**Open Science Journal of Clinical Medicine**
2014; 2(1): 39-43
Published online February 28, 2014 (http://www.openscienceonline.com/journal/osjcm)

# Hypertensive heart failure in Kumasi, Ghana

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## To cite this article

Isaac Kofi Owusu, Yaw Adu-Boakye, Lambert Appiah Tetteh. Hypertensive Heart Failure in Kumasi, Ghana, *Open Science Journal of Clinical Medicine.* Vol. 2, No. 1, 2014, pp. 39-43

## Abstract

Hypertension has become a major public health issue worldwide, and it has been found to be the most common cause of heart failure in many parts of sub-Saharan Africa. This was an observational study designed to determine the demographic and clinical characteristics of hypertensive heart failure patients seen at the department of medicine, Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana. Medical records of 180 hypertensive heart failure patients were selected using simple random sampling. The baseline demographic, clinical, chest X-ray, electrocardiographic (ECG) and echocardiographic characteristics of the patients were examined. One hundred and eighty (180) hypertensive heart failure were studied. They were aged between 24 - 88 years with the mean age (± SD) of 63.59 (±18.12) years. There were more females (52.22%; n=94) than males (47.78%; n=86). The mean systolic blood pressure (± SD) and the mean diastolic blood pressure (± SD) were 162.42 (± 32.18) and 92.29 (±18.54) respectively. The pulse rate ranged between 43-168 beats/minute with the mean pulse rate (± SD) of 85.24 (± 20.71) beats/minute. Most (46 %) of the patients presented with NYHA functional class 4. The most common presenting complaint was shortness of breath (72.22%), followed by easy fatiguability (50%), and palpitation (43.89%). The main clinical signs were pulmonary oedema (80%) and displaced apex beat (67.78%). Chest X-ray showed cardiomegaly in 71.11% of the patients. ECG LVH and echocardiographic LVH were seen in 75.56 % and 83.33% of the patients respectively. Prevalence of heart failure with preserve ejection fraction (HFPEF) was 62.22 %. Left ventricular systolic dysfunction with or with diastolic dysfunction was seen in 37.78 % of the patients. In conclusion, the most common clinical presentation of patients seen at KATH, Kumasi, with hypertensive heart failure were shortness of breath, easy fatiguability, pulmonary oedema and displaced apex beat. The prevalence of heart failure with preserved ejection fraction (HFPEF) among the patients was high.

## Keywords

Hypertension, Heart Failure, Prevalence, Left Ventricular Hypertrophy, Ghana

## 1. Introduction

Hypertension has become a major public health issue worldwide. In sub-Saharan Africa, morbidity and mortality of hypertensive related conditions has reached epidemic levels in recent years. [1-4]. It has been estimated that hypertension associated morbidity in sub-Saharan Africa may rise to 20% by the year 2020 [5].

Hypertension is the most common cause of heart failure in many parts of sub-Saharan Africa [4, 6-10], and hypertension has been reported to account for up to 30 % of hospital admissions for heart failure in West Africa [11]. Hypertension is also a powerful independent risk factor for death from heart disease [12]. The prognosis of hypertensive heart failure among Black Africans has also been found to be poor [13].

There is evidence from large population-based studies of an increased tendency to left ventricular hypertrophy in hypertensive blacks, independent of body composition [14]. Hypertension may also result in interstitial fibrosis [15]. Both factors contribute to an increase in left ventricle stiffness, resulting in diastolic dysfunction and an elevation

in left ventricular end diastolic pressure.

Left ventricular hypertrophy is not an acute condition. It takes weeks and usually months to years to develop. It has been proposed that a cardiac renin-angiotensin system and angiotensin converting enzyme activity may be an important determinant of the hypertrophic response [16]. There are two predominant types of hypertrophy: concentric; where wall thickness is increased relative to cavity dimensions, and eccentric; where there is left ventricular cavity dilatation, with an increase in muscle mass so that the ratio between wall thickness and ventricular cavity size remains relatively constant.

Three types of hypertensive heart failure (types I-III) have been described [16]. In type I hypertensive heart failure, the decompensated myocardium is still strong enough to sustain a high blood pressure and patients with this type present with high blood pressure on admission. Patients with type II hypertensive heart failure may present with a low or normal blood pressure initially; following treatment of the heart failure, the decompensated myocardium may recover sufficiently enough for the blood pressure to rise again few days after the commencement of treatment. In type III hypertensive heart failure, the decompensated myocardium has been irreversibly damaged by the chronic uncontrolled hypertension that despite adequate treatment of the heart failure, the myocardium is not strong enough to sustain a high blood pressure any longer [17]. The types II and III can easily be mistaken for cardiomyopathy.

