesterol levels of subjects showed that 16.3% of healthy subjects have high levels while 18.6% are borderline high (Table 4). The corresponding values for patients are 10.2% and 12.2% respectively.

The 5-year risk of developing cardiovascular disease (Table 5) indicated that 14.8% in the male subjects of patients' category only with no such risk occurring in both genders among the healthy subjects. However, among the male subjects, about 6.1% and 18.5% respectively for healthy subjects and patients have intermediate risk from 5-years risk estimate (Table 5). The proportions of male subjects having risk <10% are 93.6% and 66.7% for healthy subjects and patients respectively. The corresponding values for female are 100% and 90.9% respectively, suggesting that male gender are at greater risk than their female counterparts.

Table 6 showed the 10-year predictive risk values in both categories of subjects relative to gender. When both genders were compared, about three-quarter of male subjects in the healthy subjects have risk <10% whereas all the female subjects (100%) have risk values <10%. The corresponding gender values for those in the patients' category are 40.7% and 36.4% respectively for male and female genders. Similarly, no intermediate and high risk in female gender of healthy subjects whereas male and female genders of patients have high risks in the proportion of 37.0% and 13.6% respectively (Table 6). In both genders, being patients also cover higher risk than healthy subjects. For instance, 6.1% versus 37% of healthy and patients who are male have high risk factors (i.e ≥ 20%) whereas these values are 0% versus 13.6% in the female subjects.

Table 7 showed that the 10-years predictive risk of experiencing death from cardiovascular disease depend on health status as well as the type of gender. For instance, no subject in both genders in the healthy subjects is at high risk whereas, about 7.4% of male genders who are patients have high risk of death from cardiovascular disease while no female subjects is at high risks. Similarly, only 66.7% of male patients have low risks compared to 81.8% of the female patients. However the proportion of patients with intermediate risk is also higher in the male patients compared to the female patients. A significance difference (P<0.001) exist when the male risks values were compared between healthy subjects and patients but no such difference exists (P=0.062) among the female subjects.

The proportion of subjects with high risks from 10-years evaluation of risk of developing cardiovascular diseases increased from 0% in those in their third decades of life to 60% in those in their seventh decades of life (Table 8). However, 95.7% and 79.3% of patients in their third and fourth decades of life respectively have low risks compared to the 14.3% and 20% respectively of those in their sixth and seventh decades of life. About 51% of subjects in their fifth decades of life are low risk (Table 8). In a similar vein, the 10-years risk of death from cardiovascular disease indicated 14.3% of subjects in their sixth decades of life as having high risks and no other age stratum is at risk (Table 9). About 5.7%, 35.7% and 80% of those in their fifth, sixth and seventh decades of life respectively have intermediate risk.

The overall risks description between healthy subjects and patients which relate the age strata of subjects to their risks (Table 10) indicated that optimal risks occurred 14% versus 2%, elevated risk in 38.4% versus 10.2%, one major risk in 26.7% versus 38.8% equal or greater than two major risks in 1.1% versus 32.7% of healthy subjects and patients respectively.

DISCUSSION

Hypertensive is most times asymptomatic and therefore put large populace at high risk. The risk of cardiovascular morbidity and mortality has been reported to increase linearly with increase in both systolic and diastolic blood pressure and people who are pre-hypertensive have an increased risk of cardiovascular disease.[7,8] This present study identified a little above one-quarter of the healthy subjects to be hypertensive while close to two-third of those in the patients category are similarly hypertensive. This category of individuals may be at risk of developing cardiovascular events since elevated systolic blood pressure is one of the major cardiovascular risk factors and a strong predictor of CVD.[7] Early detection and management of abnormally elevation BP values is important in preventing the morbid effects and/or diseases progression. The result of this study is not different from the 33.5% prevalence rate of hypertension between 2013-2014 in the US population.[9]

Healthy subjects with stage I and Stage II hypertension increased as age increases with both peaking before 60 years. In contrast to the observed, the distribution of patients with stage II hypertension increased all through as the age increases. This is expected and in agreement with some authors' previous report that hypertension or its risk increases with age.[8] Nearly half of the healthy subjects are at pre-hypertension stage compared to more than one-quarter of the patients' group with similar BP status. Few proportions of subjects in lower age strata in both categories were observed hypertensive. These observed patterns are consistent since individuals are first pre-hypertensive before becoming hypertensive and hypertensive diagnosis is reported to occur during the third to fifth decades of life.[8] Blood Pressure reduction to below 140/90 mmHg is desirable management outcome since in order to prevent cardiovascular events like coronary heart diseases or stroke and other complications like heart failure, peripheral vascular disease, renal impairment, retinal haemorrhage and visual impairment.

