Afr. J. Med. Med. Sci. (2022) **52(2) 113 - 121**

How common is heart failure on medical wards of University College Hospital Ibadan, Nigeria?

OS Ogah[1,2], A Adebiyi.[1,2], B Adedokun.[3], A Aje[2], A Adeoye.[1,2], WO Balogun[4], OA Orimolade, KA Olatunde[5], O Oladapo[1,2,6] and AO Falase[1]

Department of Medicine[1], Division of Cardiology[2], Epidemiology and Medical Statistics[3], Endocrinology[4], ECG Unit[5] and Anatomy[6], College of Medicine, University of Ibadan and University College Hospital, Ibadan, Nigeria.

Abstract

Objective: The aim of this study was to determine the frequency of heart failure, patterns and clinical outcome on the medical wards of University College Hospital, Ibadan, Nigeria.

Methods: The study was retrospective in design. The records of patients admitted on account of heart failure during the period were reviewed. Information obtained included date of admission, age, sex, clinical diagnosis/aetiology of heart failure, co-morbidities, outcome (discharged, alive or died). In all the subjects, clinical diagnosis of heart failure was confirmed at echocardiography.

Results: During the period under review (April 1, 2013 to March 31, 2016), there were 5463 medical admissions. Heart failure admission was documented in 589 participants, constituting 10.8 % of medical admissions. There were 302 (51.3%) females and 287 (48.7%) males. The mean age of the heart failure patients was 55.1 years (SD = 17.5), with ages ranging from 12 to 99 years. There were more cases aged 40-59years (34%) and 60 years and above (44.1%) Hypertensive heart disease was the commonest diagnosis (78.6%). Comorbid conditions were found in less than a quarter (22.2%).

The median duration of hospital stay was 8 days (25^{th} and 75^{th} percentiles: 5, 12; IQR = 7 days).

Over three quarters (84.6%) were discharged home, 12.9% died and 2.5% discharged against medical advice**.** Significantly higher mortality was found among cases with comorbidity. Heart failure cases due to cardiomyopathy were more likely than patients with hypertensive heart failure to have died.

Conclusions: Heart failure is responsible for about 11% of medical admissions at the University College Hospital, Ibadan Nigeria. This appears to have remained unchanged when compared to a rate of 11.2% in the 60s/70s. Although Heart failure is a disease of young and middle aged adults, the rate was higher in the elderly population in this study. Hospital mortality appears high and this calls for future interventions.

Correspondence: Dr. O. Ogah, Division of Cardiololgy, Department of Medicine, College of Medicine, University of Ibadan, Ibadan, Nigeria. E-mail: osogah56156@gmail.com

Keywords: *Heart failure, Cardiac failure, Cardiac dysfunction, Left ventricular dysfunction, medical admissions, Ibadan, Nigeria*

Abstract

Objective: The aim of this study was to determine the frequency of heart failure, patterns and clinical outcome on the medical wards of University College Hospital, Ibadan, Nigeria.

Methods: The study was retrospective in design. The records of patients admitted on account of heart failure during the period were reviewed. Information obtained included date of admission, age, sex, clinical diagnosis/aetiology of heart failure, co-morbidities, outcome (discharged, alive or died). In all the subjects, clinical diagnosis of heart failure was confirmed at echocardiography.

Results: During the period under review (April 1, 2013 to March 31, 2016), there were 5463 medical admissions. Heart failure admission was documented in 589 participants, constituting 10.8 % of medical admissions. There were 302 (51.3%) females and 287 (48.7%) males. The mean age of the heart failure patients was 55.1 years (SD = 17.5), with ages ranging from 12 to 99 years. There were more cases aged 40-59years (34%) and 60 years and above (44.1%) Hypertensive heart disease was the commonest diagnosis (78.6%). Comorbid conditions were found in less than a quarter (22.2%).

The median duration of hospital stay was 8 days (25th and 75th percentiles: 5, 12; IQR = 7 days).

Over three quarters (84.6%) were discharged home, 12.9% died and 2.5% discharged against medical advice**.** Significantly higher mortality was found among cases with comorbidity. Heart failure cases due to cardiomyopathy were more likely than patients with hypertensive heart failure to have died.