The aim of this study was to determine the demographic and clinical characteristics of hypertensive heart failure patients seen at the department of medicine, KATH, Kumasi.

## 2. Materials and Methods

This was a descriptive study carried out at the Department of Medicine of Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana. Ethical approval was obtained from the appropriate ethical committee.

Medical records of 180 hypertensive heart failure patients were selected using simple random sampling. The baseline demographic, clinical, chest X-ray, electrocardiographic and echocardiographic characteristics of the patients were examined. Heart failure was diagnosed, using the modified Framingham criteria for the diagnosis of heart failure [7, 8, 18]:

Major criteria included: Paroxysmal nocturnal dyspnoea, raised jugular venous pressure, clinical cardiomegaly, basal crepitations, S3 gallop, clinical acute pulmonary oedema, pulmonary upper lobe blood diversion on chest X-ray (or pulmonary oedema on chest X-ray).

Minor criteria included: tachycardia, orthopnoea, exertional dyspnoea, nocturnal cough, hepatomegaly, pleural effusion, diuretic use.

Heart failure was diagnosed if the patient had two major and one minor or one major and two minor criteria

Hypertension was defined as the presence of a persistent elevated systolic blood pressure ≥ 140mmHg and/or diastolic blood pressure ≥ 90mmHg in patients aged 15 years and above [19, 20], and/or presence of hypertensive retinopathy and/or the use of antihypertensive drugs and/or past medical history of hypertension.

All the study participants had standard trans-thoracic echocardiographic procedures performed by the author. The echocardiographic data of the patients which were obtained included; m-mode, 2- dimensional, doppler, colour flow imaging, and valvular apparatus characteristics.

Left ventricular systolic dysfunction was defined as left ventricular ejection fraction (EF) < 50%. Heart failure with preserve ejection fraction (HFPEF) was defined as isolated diastolic dysfunction (EF > 50%). Left ventricular diastolic dysfunction was defined as E/A ratio<1 or E/A ratio >2, DT>220ms or DT<160ms, IVRT>100ms or IVRT < 70ms. Tissue Doppler imaging could not be done.

Resting 12-lead ECGs were obtained from 180 of the hypertensive heart failure patients. The ECGs were examined for the heart rate, the rhythm, electrical conduction, chamber enlargement, arrhythmias, and other abnormalities. Left ventricular hypertrophy was diagnosed using Scott's criteria [21]

| | | |
|---|---|---|
| Limb leads: | R in 1 + S in 3: | more than 25 mm |
| | R in aVL: | more than 7.5 mm |
| Chest leads: | S in $V_1$ or $V_2$ + R in $V_5$ or $V_6$: | more than 35 mm |
| | R in $V_5$ or $V_6$: | more than 26 mm |
| | R + S in any V lead: | more than 45 mm |

## 3. Statistical Analysis

Data from the patients' medical records were entered into a Microsoft Excel (2010) sheet. Data were cleaned and abnormal variable and wrong entry removed or changed. Data were then exported into SPSS 16.0 software for analysis. Descriptive analysis of baseline parameters was provided. Measure of central tendency using mean was calculated, and measure of spread using standard deviation and range were also calculated.

## 4. Results

One hundred and eighty (180) hypertensive heart failure patients were studied. They were aged between 24 - 88 years with the mean age (± SD) of 63.59 (±18.12) years. There were more females (52.22%; n=94) than males (47.78%; n=86). The mean age (± SD) of the females and the males were 64.52 (±18.84) and 62.57 (±17.33) respectively. The mean systolic blood pressure (± SD) and the mean diastolic blood pressure (± SD) were 162.42 (± 32.18) and 92.29 (±18.54) respectively. The pulse rate ranged between 43-168 beats/minute with the mean pulse

rate (± SD) of 85.24 (± 20.71) beats/minute. Table 1 shows baseline characteristics of the hypertensive heart failure patients.

Figure 1 shows the New York Heart Association (NYHA) functional classification of the patients. Most (46 %) of the patients presented with NYHA functional class 4, followed by NYHA functional class 3 (34%).

