Section: Medicine

Research

PATTERN OF CARDIAC DISEASES IN YOUNG VESUS OLDER ACUTE STROKE CASES

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Abstract

Background: There is an increasing prevalence of stroke in the young adults as well as older adults in general. Cardiovascular risks are a significant predisposition to occurrence of stroke in both age groups. Various cardiac abnormalities are present in stroke patients either as risk factors or as complications. A relationship exists between these cardiac abnormalities and the prevalence, morbidity and mortality from stroke. The changing pattern of the cardiovascular risk factors among these groups of patients may contribute to a changing pattern of cardiac abnormalities in these patients. The aim of the study was to investigate the pattern as well as prevalence of various cardiac abnormalities in young versus older adult stroke cases. **Materials and Methods:** Descriptive cross sectional and comparative study was done. 180 subjects comprising of 90 young(less than 45years) and 90 older (45years and above) adult stroke patients were recruited for this study. Cardiovascular risk factors (hypertension, diabetes, dyslipidaemias, smoking, and obesity) were assessed for all cases. Socio clinico and cardiac abnormalities were compared among the young versus the older groups. **Result:** Mean age in the young and older stroke patients were 40.23 ± 2.75 and 65.77 ± 12.34 years respectively. Male to Female ratio was 1.6: 1 among the older group and 1.4: 1 among the young group. Hypertension was the most prevalent risk factor in both young and older cases (84.4% vs 92.2%). Other risk factors prevalent were dyslipidaemia (53% of both), abdominal obesity (74.4% vs 64.4%). There was no significant differences both age groups. The commonest pattern of cardiac disease was hypertensive heart disease in both age groups(68.9 vs 65.5%). **Conclusion:** The prevalence of cardiovascular risk factors is high and the pattern of cardiovascular disease is similar in both young and older adult stroke patients.

INTRODUCTION

Stroke is defined by the American Stroke Association (ASA) as the sudden onset of global neurologic deficit of vascular aetiology, with objective evidence of central nervous system infarction or haemorrhage irrespective of the duration of clinical symptoms. Stroke is a major cause of morbidity and mortality in Blacks. In the Western world it is the second leading cause of death and a major cause of disability, and it has been on the rise in Africa. Broadly, stroke can be categorized into ischaemic and haemorrhagic subtypes.[1-5]

The rising incidence of stroke in young adults have been documented in several studies, however it is well established that stroke is more prevalent in the older population. While a specific definition of the "young stroke" is lacking, the vast majority of authors consider "young stroke" to pertain to individuals less than 45 years of age. The 45years age cut off has been used for several international and local studies to investigate the peculiarities of stroke in the young people.[5-12]

Earlier studies reported incidence rates of stroke in the young to be between 7.22% and 26.95% of all stroke cases studied. Cardiogenic embolism accounts for 15% to 30% of ischemic stroke in the general population. Mitral valve disease, which

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accounts for a significant proportion of cardio embolic stroke in young patients, is more common in developing countries due to a high prevalence of rheumatic heart disease. Despite the reducing prevalence of rheumatic heart disease, there is still an increasing incidence of stroke in young adults suggesting a possibility of other aetiologies like hypertension, as seen in older adults.[7,14-16]

Other conditions leading to cardio embolic stroke include atrial fibrillation (AF), non-rheumatic valvular heart diseases, congenital heart disease (e.g. patent foramen ovale), acute myocardial infarction, left atrial myxoma, left ventricular aneurysm/dysfunction, left atrial/ventricular thrombus, hypertrophic obstructive cardiomyopathy, and prosthetic valve. These have been reported from various studies.[17-20]

A combination of clinical assessment, electrocardiography, echocardiography and ancillary investigations improves diagnostic yields in the assessment of cardiac abnormalities. Stroke is a major cause of morbidity and mortality worldwide. Globally, 15million people are affected by stroke and one-third of those affected die annually while another one-third are left permanently disabled. Without intervention, the number of global deaths was projected to rise to 6·5 million by 2015 and would increase to 7·8 million in 2030. This rising burden of stroke weighs heavily on low and middle-income countries, especially the Black population.[22-25]

The prevalence of stroke in Nigeria was 1·14 per 1000 while the 30-day case fatality rate is as high as 40% in 2011.Sanya et al in Ilorin, Nigeria in the year 2015 reported the prevalence of stroke to be 1.31 per 1000 persons, depicting a rising incidence. The frequency of stroke hospitalization ranges from 0.9 to 4.0%. It accounts for 0.5 to 45% of neurological admissions and has been found to be the eighth leading cause of death in Nigeria.[13,27,28]