Conclusions: Heart failure is responsible for about 11% of medical admissions at the University College Hospital, Ibadan Nigeria. This appears to have remained unchanged when compared to a rate of 11.2% in the 60s/70s. Although Heart failure is

a disease of young and middle aged adults, the rate was higher in the elderly population in this study. Hospital mortality appears high and this calls for future interventions.

Keywords: *Heart failure, Cardiac failure, Cardiac dysfunction, Left ventricular dysfunction, medical admissions, Ibadan, Nigeria*

Introduction

Heart failure (HF) is "a clinical syndrome characterized by dyspnoea and fatigue on exertion (and occasionally at rest) and evidence of fluid retention which may lead to peripheral oedema or pulmonary congestion" [1]. This is in the context of a structural or functional cardiac disorder that impairs its ability to fill and pump blood (at rest). Globally, HF which is a common reason for hospital admission is now a public health issue which is associated with high mortality and economic cost. About 37.7 million people are affected worldwide [2]. It is estimated that 5.8million people in the USA have HF and 2.4 million in Japan [2]. About one million new cases are diagnosed yearly worldwide [2].

Data from high income countries indicate that HF increases with age. The mean age at presentation in these economies is mid-70s [2]. On the other hand, HF is a disease of the young and middle age people in low income countries with the attendant high Disability-Adjusted Life Years(DALYS) [3-6].

The prognosis of HF is poor with about 50% of individuals admitted for the first time with HF dying within 5-years.[7] HF is associated with sudden death or with worsening HF symptoms and fluid overload.(2) Over a period of 14 years, mortality from HF in the US has increased from 290 to 310 per 1000 cases [8].

There are limited data on HF in Sub-Saharan Africa in general and Nigeria in particular. With possible changes in demography, prevalence of risk factors and aetiologies of HF, it is important to know how these have impacted the admission and mortality rates of HF in our setting. This study was carried out to determine the frequency of HF, patterns and clinical outcome of HF on the medical wards of University College Hospital, Ibadan, Nigeria.

Materials and Methods

The study was conducted at the medical wards of the University College Hospital, Ibadan, Nigeria. It is a retrospective three [3] years review of all HF cases admitted into the medical wards of the hospital from April 1, 2013 to March 31, 2016.

The University College Hospital, Ibadan is the oldest teaching hospital in the country and affiliated to the University of Ibadan. Currently the hospital has 850 bed spaces and 163 examination couches with a current bed occupancy rate of 55-60%. The hospital has over 60-clinical departments. It serves a population of over 10-million people and receives referrals from all over the country as well as from the West African sub-region.

The records of patients admitted on account of HF during the period were reviewed. Information obtained included date of admission, age, sex, clinical diagnosis/aetiology of HF, co-morbidities, outcome (discharged, alive or died). In all the subjects included, clinical diagnosis of HF was confirmed by echocardiography. The total number of medical admissions during the 3-year period was also computed. For patients who were readmitted, the first admission during the period of review was taken.

The UCH Ibadan has a good health information management system. It operates a central record system with outlets in the clinics such as the medical outpatient clinic. This makes retrieval of case notes relatively easy but with occasional hitches. The source of data is the UCH case note. At the moment the hospital is not fully using electronic database.

Ethics approval was obtained from the Joint University of Ibadan/ University College Hospital ethics review committee.

Definitions of all aetiologic risk factors

HF in addition to any of the following (as documented previously)[9]:

a. Valvular heart disease: (i) Mitral stenosis: – presence of thickened and calcified mitral valve leaflets, loss of the classic M-shaped pattern of a normal mitral valve, diastolic dooming and restriction of the mitral valve leaflet motions; (ii) Mitral Regurgitation: Poor coaptation of the mitral valve leaflets in systole, thickened leaflets, dilated and hyperdynamic left ventricle; (iii) Aortic stenosis: Presence of calcified aortic valve, reduction in aortic cusp sepa(9)ration, highly echo reflectant aortic valve leaflets; and
(iv) Aortic regurgitation: Poor coaptation of the aortic cusps in diastole dilated left ventricles and fine fluttering of the anterior mitral valve in diastole.
b. Dilated cardiomyopathy was diagnosed when there are dilated heart chambers with normal or