***Table 1.*** *showing the baseline characteristics of the hypertensive heart failure patients.*

| Baseline Characteristics | Mean (±SD) | Range |
|---|---|---|
| Age | 63.59 (±18.12) | 24-88 years |
| Systolic Blood Pressure (SBP) | 162.42 (±32.18) | 126-250 mmHg |
| Diastolic Blood Pressure (DBP) | 92.29 (±18.54) | 56-160 mmHg |
| Pulse Rate | 85.24 (± 20.71) | 43-168 beats/minute |
| Male (47.78%; n=86) | | |
| Age | 62.57 (±17.33) | 24-86 years |
| Females (52.22%; n=94) | | |
| Age | 64.52 (±18.84) | 30-88 years |

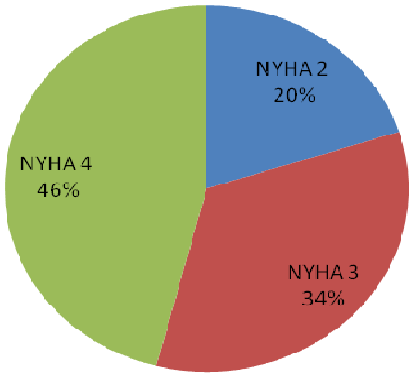


***Figure 1.*** *showing the New York Heart Association Functional Classification of the patients.*

Table 2 shows the clinical presentation of the patients. The most common presenting complaint was shortness of breath (72.22%), followed by easy fatiguability (50%), and palpitation (43.89%). The main clinical signs were pulmonary oedema (80%) and displaced apex beat (67.78%). Chest X-ray showed cardiomegaly in 71.11% of the patients. ECG LVH and Echocardiographic LVH were seen in 75.56 % and 83.33% of the patients respectively. Prevalence of heart failure with preserve ejection fraction (HFPEF) was 62.22 %. Left ventricular systolic dysfunction with or with diastolic dysfunction was seen in 37.78 % of the patients.

***Table 2.*** *showing the clinical presentation of the hypertensive heart failure patients.*

| Clinical Presentation | N | % |
|---|---|---|
| Symptoms | | |
| Shortness of breath | 130 | 72.22 |
| Easy fatiguability | 90 | 50 |
| Palpitation | 79 | 43.89 |
| Cough | 62 | 34.44 |
| Chest pain | 34 | 18.89 |
| Signs | | |
| Pulmonary oedema | 144 | 80 |
| Displaced apex beat | 122 | 67.78 |
| Systemic oedema | 81 | 45 |
| Other characteristics | | |
| Chest X-ray cardiomegaly | 128 | 71.11 |
| ECG LVH | 136 | 75.56 |
| Echocardiographic LVH | 150 | 83.33 |
| HFPEF | 112 | 62.22 |
| LVSD (± diastolic dysfunction) | 68 | 37.78 |

HFPEF=heart failure with preserve ejection fraction, LVSD=left ventricular systolic dysfunction
ECG=electrocardiographic, LVH=left ventricular hypertrophy

## 5. Discussion

The mean age (± SD) of the patients in this study was 63.59 (±18.12). The mean age was slightly higher than the mean age of patients with heart failure reported by earlier studies in Kumasi [6, 8, 22], Accra [7] and other parts of West Africa [23]. Isezuo et al [23] reported that the mean age of Gambians and Nigerians with heart failure was 53 (± 12.1). However, Oyoo and Ogola in Nairobi, Kenya found three quarters of their patients with hypertensive heart failure to be above the age of 50 years [24]. An earlier study in Kumasi, Ghana among hypertensive heart failure patients found a median age of 60 years [25]. In sub-Saharan Africa, other important causes of heart failure such as rheumatic heart disease and dilated cardiomyopathy occur at a relatively early age whilst hypertensive heart disease occurs at a later age. This might explain the higher mean age for patients presenting with hypertensive heart failure as compared to the mean age of patients presenting with heart failure in sub-Saharan Africa.

The mean age of patients presenting with heart failure in sub-Saharan Africa is generally lower than the mean age heart failure patients reported in the general European population (74 years) and in the Framingham heart study (70 ± 10.8 years) [26, 27]. Thus, heart failure occurs a decade earlier in sub-Saharan Africa than in Europe and America. Besides differences in aetiology of heart failure in sub-Saharan Africa and the Western world, many people with myocardial infarction in Europe and America are surviving because of advances in treatment, and these

patients eventually end up with heart failure later in life.