The young constitute a majority of the work force of any country, and inevitably determine the productivity of such a nation. The existence of disabilities in a significant proportion of this population also increases economic loss and dependence on the family and government for care. The disability associated with stroke has enormous socioeconomic impact on the lives of affected persons. It is the commonest cause of acquired disability worldwide. In 1990, Disability Adjusted Life Years was 38million worldwide, and this is projected to rise to 61million DALYs in 2020.[26,28-30]

The INTERSTROKE study showed that five risk factors accounted for more than 80% of the global risk of all stroke (ischaemic and haemorrhagic subtypes) and they include: hypertension, current smoking, abdominal obesity, diet, and physical inactivity. Congenital and rheumatic heart diseases are said to be commoner in younger patients compared to older patients. This is due to the fact that most patients with these congenital heart diseases have a reduced life expectancy and so are less likely to reach older age. On the other hand, hypertension is reported to be commoner in the older individuals, and is still the most recognized risk factor for stroke in this group of patients. Only a few studies have been done to compare the pattern and prevalence of cardiac abnormalities in the young and old stroke patients. A few of the available studies compared only a few number of young patients with a larger proportion of older stroke patients and as well as recruited only patients with ischaemic stroke in these comparatives.[15,18,21,34-38]

MATERIALS AND METHODS

This is a cross-sectional, descriptive and comparative study done in Delta State University Teaching Hospital (DELSUTH), Nigeria. Every other stroke case that met the inclusion criteria was recruited for the study.

Inclusion Criteria

1. Stroke cases (CT scan or MRI evidenced) aged 18years and above.
2. Cases who consent to participate in the study.

Exclusion Criteria

1. Cases who were not willing to participate in the study.
2. Suspected stroke Patients with CT or MRI evidence of other conditions that mimic stroke such as an intracranial tumour, tuberculoma,

Data was collated, and then analyzed using the Statistical Package for the Social Sciences (SPSS) version 22 Categorical variables were expressed as percentages or proportions, while continuous variables were expressed as means ± standard deviation. Chi-squared and Fischer's exacts tests were used to determine the association between categorical variables, and student t-test was used to determine the difference between means for continuous variables. Level of statistical significance was set at $p<0.05$ for chi-square and t-test. Ethical approval from the Health Research and Ethics Committee of Delta State University Teaching Hospital, Oghara and informed consent was obtained. Confidentiality was maintained.

RESULTS

Ninety young (18- 44 years) and 90 older (45 and above) adult stroke patients who fulfilled the inclusion criteria were recruited for the study. As expected, the mean age of the older participants was statistically more than that of the younger participants (65.8 ± 12.3 years versus 40.23 ± 2.8years, $p<0.001$). Males constituted 62.2% of the study population in the young age group and 58.9% in the older age group. Less than two-fifths (37.8%) of the young patients and slightly above two-fifth

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(41.1%) of the older patients were females. There was however no statistically significant difference between the proportion of males and female participants in both age groups. (p=0.647)

The majority of participants in both groups were married, representing 89% and 85% of the young and older groups respectively. All participants in the young group had one form of formal education or the other, with 66.7% of them having tertiary form of education, while 85.6% of the older patients had one form of formal education, with only 27.8% having tertiary form of education. The proportions of patients with different levels of education among both age groups were statistically significant ($p < 0.001$).

Majority of the respondents in both study groups were farmers and traders (Market-oriented skilled agricultural workers), accounting for 43.3% in young patients and 50.0% in older patients. Clerical support workers, craft and related trade workers were more frequent in young compared to older stroke patients. Participants in older group had more unemployed persons compared with young subjects (22.2% versus 11.1% in older and young groups respectively).

Personal and Family History of Cardiac Risk Factors [Table 1]

Although a history of hypertension was higher in older (67.8%), compared with young patients (57.8%), this was not statistically significant ($p = 0.422$). Lack of awareness of blood pressure status was found in 3.3% of the participants in the older age group and 5.5% of the young age group. Family history of stroke was observed to be more in the Young, 28.9%, compared with 22.2% in the older group. However, there was no statistically significant difference between the family history of stroke among both groups (p-value = 0.200).

Just over one-fifth (21.1%) of older subjects previously had a stroke, similarly about the same proportion (20%) of the younger group had a previous stroke. Therefore, there was no statistically significant difference. (p=0.210) More than two-fifths (43.3%) of patients in the older group had significant alcohol intake, which was higher, compared to 32.2% in the young group. There was no significant difference in the prevalence of alcohol consumption among the two groups of participants. (p=0.124). Stroke patients in the older group had a higher proportion of respondents (10.0%) with both current and past history of cigarette smoking compared to the young (5.6%), though the difference in prevalence was not significant (p=0.266).