decreased wall chambers as well as impaired LV systolic function

c. Endomyocardial fibrosis (EMF) was documented in the presence of clinical features coupled with dilated atria and thickening of the endocardium especially at the apices of the ventricles.
d. Pericardial effusion was diagnosed when there is echo free space between the visceral and parietal pericardium. Diagnosis of constrictive pericarditis was based on standard criteria.
e. Cor pulmonale was present when there is dilated and hypertrophied right ventricle (RV), evidence of increased RV systolic pressure (D-shaped LV in diastole (diastolic flattening of the LV septum)
f. HF associated with diagnosis of myocardial infarction. Diagnosis of MI was based on ECG changes, Cardiac enzyme elevation and regional wall motion abnormality at echocardiography

Data management and statistics

Data were first obtained using a proforma. Epi-info (Epi Info™ 7) was used for data management. SPSS version (IBM SPSS statistics version23) was used for statistical analysis. All the continuous variables **were** expressed as mean +/_ Standard deviation (SD) while categorical variables **were** expressed as proportions where applicable comparison of continuous and categorical variables were by student t-test and chi-square statistics respectively. A p-value of < 0.05 was considered as statistically significant.

Results

During the period under review, there were 5463 medical admissions. Heart failure admission was documented in 589 participants, constituting 10.8 % of medical admission. There were 302 (51.3%) females and 287 (48.7%) males. The mean age of the HF patients was 55.1 years (SD = 17.5), with ages ranging from 12 to 99 years. There were more cases aged 40-59years (34%) and 60 years and above (44.1%).

Hypertensive heart disease was the commonest diagnosis (78.6%) followed by cardiomyopathy-related (7.1%) and valvular (6.6%). Hypertensive heart failure was significantly commoner among males and older patients while the reverse was found for cardiomyopathy ($p < 0.001$)

Comorbid conditions were found in less than a quarter (22.2%). Of this number, about a quarter (25.2%) had diabetes mellitus (or 5.6% of all patients with HF), 12.2% each had chest infection or atrial fibrillation, and 11.5% had Sickle cell disease. Other comorbidities include chronic obstructive pulmonary

Table 1: Frequency and percentage distribution of socio-demographic and clinical variables in the participants

Variables	Frequency	%
Age group (years)		
<20	14	2.4
20-39	108	18.3
40-59	200	34.0
60+	260	44.1
Missing	7	1.2
Gender		
Male	287	48.7
Female	302	51.3
Comorbidity		
Yes	131	22.2
No	458	77.8
Type of heart disease		
Hypertensive heart disease	463	78.6
Valvular heart disease	39	6.6
Cardiomyopathies	**42**	**7.1**
Dilated Cardiomyopathy(idiopathic)	20	3.4
Alcoholic Cardiomyopathy	1	0.2
Thyroid heart disease	11	1.9
Peripartum cardiomyopathy	10	1.7
Ischaemic heart disease	11	1.9
Pericardial diseases	1	0.2
Complete heart block	8	1.4
Anaemic heart failure	15	2.5
Cor pulmonale	9	1.5
Congenital heart disease	1	0.2

Table 2: Age and gender differences in aetiology of heart failure

	N	Hypertensive	Valvular	Cardiomyopathy	Others	P value
Age (years)						
<20	14	14.3	50.0	21.4	14.3	<0.001
20-39	108	52.8	1.7	19,4	12.0	
40-59	200	80.5	7.0	6.0	6.5	
60+	200	90.8	0.4	2.3	6.5	
Gender						
Male	287	85.7	5.6	2.4	6.3	<0.001
Female	302	71.9	7.6	11.6	8.9	

disease (5.3%), sepsis (4.6%), acute pulmonary edema (4.6%), infective endocarditis (3.8%), cardiogenic shock (3.1%). About 5% of cases had been readmitted in the period of study. Readmission rates were similar between HF due to hypertension (5.4%), valvular aetiology (5.1%), and cardiomyopathy related (4.8%). Over three quarters (84.6%) were discharged home, 12.9% died and 2.5% discharged against medical advice.