A minority of individuals in the healthy subjects were found to have fasting blood sugar in the diabetes range while nearly one-quarter of the subjects in the patients categories are already diagnosed to have diabetes mellitus. The distribution of diabetes relating age in this present study peaked in those in their fifth decades of life among healthy individuals as against the peaked age of 60-69 years of the patients' category. National Institute of health similarly reported age population of DM type II above 60 and 70 years in US.[10] According to Gale[11], DM cases in apparently healthy subjects can be discovered through aggressive screening exercise. The presence of diabetes mellitus increases the risk of cardiovascular events.[8] Furthermore, type 2 diabetes mellitus increases the risk of cardiovascular disease by two folds and diabetes patients are also two-to-four times liable to die from CVD than non-diabetes.[12,13] Aggressive management of cardiovascular disease risk factors in type 2 DM is necessary to reduce the risk of adverse cardiovascular events or death.[14]

Contrary to expectations, the proportions of patients with high levels of cholesterol are higher at lower age range than individual with higher age range. Furthermore, high levels of cholesterol were observed on the average among the healthy subjects compared to the patients' subjects. The reason for this observed pattern is unknown, but it is possible that there is improved awareness of this risk factor in the elderly and among patients since many in this category may have interacted with health professionals where they are adequately educated on effects of such risk factors.

The gender variation in risk differences is demonstrated in the five year risk of developing cardiovascular disease events (Table 4) where a small proportion of male subjects have high risk while about one-tenth have intermediate risk compared to female subjects who only indicated intermediate risk in small proportions of subjects. Also observed was the fact that patients develop higher risks than healthy subjects. For example, the 5 years risk for developing cardiovascular disease events between healthy male subjects and male patients are significantly different ($P<0.001$) from each other. Significant difference among the two subjects was also observed in subjects in the female category ($P<0.001$) (Table 5). Similarly, the 10-year risk of developing cardiovascular disease also vary significantly ($P=0.001$) between healthy subjects and patients for male subjects but not for female subjects ($P=0.167$). Even among the patients, the proportion of subjects with higher risk is higher in male compared to female subjects. Genders differences in cardiovascular diseases are reported.[4]

It has been suggested that individuals with diabetes and hypertension at higher cardiovascular risk (existing atherosclerotic cardiovascular disease or 10-year atherosclerotic cardiovascular disease risk >15%), should target blood pressure control of <130/80 mmHg if it can be safely attained while individuals with diabetes and hypertension at lower risk for cardiovascular disease (10-year atherosclerotic cardiovascular disease risk <15%) be treated to a controlled blood pressure target of <140/90 mmHg.[15] Generally, there is poor early health seeking behaviour of most individuals, more so, that most of the determinants risk factors like hyperlipidemia, hypertension, and smoking are either asymptomatic or showed slow progression of disease. These reasons may account for why most healthy subjects in this study with abnormal BP, fasting blood sugar and cholesterol who have high cardiovascular disease events risks are yet to be diagnosed as such. The outcome can lead to sudden heart attack in previously undiagnosed CVD individuals. Routine CVD surveillance is therefore important in order to identify individual with high risk of cardiovascular events. Some treatment guidelines have consider investigations for coronary artery disease an atypical cardiac symptoms such as unexplained dyspnea, chest discomfort with signs or symptoms of associated vascular disease including carotid bruits, transient ischemic attack, stroke, claudication, or peripheral arterial disease; or electrocardiogram abnormalities affecting the Q waves.[15]

For patients with blood pressure >120/80 mmHg, lifestyle intervention consists of weight loss if overweight or obese, a Dietary Approaches to Stop Hypertension (DASH)-style dietary pattern including reducing sodium and increasing potassium intake, moderation of alcohol intake, and increased physical activity.[15] Lifestyle modifications are an important treatment component in cardiovascular diseases since they lower blood pressure. Other advantages that can also be derived from such modifications have been reported to include: enhancements of the effectiveness of some antihypertensive medications, promotion of other aspects of metabolic and vascular health, and generally leads to few adverse effects.[16] Lifestyle therapy consists of reducing excess body weight through caloric restriction, restricting sodium intake (<2,300 mg/day), increasing consumption of fruits and vegetables (8–10 servings per day) and low-fat dairy products (2–3 servings per day), avoiding excessive alcohol consumption (no more than 2 servings per day in men and no more than 1 serving per day in women)[17], and increasing activity levels.[16]

The proportion of subjects with high risks increased from 0% in those in their third decades of life to nearly two-third in those in their seventh decades of life (Table 7). However, all subjects below 50 years have low risks. A little above average number of subjects in their fifth decades of life is at low risk (Table 7). In a similar vein, the 10-years risk of death from cardiovascular disease indicated no high risk in those below 60 years of age. Above this age strata, both intermediate and high risks begin to emerge. The results of this finding must have indicated that special management attention be given individual who are above 60 years.