Table 1: Personal and Family history of stroke risk factors among participants

Variables	Categories	Frequency (%)		Chi-square	p-value
		<45years (n=90)	≥45years (n=90)		
History of hypertension	Yes	52 (57.8)	61 (67.8)		
	No	33 (36.7)	26 (28.9)	2.048 FE	0.422
	Don't know	5 (5.5)	3 (3.3)		
Family History of stroke	Yes	26 (28.9)	20 (22.2)		
	No	36 (40.0)	48 (53.3)		
	Don't know	28 (31.1)	22 (24.4)	3.217	0.200
Previous History Stroke	Yes	18 (20.0)	19 (21.1)		
	No	71 (78.9)	66 (73.3)		
	Don't Know	1 (1.1)	5 (5.6)	3.121	0.210
Significant Alcohol Use	Yes	29 (32.2)	39 (43.3)		
	No	61 (67.8)	51 (56.7)	2.363	0.124
Cigarette Smoking (Both current and previous)	Yes	5 (5.6)	9 (10.0)		
	No	85 (94.4)	81 (90.0)	1.239	0.266

Pattern of Cardiac Diseases Among Cases [Table 2]

About one-fifth (21.1%) of the young patients had no cardiac diseases which was more than one-tenth (11.1%) of the older group that was without cardiac abnormalities. Hypertensive heart disease was the commonest diagnosis in both groups 65.5% in young and 68.9% in older patients respectively. Of these, hypertensive heart failure was diagnosed in 4.4% of young subjects and 6.7% of older subjects. Others were valvular heart disease, dilated and hypertrophic obstructive cardiomyopathy, ischaemic heart disease, left atrial myxoma, pericardial disease, and heart failure. [Table 3]. Pericardial disease, heart failure, ischaemic heart disease and dilated cardiomyopathy were more in older compared with young patients. Hypertrophic cardiomyopathy was present in one (1.1%) patient in the older group. Also, one patient had left atrial myxoma in the younger group

Table 2: Pattern of Cardiac Diseases in Stroke Patients

Variables	Categories	Frequency (%)		Test statistics X2	P–value
		<45years (n=90)	≥45years (n=90)		
Heart disease	Normal	19 (21.1)	10 (11.1)		
	Hypertensive heart disease	59 (65.5)	62 (68.9)		

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	Valvular heart disease	6 (6.7)	6 (6.7)	8.907	0.259
	Dilated Cardiomyopathy	0 (0.0)	1 (1.1)		
	Hypertrophic cardiomyopathy	0 (0.0)	1 (1.1)		
	Ischaemic heart disease	3 (3.3)	5 (5.5)		
	Left atrial myxoma	1 (1.1)	0 (0.0)		
	Pericardial disease	2 (2.2)	5 (5.5)		

Rheumatic mitral valve disease was the commonest structural valve abnormality, present 6.7% in young and 2.2% in older (p=0.2778). Degenerative aortic valve disease was present in 3(3.3%) of older participants, but none in the younger group. One patient (1.1%) had aortic valve prosthesis (as a treatment for degenerative aortic valve) in older subjects and none in young. BIOPHYSICAL CHARACTERISTICS OF CASES [Table 3].

Anthropometric measurements of study participants showed that the mean body mass indexes (done for only 84 and 85 patients in young and older groups respectively; 26.41 versus 26.56) kg/m² and abdominal circumferences (95.57 versus 93.01) cm among young and older participants respectively were not statistically significantly different.

Mean systolic blood pressure (156 versus 152) mmHg, diastolic blood pressure (95 versus 92) mmHg, mean arterial blood pressure (115 versus 112) mmHg and pulse pressure (61 versus 59) mmHg were elevated in both groups with younger patients having higher values compared to older patients respectively. Comparisons between both groups were not statistically significant.

The mean fasting blood sugar was higher in the young group (87.79 mg/dl), compared with the older group (81.70mg/dl), There was no statistically significant difference amongst the means in both groups (p=0.055). Lipid profile of both groups showed that the mean of low-density lipoprotein cholesterol was higher (94.80mg/dl) in older group compared with 87.21mg/dl in the young patients. There was a significant difference between the means (p =0.004).The mean triglycerides were higher in the older group (129.32mg/dl) compared with the young (125.01mg/dl), but there was no significant difference (p=0.202).Mean high-density lipoprotein cholesterol in young was slightly higher (49.25mg/dl) than the mean for older group (45.78mg/dl), but there was also no statistically significant difference in the means (p=0.101).The mean total cholesterol was similar (178.63 versus 178.87) mg/dl in both young and older groups of patients respectively, and was not statistically significantly different in both groups (p = 0.929).