Table 3: Frequency of co-morbidities in the participants

Comorbidity	Frequency	Percent (%)
Diabetes Mellitus	33	24.8
Other arrhythmias	17	12.8
Chest infection/pneumonia	16	12.0
Sickle cell disease	15	11.3
COPD	6	4.5
Sepsis	6	4.5
Acute pulmonary oedema	6	4.5
Infective endocarditis	5	3.8
Cardiogenic shock	4	3.0
Acute diarrhoea	4	3.0
Renal failure/CKD	3	2.3
Pulmonary hypertension	3	2.3
HIV/AIDS	2	1.5
Malignancy	2	1.5
Severe hypertension	2	1.5
Obesity	1	.8
Chronic liver disease	1	.8
Alcoholic liver disease	1	.8
Degenerative valve disease	1	.8
Goitre	1	.8
Hepatitis	1	.8
Pleural effusion	1	.8
Sickle cell disease	1	.8
Stroke	1	.8
Total	133	100.0

Factors associated with mortality are shown in **Table 4.** Significantly higher mortality was found among cases with comorbidity on cross-tabulations ($p = 0.007$). The odds of mortality remained higher among comorbid HF cases (OR = 2.21, 95% CI = 1.28 – 3.79). Also, HF cases due to cardiomyopathy were more likely than patients with hypertensive HF to die (OR = 3.04, 95% CI = 1.25 – 7.40). The median duration of hospital stay was 8 days (25^{th} and 75^{th} percentiles: 5, 12; IQR = 7 days). The duration of stay was not significantly associated with age, gender or clinical variables. **(Table 5)**

Discussion

In this study, HF is responsible for 10.7% of all medical admissions in Ibadan. This is similar to the report by Ogah [9] from Abeokuta in 2014 and Adeoti [10] in Ado Ekiti, Shittu [11] in Ilorin and Ojobi [12] in Markurdi but lower than 17.4% reported by Eze *et al* [13] in Abakaliki (South East Nigeria) The true prevalence and incidence of HF at the population level is lacking in Nigeria and in Africa as there are no robust community based surveys. However, in one report from a rural community in northcentral region of Nigeria, Okeahialam reported a prevalence of 0.95% [14].

Hospital based studies in Nigeria suggests that HF is responsible for 5.4-17.4% of medical admissions(9, 10, 15-17), 20-44.3% of cardiac related admissions[10,15,16] and 7.8% of emergency medical ward admissions [18]. The prevalence is higher in the elderly. Sanya *et al* [19] reported a rate of 17.4% in elderly patients in Ilorin.

Table 6 shows the prevalence of heart failure in medical wards, cardiac or emergency units of different hospitals in Nigeria and in some parts of Africa. The differences may be accounted for by pattern of referrals or differences in disease burden and prevalence or controls of risk factors for HF especially hypertension in the communities.

The mean age of HF patients in Ibadan is about 55 years. This is similar to data from others parts of sub-Saharan Africa where the mean age of HF patients ranges from 36.5 years in Rwanda [20 to 61.5 years as reported Bombhi in Cameroon [21]. HF in Africa is generally a disease of young and middle aged individuals (in the prime of their life) This is different from the picture in high income countries of Western Europe, America and Japan where HF is a disease of the elderly.

There were more females than males in this cohort. This may be explained by health seeking behaviour in Ibadan which appears to be better in women. Women also live longer than men in our environment. The data on gender distribution in HF in Africa is not consistent. However, women generally dominate in the younger age group because of the impact of rheumatic heart disease (which is commoner in women) and peripartum cardiomyopathy. In the THESUS-HF registry, HF was commoner in women before the age of 40 years, but thereafter commoner in men. This was also demonstrated in this cohort **(Table 2)** In those aged 40 years and below, valvular heart disease and cardiomyopathies were commoner while hypertensive heart disease is by far commoner in those aged 60 years and above. Furthermore, hypertensive heart failure was noted to be commoner in men compared to valvular heart disease and

Table 4: Association between mortality and patients' socio-demographic and clinical variables