CONCLUSION

Both 5 and 10-years predictive risk for cardiovascular disease events indicated higher values in patients compared with healthy subjects. Patients have higher risk of developing CVD events than healthy subjects. The risk of death from the two conditions is also higher among the patients' group than healthy subjects. These risks are also higher in both patients and healthy subjects who are above 50 years of age.

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REFERENCES

1. World Heart Federation: Global facts and maps on deaths due to cardiovascular disease 2012 http//:www.world-heart federation.org/cardiovascular-health/ Accessed on, July 2018
2. Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callaway CW, Carson AP, Chamberlain AM, Chang AR, Cheng S, Das SR, et al., on behalf of the American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics - 2019 update: a report from the American Heart Association [published online ahead of print January 31, 2019]. Circulation. doi: 10.1161/CIR.0000000000000659. accessed on Sept 2019.
3. AHA 2019. Heart Disease and Stroke Statistics—2019 Update: A Report From the American Heart Association. Available at https://www.ahajournals.org/doi/10.1161/CIR.0000000000000659. Accessed on September, 2019
4. World Health Organization. Cardiovascular diseases. 2017 http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) Accessed on, July 2018.
5. Gaziano TA: Reducing the growing burden of cardiovascular disease in the developing world health. Affairs, 2007; 26 (1): 21-24.
6. Texas Health Institute (THI), Cardiovascular Disease 2011. Available at http://www.texasheart.com/HIC/topics Access on, May 2015.
7. Chobanian AV, Bakris GL, Black HR, *et al*. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension, 2003; 42: 1206–1252.
8. Joseph JS and Barry LC: Hypertension: In Pharmacotherapy: A pathophysiologic Approach

edited by JT DiPiro, RI Tabert, GC Yee, GR Matzke, BG Wells and LM Posey; sixth edition.Mcgram-Hill Companies, New York USA, 185-217.
9. Centers for Disease Control and Prevention: Hypertension. 2017. Available at https://www.cdc.gov/nchs/fastats/hypertension.htm, Accessed, July 2018.
10. National Institute of Health: Diabetes in America. Second edition, 1995.
11. Gale EA: Is there really an epidemic of type 2 diabetes? Lancet, 2003; 362: 503–504.
12. Kvan E, Petersen KI, Sanvik L and Reikvam A: High mortality in diabetic patients with acute myocardial infarction: Cardiovascular co-morbidity contributes most to the high risk. Int. J. Cardiol, 2007; 121: 184-85.
13. Highlander P and Shaw GP, Current Pharmacotherapeutics concepts for the treatment of cardiovascular disease in diabetics; the Advance Cardiovasc Dis, 2010; 4: 43-54.
14. Curtis LT, Charles AR and Williams LI: Diabetes Mellitus: In Pharmacotherapy: A pathophysiologic Approach edited by JT DiPiro, RI Tabert, GC Yee, GR Matzke, BG Wells and LM Posey; sixth edition. Mcgram-Hill Companies, New York USA, 2005; 333-1367.
15. ADA, 2019 American Diabetes Association. Cardiovascular Disease and Risk Management: *Standards of Medical Care in Diabetes—2019.* Diabetes Care, 2019 Jan; 42(Supplement 1): S103-S123. https://doi.org/10.2337/dc19-S010.
16. James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*, 2014; 311: 507–520. CrossRefPubMedWeb of Science Google Scholar.
17. Sacks FM, Svetkey LP, Vollmer WM, et al.; DASH-Sodium Collaborative Research Group. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. *N Engl J Med*, 2001; 344*:* 3–10. CrossRefPubMedWeb of Science Google Scholar. https://healthmetrics.heart.org/wp-content/uploads/2019/02/At-A-Glance-Heart-Disease-and-Stroke-Statistics-%E2%80%93-2019.pdf