Table 4: Biophysical characteristics of cases

Variables	<45years (n=90)	≥45years (n=90)	T	p-value
Anthropometry				
Body mass index (kg/m2)	26.41 ±4.13	26.56 ±3.72	0.270	0.788
Abdominal circumference(cm)	95.57 ±11.03	93.01 ±9.81	1.643	0.102
Blood pressure				
Systolic blood pressure(mmHg)	156.99 ± 32.20	152.36 ±21.91	1.129	0.261
Diastolic blood pressure(mmHg)	95.24 ±13.16	92.40 ±12.63	1.480	0.141
Mean Arterial BP (mmHg)	115.83 ± 17.00	112.38 ± 14.11	1.477	0.142
Pulse pressure(mmHg)	61.74 ± 27.81	59.96 ± 17.36	0.518	0.605
Laboratory investigation				
Fasting blood glucose (mg/dl)	87.79 ± 20.26	81.70 ± 22.07	1.928	0.055
Lipid profile				
Total cholesterol (mg/dl)	178.63 ±19.56	178.87 ± 15.88	0.089	0.929
HDL cholesterol (mg/dl)	49.25 ±17.26	45.78 ± 9.74	1.648	0.101
LDL cholesterol (mg/dl)	87.21 ± 17.48	94.80 ± 16.67	2.947	0.004
Triglyceride (mg/dl)	125.01 ±24.82	129.32 ± 20.07	1.281	0.202

Prevalence of Traditional Risk Factors Among Cases [Table 5]

Hypertension, abdominal obesity, and dyslipidaemia were the most prevalent cardiovascular risk factors among both groups in decreasing order. Hypertension (92.2% versus 84.4%), BMI based obesity (14.4% versus 4.0%), and Diabetes mellitus (28.8% versus 22.2%) were more prevalent in older group than young respectively. There was however no statistically significant difference between the prevalence of these cardiovascular risk factors in the older group compared with young participants.

A family history of heart disease was the least frequent risk factor that was reported in both groups (present in 4.4% and 3.3% of the older and young respectively). There was no significant statistical difference in the prevalence in both groups (p=0.807). The prevalence of dyslipidaemia was same in both age groups of patients (53.3%). Obesity using abdominal circumference was higher in the young (74.4%) compared with the older group (64.4%).There was however no significant difference between the prevalence in both groups of patients (p=0.145).

Table 5: Prevalence of Traditional risk factors among Stroke cases

Variables	Categories	Frequency (%)		Chi-square	P–value
		<45years (n=90)	≥45years (n=90)		
Hypertension	Present	76 (84.4.)	83 (92.2)		

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	Absent	14 (15.6.)	07 (7.8)	2.642	0.104
Dyslipidaemia	Present	48 (53.3)	48 (53.3)		
	Absent	42 (46.7)	42 (46.7)	0.000	1.000
*BMI category	Normal	34 (43.3)	30 (34.4)		
	Overweight	37 (41.1)	43 (51.2)		
	Obese	3(4.0)	12 (14.4)	0.734	0.693
Obesity (abdominal circumference)	Present	67 (74.4)	58 (64.4)	2.212	0.145
	Absent	23(25.6)	32(35.6)		
Diabetes Mellitus	Present	20 (22.2)	26 (28.8)	1.051	0.305
	Absent	70(77.8)	64(71.2)		
Family history of heart	Yes	3 (3.3)	4 (4.4)	0.430	0.807
disease	No	56 (62.2)	52 (57.8)	0.430	0.807
	Don't know	31 (34.4)	34 (37.8)		

*could not be done for all patients (done for only 84 and 85 patients in young and older groups).

DISCUSSION

The mean age of patients in the young group (selected from among 18 and 44 years of age) in this study was about40years. This mean was similar to the 38years reported from a previous work done by Razzaq et al in South East Asia among young stroke patients (between 15 and 44years of age). These means were however higher than the 31years mean that was reported from a similar study (that compared cardiovascular risk factors in young stroke patients aged 15 and 44years compared with older stroke patients) by Karaye et al in Kano Nigeria.[10,37]

The dissimilarity in mean age may be accounted for by the variation in the sample sizes of the study population in this current study and Karaye et al's study; Karaye et al included only 15 young patients and 65 older adult stroke patients, while this study recruited 90 young and 90 older adult stroke patients. On the other hand, the mean age of those in the older group was about 65years (selected from patients 45years and above). This mean age was similar to that recorded among adult stroke patients (40years and above) in Port Harcourt, Nigeria by Ezennaka et al.[24] As expected, the age difference between the young and older groups of participants in this study was statistically significant.[21]