Variable	Cross-tabulations N	% died	P value	Multiple logistic regression Odds ratio (OR)	95% CI OR	P value
Age (years)						
<40	116	14.7	0.635	0.72	0.35 - 1.48	0.374
40-59	199	11.6		0.71	0.40 - 1.28	0.255
60+ (ref)	252	13.1`		1		
Gender						
Male	281	14.6	0.350	1.60	0.96 - 2.69	0,074
Female (ref)	293	11.9		1		
Comorbidity						
Yes	128	20.3	0.007	2,21	128 - 3.79	0.004
No (ref)	**447**	**11.2**		**1**		
Readmission						
Yes	29	6.0	0.301	0.54	0.12 - 2.36	0.414
No (ref)	545	13.6		1		
Type of heart disease						
Hypertensive (ref)	451	11.8	9.192	1		
Valvular	38	18,4		2.09	0.81 - 5.41	0.129
Cardiomyopathy-related	41	22.0		3.94	1.25 - 7.40	0.015
Others	44	15.9		1.38	0.57 - 3.34	0.478

Table 5: Log rank tests of duration of admission and patients' socio-demographic and clinical variables

Variable	Log rank tests N	Median time in days (25^{th}, 75^{th} percentiles)	Chi square	Cox regression P value	Hazard ratio	95% CI
Age (years)						
<40	122	8 (6, 13)	2.769	0.251	0.93	0.71 - 1.22
40-59	200	8 (5, 12)			0.96	0.78 - 1.17
60+ (ref)	260	7.5 (4m 13)			1	
Gender						
Male	287	8 (5, 12)	0.133	0.716	0.99	0.82 - 1.81
Female (ref)	302	8 (5, 13)			1	
Comorbidity						
Yes	131	8 (5, 12)	0.810	0.368	1.08	0.86 - 1.34
No (ref)	458	8 (4,13)			1	
Type of heart disease						
Hypertensive (ref)	463	8 (5, 12)	6.627	0.085	1	
Valvular heart disease	39	9 (7,14)			0.80	0.54 - 1.19
Cardiomyopathy-related	42	10 (5,8, 13.3)			0.73	0.50 - 1.07
Others	45	8 (6,15)			0.88	0.62 - 1.25

cardiomyopathies which were reported more in women.

In terms of aetiology of HF, hypertensive heart disease, cardiomyopathies, valvular heart disease are the main risk factors. Hypertensive heart disease alone was responsible for over 70% of cases. This is a marked shift compared to similar report from the hospital 40 years ago when rheumatic heart disease and endomyocardial fibrosis played significant **roles** [22].

There is a significant shift to the right of the burden of hypertension in Ibadan and many parts of Nigeria and this is responsible for role of this condition in the aetiology of HF. Epidemiologic and

Table 6: Prevalence of HF in medical and cardiac admissions in Nigeria and other parts of Africa.

Author	Year	City	Facility	Spectrum of admission	Sample size	% HF
Ajayi(17)	2014	Ado-Ekiti	Tertiary	Cardiac unit admission	1009	27.6
Osuji(15)	2014	Nnewi	Tertiary	Cardiac unit admission	537	30.9
Oguanobi(16)	2013	Enugu	Tertiary	Cardiac unit admission	1261	20.5
Ansa(31)	2008	Uyo	Tertiary	Cardiac unit admission	558	44.3
Ogah(18)	2012	Abeokuta	Tertiary	Emergency room admission	2377	7.8
Shittu(11)	2016	Ilorin	Secondary	Medical ward admission (elderly patients)	933	10.4
Sanya(19)	2008	Ilorin	Tertiary	Medical ward admission	384	17.4
Ojobi(12)	2014	Markudi	Tertiary	Medical ward admission	840	9.1
Eze(13)	2013	Abakaliki	Tertiary	Medical ward admission	1247	17.4
Ogah(9)	2014	Abeokuta	Tertiary	Medical ward admission	452	9.4
Adeoti(10)		Ado-Ekiti	Tertiary	Medical ward admission	3750	11
Other part of Africa						
Author		Country	Facility	Spectrum of admission	Sample size	%HF
Kingue(32)	2005	Cameroon	Tertiary	Cardiac unit admission	144	30
Pio(33)	2014	Togo	Tertiary	Cardiac unit admission (Young adults)	376	28.6
Pio(34)	2014	Togo	Tertiary	Cardiac unit admission	287	23.6

HF = Heart failure

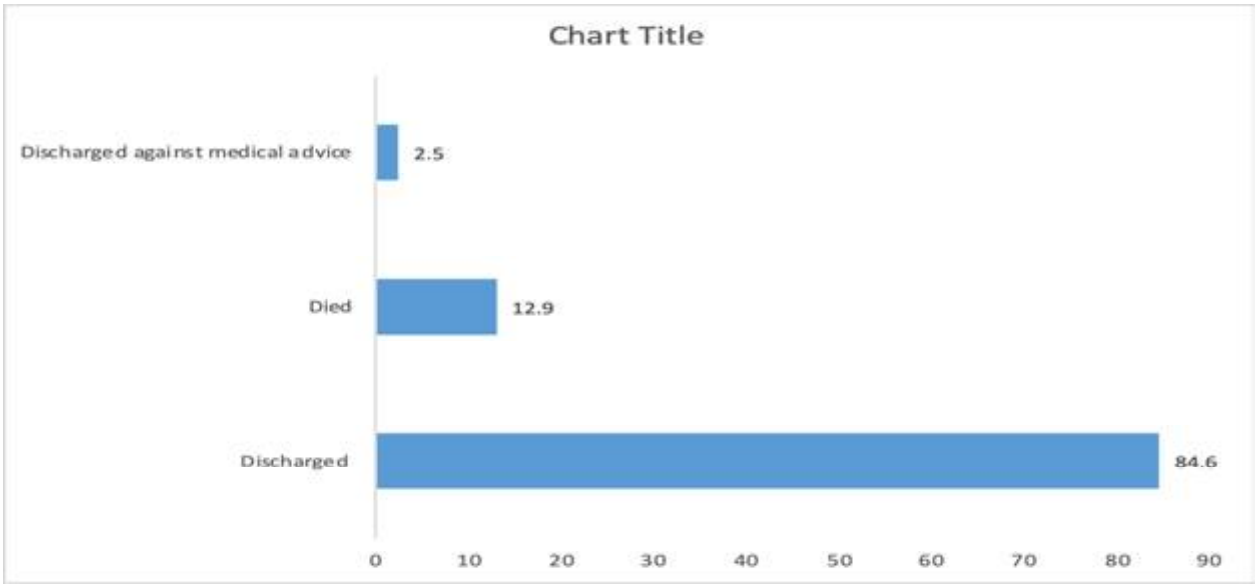

Fig. 1: Outcomes in the participants

demographic transition coupled with rising rates of obesity and acculturation has been attributed to this. Improvement in the housing condition, access to health care for the treatment of sore throat and upper respiratory infections and possibly low burden of soil or environmental parasites may be responsible for the decreasing rates of rheumatic heart disease and endomyocardial fibrosis (EMF) in the city. Surprisingly there was no case of EMF in the current report. This is similar to report by Ogah *et al* [9] in Abeokuta, Ojji *et al* [23,24] in Abuja and Akinwusi *et al* [25] in Osogbo.

Common co-morbidities in our cohort are diabetes mellitus, atrial fibrillation/other arrhythmias, and chest infection. This is similar to the data from the Abeokuta HF registry [9] and the THESUS-HF registry [6]. Although diabetes was present in 5.6% of all cases with HF, this is much lower than is obtained in western countries including African Americans in the US. This is surprising and

the reason for the low rate remains obscured considering that globally, diabetes is a strong predictor of cardiovascular disease and HF, even amongst native black Africans [26,27]. Furthermore, prevalence of diabetes is rising in sub-Saharan Africa in keeping with global trend [28].

About 3.0% of our HF patients presented in cardiogenic shock. Although only about 2.3% were reported to have overt renal failure, this is likely to have been under-estimated as the data of the glomerular filtration rate was not reported. The rate of pulmonary hypertension (based on clinical auscultation) is also likely to have ben under-estimated as we did not report the echocardiography data.

The Intrahospital mortality is about 12.9%. The reported in-hospital mortality from various centres in Africa is in the range of 3.8–25.2%. Ogah *et al* [9] reported a rate of 3.8% in Abeokuta and a rate of 18% was reported by Okello in Uganda [29]. The highest rate of 25% were in patients with severe/ advanced HF (NYHA III and IV) who were in cardiogenic shock.[30] HF is responsible for 4% of deaths in the medical wards of a secondary healthcare facility in Ilorin [11] and 18% of deaths in the elderly in the same city [19]. The differences may be explained by severity of HF, aetiological risk factors, and patient factors such as financial access to care. Factors that influence mortality include presence of co-morbidities, type of heart disease (cardiomyopathy appears to confer a 3x higher risk of death compared to hypertensive heart failure) age category, gender, presence of co-morbidities. Aetiology of heart failure did not influence the duration of admission in this cohort.