Male to female ratio among the participants shows a male preponderance in both age groups of stroke patients. The male sex is known to be a risk factor for stroke, especially in younger patients, except in postmenopausal women who have comparable or a higher risk. This finding of male preponderance is similar to that reported by Kolo et al in Ilorin, south-west Nigeria and Fromm et al in Bergen, Norway. Ogun et al, however, reported a slightly higher proportion of females in a study conducted among stroke patients in Sagamu, Nigeria. The reason for this disparity is not clear but may be related to the method of selection of the participants in the study in Sagamu as cases were selected from medical records of consecutive patients admitted prior to the study date, and such correct documentation of prevalence may have been difficult. The mean age from that study was 68years, representing an older population with postmenopausal women in which prevalence of stroke is believed to be comparable to that in males or even higher.[13,22,38,54,55]

The level of education was significantly higher in the young group when compared to the older participants. This finding is congruent with that from a comparative study done in Finland among young and older age groups of stroke patients. The reason for this difference may be related to increasing westernization, which affords younger persons more opportunity for higher education, compared to what obtained in the past when fewer persons had the opportunity for higher studies. This difference may affect health-seeking behaviour and lifestyle preference which may determine the occurrence of cardiovascular diseases. A different study will be needed to establish this relationship.[55]

Risk Factors for Stroke

Systemic hypertension was the most common risk factor identified from this study for both groups of patients, present in well above four-fifth of both age groups. The prevalence of hypertension in the young was high in this study and was comparable to that in the older group. This high prevalence in the young may be a reflection of an increasing prevalence of hypertension in younger people and an increasing trend towards unhealthy lifestyle practices among the young people. This high prevalence among young and old was similar to findings reported by Owolabi et al from a multicenter study where 88.7% of the younger group and 91.6% in the older adult stroke patients had systemic hypertension. This was not surprising as hypertension is the most common cardiovascular risk factor in sub-Saharan Africa.[49,56-58]

However, in contrast to this current study in which the prevalence of hypertension was comparable among young and older adult stroke patients, Karaye et al in Kano Nigeria reported lower prevalence in the young compared with the older group. Similarly, Fromm et al in Norway reported a significantly lower prevalence of hypertension in the young when compared with the older group. The difference in this prevalence may not be unconnected to the fact that the number of young patients recruited for comparison was much fewer. These studies with a lower prevalence of

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hypertension in the young also considerably had a lower prevalence of traditional risk factors among the young group. There was no significant difference in the mean systolic blood pressure (SBP) and diastolic blood pressure (DBP), Pulse pressure (PP) and mean arterial blood pressure (MAP) among the two groups of patients reflecting the similarity of the prevalence of hypertension among both groups. This finding also mirrors mean blood pressure values among young and older stroke patients in the previous study done by Karaye et al.[37]

The prevalence of dyslipidemia was high in both age groups and did not vary significantly among both groups of participants. This high prevalence is a reflection of the high Nigerian prevalence of dyslipidemia among the general population. A study of the prevalence of dyslipidaemia among apparently healthy Nigerians was reported by Oguejiofor et al to be between 60-89%.[59,75]

Yau et al in Kano, Northern Nigeria and Putaala et al in Helsinki Finland, reported comparable prevalence (53 and 60% respectively) among adults with stroke ranging from young to older adults. Putaala et al specifically looked at young ischaemic stroke patients between the ages of 15 and 49years, and reported dyslipidemia to be as high as 60%. The definitions of dyslipidemia was with the NCEP standard criteria in these previous studies and the index study. Conversely, Assogba et al in Togo and Zabsonr et al in Burkina Faso reported a much lower prevalence of dyslipidaemia (4.2% and 20.6% respectively) as a cardiovascular risk factor among adult stroke patients. Assogba et al and Zabsonr et al, defined dyslipidemia using total cholesterol only as against the earlier studies that used standard definition criteria. This may be accountable for the differences in prevalence in the various studies with high and lower prevalence.[32,35,42,60]

The mean values for total cholesterol, high-density lipoprotein cholesterol, and triglycerides were comparably similar between the young and the older groups of patients, this may be due to the comparable prevalence of dyslipidaemia among both age groups studied. This finding of comparable mean values of cholesterol is similar to previous findings in Kano and in the USA. The mean low-density lipoprotein cholesterol was significantly lower in the young than the older group of participants. These differences may be related to the differences in the duration of dyslipidaemia, treatment status, differences in medication type and adherence to medications. The implication of this finding is that lifestyle measures to reduce total cardiovascular risk both among young and older persons, are probably not strictly adhered to, and this may be responsible for the increasing prevalence of dyslipidaemia as a cardiovascular risk.[35,37,61]