Limitations of the study

The main limitation of this study is the fact that it is retrospective in design. Many information especially the burden of comorbidities could not be captured. A prospective study would have filled this gap. The fact that the medical record at the University College hospital is not fully computerized made the retrieval of information often difficult. “Re-hospitalization is a common challenge in patients with heart failure. Only about 5% of the patients studied had re-admission. This is quite low and may be due to loss of data”.

Conclusion

HF is responsible for about 11% of medical admission in Ibadan. This appears to have remained stable over the years based on a rate of 11.2% in the 70s. It is a disease of young and middle aged adults but the rate is higher in the elderly population. There are gender differences. Hypertensive heart disease is commoner in men while cardiomyopathies and valves disease predominate in women. Intrahospital mortality is high and this provides an area for future intervention.

References

1. Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JG, Coats AJ, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Eur Heart J. 2016.
2. Ziaeian B, Fonarow GC. Epidemiology and aetiology of heart failure. Nat Rev Cardiol. 2016;13(6):368-78.
3. Sakata Y, Shimokawa H. Epidemiology of heart failure in Asia. Circ J. 2013;77(9):2209-17.
4. Al-Shamiri MQ. Heart failure in the Middle East. Curr Cardiol Rev. 2013;9(2):174-8.
5. Dokainish H, Teo K, Zhu J, Roy A, AlHabib KF, ElSayed A, et al. Heart Failure in Africa, Asia, the Middle East and South America: The INTER-CHF study. Int J Cardiol. 2016;204:133-41.
6. Damasceno A, Mayosi BM, Sani M, Ogah OS, Mondo C, Ojji D, et al. The causes, treatment, and outcome of acute heart failure in 1006 Africans from 9 countries. Arch Intern Med. 2012;172(18):1386-94.
7. McMurray JJ, Stewart S. Epidemiology, aetiology, and prognosis of heart failure. Heart. 2000;83(5):596-602.
8. Ni H, Xu J. recent trends in heart failure-related mortality: United States, 2000-2014. NCHS Data Brief. 2015(231):1-8.
9. Ogah OS, Stewart S, Falase AO, Akinyemi JO, Adegbite GD, Alabi AA, et al. Contemporary profile of acute heart failure in Southern Nigeria: data from the Abeokuta Heart Failure Clinical Registry. JACC Heart Fail. 2014;2(3):250-9.
10. Adeoti AO, Ajayi EA, Ajayi AO, Dada SA, Fadare JO, Akolawole M, et al. Pattern and