Prevalence of diabetes mellitus in this study was comparably similar among young and older stroke patients. The reason for this similarity in the prevalence of diabetes among the young and older groups is not clear, but may be related to the comparable prevalence of obesity/overweight, hypertension amongst others. Similarly, the mean fasting blood glucose (FBG) levels among both age groups were comparable. This comparable prevalence of diabetes and comparable levels of FBG across different age groups of stroke patients is similar to findings from studies from Bergin Norway by Fromm et al, Owolabi et al in a Ghana/Nigeria multicenter study, and Assogba et al in Togo among young and older stroke patients.[32,38,58]

Diabetes Mellitus is a significant risk factor for the initiation of atherosclerosis and the excess risk of stroke in patients with diabetes mellitus is higher when compared with normal individuals in a general population. It is therefore vital to ensure good glycemic control in those with the condition to prevent the development of stroke. The implication of the findings from our study is that this risk is present irrespective of the age of the individual with stroke.[39,41]

Overweight using the body mass index (BMI) was found in a significant proportion in both young and older groups of stroke patients in this study. The average BMI was high (about 26kg/m^3) in both groups of patients. Though the prevalence of BMI-based obesity was relatively higher in the older patients, there was no significant difference between the body mass indexes of both groups of patients. The reason for a slightly higher body mass index among the older group of the patient in this study may be due to socioeconomic differences in health related behaviour such as excessive alcohol consumption, unhealthy diet and physical inactivity.[62]

This high prevalence of overweight/obesity is similar to that reported by Komolafe et al in Ile-Ife Nigeria found over a third of stroke patients to be overweight and only 14.6% were obese. The majority of participants in Komolafe's study were above forty years of age, representing a relatively older population. Obesity however, did not vary significantly with age in that study. Wang et al in China had also reported a high prevalence of overweight (37%) and obesity(7%) among ischaemic and haemorrhagic stroke patients recruited consecutively. The prevalence of obesity and overweight in both age groups is likely related to poor attention to healthy lifestyle measures that are generally recommended for adults, especially in the presence of other cardiovascular risk factors. Song et al in Korea had reported that stroke morbidly and mortality is higher with increasing BMI.[45,46,63]

Conversely, the prevalence of obesity estimated using abdominal circumference was found in both age groups (74.4% in the young and 64.4% in the older) was high in this current study. A finding which supports a previous report by Prasad et al that reviewed data on abdominal obesity among Asians, in India,where abdominal obesity was found to be a

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significant risk factor for cardiovascular disease, irrespective of the BMI of the patients. It is possible that ethnicity, lifestyle (sedentary) and dietary pattern could have influenced the results observed; however since this study did not assess these variables, these results should be explained with caution because some of these factors could affect body weight. It is believed that our findings can serve as a guide to investigate further, the relationship between abdominal obesity and risk for cardiovascular disease, compared with BMI-based obesity.[64]

A family history of heart disease was present in 3.3% and 4.4% of young and old respectively, these figures, though low in both age groups, may be a reflection of the poor knowledge of symptoms of heart disease and also poor health-seeking behaviour among Africans. This may be explained by the fact that over a third of both age groups in this study did not know if they had a family history of heart disease.[65]

Family history of stroke was present in 28.9% and 22.2% of young and older groups of patients. There was also no difference in the prevalence of family history of stroke among both age groups. The family history of stroke is significantly more reported in both age groups compared to that reported for heart disease, probably because symptoms of stroke may be much easier to identify among family members. A multi ethnic study in Amsterdam, Netherlands by Valerio et al, reported a high risk of cardiovascular disease in individuals with a family history of cardiovascular disease and this risk was found to increase the risk of stroke. Similarly, Amu et al in Lagos, found a family history of stroke in 25% of patients with stroke and was higher than the prevalence among controls recruited for that study.[39,66]

A study among young stroke patients in India by Chandana et al, reported a family history of stroke in only 2% of individuals whereas Razzaq et al in Pakistan reported the prevalence of family history of heart disease among young stroke patients to be 12.7%. Although the reason for the differences in family history of stroke in the various studies could not be explained, there may be some genetically determined factors as linking to the occurrence of stroke and heart disease among family members, which can be expressed at different stages of life.67

Other risk factors documented include the previous history of stroke, significant alcohol use and current and past history of cigarette smoking. They were not significantly different among the age groups. The prevalence of cigarette smoking among participants was comparable to national tobacco smoking prevalence (7.7% ever smokers) in the Nigerian population. The older group of patients had a higher cigarette smoking prevalence but was not statistically different from the young. Sani et al in North West Nigeria also reported 4.2% prevalence among adult stroke patients, while Owolabi et al in a multi centre study reported 8% prevalence of current and past tobacco use among adult stroke patients.[36,58,66]