outcome of medical admissions in Ekiti state university teaching hospital, Ado-Ekiti-a 5 year review. American Journal of Medicine and Medical Sciences. 2015;5(2):92-98.
11. Shittu RO, Sanni MA, Odeigah LO, AA AI, Sule AG, Okesina B, et al. A Two-Year Review of the Pattern and Outcome of Medical Admissions in A Secondary Health Facility in Nigeria.
12. Ojobi J, Onuh J, Odoh G, Gomerep S and Ogiator M. Pattern of medical admissions in a tertiary health centre in Makurdi, north central Nigeria: A one year review. Highland Medical Research Journal. 2014;14(2):67-70.
13. Eze CO, Agu CE, Kalu UA, *et al*, Pattern of Medical Admissions in a Tertiary Health Centre in Abakaliki South-East Nigeria. Journal of Biology, Agriculture and Healthcare. 2013;3(12):90-94.
14. Okeahialam BN, Agbo HA, Ogbonna C, Chuhwak E and Isiguzoro I, editors. Rarity of Heart Failure in a Traditional African Population. A Rural Community Based Study. International Cardiovascular Forum Journal; 2016.
15. Osuji CU, Onwubuya EI, Ahaneku GI and Omejua EG. Pattern of cardiovascular admissions at Nnamdi Azikiwe University teaching hospital nnewi, South East Nigeria. The Pan African Medical Journal. 2014;17.
16. Oguanobi NI, Ejim EC, Onwubere BJ, *et al.* Pattern of cardiovascular disease amongst medical admissions in a regional teaching hospital in Southeastern Nigeria. Nigerian Journal of Cardiology. 2013;10(2):77.
17. Ajayi E and Ajayi A. Pattern and outcome of diabetic admissions at a federal medical center: a 5-year review. Annals of African medicine. 2009;8(4).
18. Ogah O, Akinyemi R, Adesemowo A and Ogbodo E. A two-year review of medical admissions at the emergency unit of a Nigerian tertiary health facility. African Journal of Biomedical Research. 2012;15(1):59-63.
19. Sanya E, Akande T, Opadijo G, Olarinoye J and Bojuwoye B. Pattern and outcome of medical admission of elderly patients seen at University of Ilorin Teaching Hospital, Ilorin. Afr J Med Med Sci. 2008;37(4):375-381.
20. Kwan GF, Bukhman AK, Miller AC, *et al.* A simplified echocardiographic strategy for heart failure diagnosis and management within an integrated noncommunicable disease clinic at district hospital level for sub-Saharan Africa. JACC: Heart Failure. 2013;1(3):230-236.
21. Boombhi J, Moampea M, Kuate L, *et al*. Clinical pattern and outcome of acute heart failure at the Yaounde Central Hospital. Open Access Library Journal. 2017;4(03):1.
22. Carlisle R and Ogunlesi T. Prospective study of adult cases presenting at the Cardiac Unit, University College Hospital, Ibadan 1968 and 1969. The African journal of medical sciences. 1972;3(1):13.
23. Ojji D, Stewart S, Ajayi S, Manmak M and Sliwa K. A predominance of hypertensive heart failure in the Abuja Heart Study cohort of urban Nigerians: a prospective clinical registry of 1515 de novo cases. Eur J Heart Fail. 2013;15(8):835-42.
24. Ojji DB, Alfa J, Ajayi SO, Mamven MH and Falase AO. Pattern of heart failure in Abuja, Nigeria: an echocardiographic study. Cardiovasc J Afr. 2009;20(6):349-352.
25. Akinwusi PO, Peter JO, Oyedeji AT and Odeyemi AO. The new face of rheumatic heart disease in South West Nigeria. Int J Gen Med. 2013;6:375-381.
26. He J, Ogden LG, Bazzano LA, *et al.* Vupputuri S, Loria C, Whelton PK. Risk factors for congestive heart failure in US men and women: NHANES I epidemiologic follow-up study. Archives of internal medicine. 2001;161(7):996-1002.
27. Bertoni AG, Hundley WG, Massing MW, *et al*. Heart failure prevalence, incidence, and mortality in the elderly with diabetes. Diabetes care. 2004;27(3):699-703.
28. Atlas ID. 6th edn. International Diabetes Federation 2013. 2018.
29. Okello S, Rogers O, Byamugisha A, Rwebembera J and Buda AJ. Characteristics of acute heart failure hospitalizations in a general medical ward in Southwestern Uganda. International journal of cardiology. 2014;176(3):1233.
30. Familoni O, Olunuga T and Olufemi B. A clinical study of pattern and factors affecting outcome in Nigerian patients with advanced heart failure. Cardiovascular journal of Africa. 2007;18(5):308.
31. Ansa V. Profile and outcome of cardiovascular admissions at the University of Uyo Teaching Hospital, Uyo-a five year review. Nigerian Journal of clinical practice. 2008;11(1):22-4.
32. Kingue S, Dzudie A, Menanga A, *et al*. A new look at adult chronic heart failure in Africa in

the age of the Doppler echocardiography: experience of the medicine department at Yaounde General Hospital. Annales de cardiologie et d'angeiologie; 2005.
33. Pio M, Goeh-Akue E, Afassinou Y, *et al.*, editors. Young heart failure: epidemiological, clinical and etiological aspects in the teaching hospital Sylvanus Olympio of Lomé. Annales de cardiologie et d'angeiologie; 2014.
34. Pio M, Afassinou Y, Pessinaba S, Baragou S, N'djao J, Atta B, et al. Epidemiology and etiology of heart failure in Lome. The Pan African medical journal. 2014;18:183-.

Received = 06/09/2019
Accepted = 11/05/2020