Karaye et al, in a comparative study among young and older stroke patients in Kano, reported 10.8% prevalence of cigarette smoking among older adult and none of the young stroke patients had any cigarette smoking history in that study. The reason for the significant disparity in prevalence among both age groups may be due to the limitation of smaller sample size in the young group of that Kano study. Desalu et al in Ilorin, North central Nigeria, however, reported a higher prevalence of smoking among stroke patients (22.8%).[37,41]

Desalu's study however recruited a significantly older population with a mean age of 68years and may account for a higher prevalence of smoking in that study since older patients are more likely to be ever smokers, even though not currently smoking actively. On the contrary Chandana et al in India reported 36% prevalence of cigarette smoking among young stroke patients, while Razzaq et al in Pakistan reported 21% prevalence of smoking as a risk factor for stroke in young patients.[10,67,69]

These Asian studies did not compare with older stroke patients. However, Fromm et al, in a comparative study had reported a significantly higher prevalence of current cigarette smoking among younger stroke patients compared to the older group. The reason for the high prevalence among the young stroke patients in some of these studies may be from sociocultural acceptability or poorly implemented legislature against smoking wherever it exists., Cigarette smoking has been documented to increase the risk of stroke due to increased risk of atherosclerosis.[10,38,44,67]

Significant alcohol use was prevalent in both groups of participants -33.2% in the young and 43.3% among older adults. The prevalence in both groups is high and maybe for different reasons, social drinking among the young patients and cultural practices among the older groups; who use alcohol for prayer purpose and dilution of herbal medications consumed to relieve age-related pains and other conditions Chandana et al and Subha et al both reported similar prevalence(30% and 40% respectively) among young stroke patients in India. However, this prevalence was much higher than the prevalence (3%) of significant alcohol use reported by the SIREN study group, in which all sub-types of stroke patients were recruited. Higher prevalence of alcohol use was present in that study, but only 3% had a history of significant use. This dissimilarity may be due to the heterogeneity of the cultural practices among the study population in the SIREN study.[47,58,63,70]

Most of these studies (Subha et al and Chandana et al) identified alcohol consumption to be significantly higher in young compared with the older adult stroke patients. The presence of significant alcohol use in both old and young groups in this study may also be related to lifestyle preferences among the population studied.

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Cardiac Disease Distribution: Cardiovascular diseases were identified in this study with a combination of clinical symptoms, physical examination and investigation findings in the patients recruited. A diagnosis of heart disease was made in over three-quarters of the young patients and over four-fifths of the older group. Hypertensive heart disease was the most predominant form of heart disease in both groups. The prevalence of hypertensive heart disease was similar in both groups of patients. This may be a reflection of the role of hypertension in the development of heart disease suggesting that the patients have had hypertension for a considerable length of time, resulting in cardiac remodeling. Prevalence of hypertension was considerably high in this study among the young and older groups. Previous studies have demonstrated that hypertensive heart disease is a risk factor for stroke; it leads to the development of left ventricular hypertrophy, cardiac arrhythmia, heart failure, myocardial ischaemia, left atrial abnormalities and functional valvular damages.[50,51]

Hypertensive heart disease was the commonest heart disease reported from some previous studies to investigate heart disease pattern in a different group of patients; Umuerri et al in Oghara, Southern Nigeria reported 45.9% prevalence of hypertensive heart disease among patients who were referred to do echocardiography done for varying indications. Yau et al in Northwest Nigeria reported 55% among adults stroke patients of all subtypes. Karaye et al in a comparative study between young and older stroke patients in Kano Nigeria reported 66.7% prevalence of hypertensive heart disease among the older group and 33% in the younger group. Similar to all these studies and the index study was that hypertension was the commonest risk factor for heart disease and stroke in the participants of the various studies, therefore suggests the contributory role of hypertension in causing heart disease.[35,37,53]

The prevalence of valvular heart disease, Ischaemic heart disease, and pericardial disease was low in both age groups and was not significantly different in both groups as well. This could be a reflection of the low prevalence of rheumatic valve disease in the population from which the study was done. In this study, all young patients with valve disease had rheumatic mitral valve disease, while the older group had predominantly degenerative aortic valve disease (3.3%), and others had rheumatic mitral valve disease (2.2%) and prosthetic aortic valve disease (1.1%). Umuerri et al has earlier reported 7.2% (rheumatic heart disease), 0.3% (Ischaemic heart disease) and 0.7% (pericardial disease) prevalence among adult patients referred to have echocardiography for various indications, in Oghara, Delta State where this current study was done.[53]

Fromm et al in Norway reported a low prevalence of valve abnormalities in stroke patients in his comparative studies between the young (5.0%) and older (1.9%) stroke patients, with a slightly higher prevalence in the young group. The Norwegian study however compared very few numbers of young patients with over 10 times higher number of older patients; this may have contributed to the difference in the prevalence among both group. Similarly, Yau et al also found a slightly higher prevalence (8%) of rheumatic valve disease while Kolo et al reported a prevalence of 7.2% in Ilorin among stroke patients. The slightly lower prevalence of valvular heart disease in this study may be a reflection of a reducing prevalence of rheumatic heart disease, explained by increasing use of antibiotics for febrile illnesses and improving health-seeking behaviour and cardiac diagnostic facilities among children.[22,25,35,38,42,46,71]

On the contrary, there was a higher prevalence of ischaemic heart disease among stroke patients in this current study. This prevalence is higher compared to a previously reported prevalence of ischaemic heart disease among all adult patients studied, using echocardiography, in the same centre by Umuerri et al. Though participants in the previous study was not restricted to stroke patients, but the difference in prevalence suggest that the prevalence of Ischaemic heart disease may be on a rising trend, especially in patients with a high prevalence of other cardiovascular risk factors. Interestingly, no patients in both study groups was found to have congenital heart defects like patent foramen ovale, atrial septal defects amongst others, and the prevalence of rheumatic heart disease was not significantly higher in the young when compared to older patient groups. The reason for this is not known, but it may be that valvular heart disease and congenital heart diseases are not major contributions to occurrence of stroke in Delta state, Nigeria where this study was done.53

The low prevalence of cardiomyopathy in this study (1.1% hypertrophic cardiomyopathy in the older group and 1.1% dilated cardiomyopathy in the young) is comparable to the low prevalence reported by Amu et al in Benin-City, Nigeria(1.25%) among stroke patients. Biller et al in Iowa, USA reported 2(1.5%) cases of dilated cardiomyopathy and 1(0.8%) among young stroke patients with non-haemorrhagic cerebral infarction; though only a few of the participants had echocardiography done in those studies. Kolo et al in Ilorin, Nigeria, however, reported a higher prevalence of dilated cardiomyopathy (7.1%) among adult stroke patients who all had echocardiography done.[20,22,39]

Interestingly, in this current study, one of the older patients had hypertrophic cardiomyopathy, and also atrial fibrillation on electrocardiography. This is an interesting finding among the older group of patients since the patient was expected to have presented at a younger age. The index patient was however diagnosed five years prior to the occurrence of stroke and was not able to afford recommended treatment before presenting with atrial fibrillation and later stroke. A similar finding has been documented in Japan by Higashikawa et al, with the observation that atrial fibrillation increase risk of

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stroke in patients with hypertrophic cardiomyopathy. The dissimilarity in prevalence between this current study and the study by Kolo et al may have resulted from differences in the method of patient recruitment (consecutive versus systematic sampling), differences in the risk factors for stroke: In the study by Kolo et al, some patients had peripartal cardiomyopathy (PPCM) compared to this study which had none. Dilated cardiomyopathy is a cause of chamber enlargement, which can predispose to a cardiogenic source of emboli (CSE) and also lead to cardiac arrhythmias and predispose to development of stroke.[22,39,48,72]

Left atrial intracardiac mass (most likely a myxoma) was an isolated finding in one of the young patients with ischaemic stroke. A similar finding has been previously reported by Biller et al in Iowa, USA, Sanya et al and Kolo et al both in Ilorin, Nigeria, among young stroke patients. The intracardiac mass most probably served as a reservoir for thrombus formation which was dislodged ultimately and then embolize to the right middle cerebral artery, resulting in ischemic stroke.The pericardial disease was found slightly more among the older stroke patients in this study. The reason for this finding is not clear, but this can however be investigated in a different study.[20,22,25,52,73,74]

CONCLUSION

The most frequent risk factors among both age groups of stroke patients were hypertension, dyslipidemia and obesity/overweight.

This study suggests that traditional cardiovascular risk factors are prevalent in the young and older stroke patients and are contributory to occurrence of heart diseases which are similar in pattern and prevalence in both age groups of patients with little or no difference.

Recommendation

1. Screening for cardiovascular risk and cardiac abnormalities should be done for all adult patients with stroke.
2. Control of high blood pressure, dyslipidaemia, and obesity should be more intensive and aggressively done.
3. Further study should be done to evaluate the high prevalence of cardiovascular risk factors in both young and older groups of patients with stroke

Limitation of this Study

This research is hospital-based and so lacks the opportunity to include several patients with stroke in the community who have not been referred to this institution. This can invariably affect the pattern of diagnosis.

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