The severity of heart failure at presentation using the NYHA functional classification in this study is similar to the findings of Oyoo and Ogola in Nairobi where majority of their patients were in NYHA functional class IV [24]. This finding shows that many patients with heart failure in sub-Saharan Africa present to the hospital late. This is unfortunate because patients with asymptomatic heart failure are more likely to achieve reverse cardiac remodeling and normal cardiac function when neuro-hormonal blocking agents are started early.

The mean SBP (162.42 ± 32.18 mmHg) and the mean DBP (92.29 ±18.54 mmHg) of the patients in this study were high. An earlier study in Kumasi also reported high mean SBP and mean DBP of 175 ±15 mmHg and 112 ±24 mmHg respectively [25]. Isezuo et al [23] reported high mean SBP and mean DBP of 180.4 ± 28.2 mmHg and 117 ± 12.9 mmHg respectively, among Gambians and Nigerians with hypertensive heart failure. Another study in Nigeria found the mean SBP and the mean DBP as 167.4 ± 18.2 mmHg and 98.6 ± 13.5 mmHg respectively [28]. Studies have demonstrated that as the SBP and the DBP increase, the risk of cardiovascular events increases continuously [29]. A positive relationship between diastolic dysfunction and the level of the BP has also been established [30], with the degree of the diastolic dysfunction proportionate to increasing level of blood pressure.

The most common presenting complaint in this study was shortness of breath whilst the most common presenting sign was pulmonary oedema. A previous study in Ghana [22] found fluid overload as the most common clinical presentation of heart failure patients. Uncontrolled hypertension leads to neuro-hormonal activation which eventually results in concentric left ventricular hypertrophy. In the absence of appropriate therapy, concentric left ventricular hypertrophy may lead to impaired left ventricular relaxation and pulmonary oedema. ECG LVH and echocardiographic LVH were seen in 75.56 % and 83.33 % of the patients in this study respectively. This finding shows that the majority of the patients had already developed left ventricular remodeling.

The prevalence of heart failure with preserve ejection fraction (HFPEF) was high (62.22 %) in this study. Only 37.78 % of the patients presented with left ventricular systolic dysfunction with or without a diastolic dysfunction. This finding is different from an earlier report from Nigeria [31]. It was found in Zaria, Nigeria that 87.4 % of hypertensive heart failure patients presented with left ventricular systolic dysfunction with or without a diastolic dysfunction, whilst 12.6 % of the patients presented with isolated left ventricular diastolic dysfunction (HFPEF) [31]. As it has been explained earlier, left ventricular diastolic dysfunction is a major problem in patients with hypertensive heart disease. When left ventricular hypertrophy is detected early, appropriate therapy can lead to reverse remodeling and prevent the occurrence of left ventricular diastolic dysfunction.

## 6. Conclusion

The most common clinical presentation of patients seen at KATH, Kumasi, with hypertensive heart failure were shortness of breath, easy fatiguability, pulmonary oedema and displaced apex beat. The prevalence of heart failure with preserved ejection fraction (HFPEF) among the patients was high.

## Conflict of Interest

The authors confirm that this article content has no conflict of interest.

## Acknowledgement

The authors would like to express their sincere gratitude to the staff at the department of medicine, Komfo Anokye Teaching Hospital, Kumasi, Ghana for their support. Without their co-operation this study would not have been done.

## References

[1] Opie LH, Seedat YK. Hypertension in sub-Saharan African populations. Circulation. 2005;112:3562–3568.

[2] Kengne AP, Awah PK, Fezeu L, Mbanya JC. The burden of high blood pressure and related risk factors in urban sub-Saharan Africa. Evidence from Douala in Cameroon. Afr Health Sci. 2007;7:38–44.

[3] Plange-Rhule J, Philips R, Acheampong JW, Sagar-Malik AK, Cappuccio FP, Eastwood JB. Hypertension and renal failure in Kumasi, Ghana. J Hum Hyp 1999; 13: 37-40.

[4] Falase AO, Ayeni O, Sekoni GA, Odia OJ. Heart failure in Nigerian hypertensives. Afr J Med Sci 1983; 12: 7-15.

[5] Van der Sande MA. Cardiovascular disease in sub-Saharan Africa: a disaster waiting to happen. Neth J Med. 2003;61:32–36.)

[6] Owusu IK. Causes Of Heart Failure As Seen In Kumasi, Ghana: The Internet Journal of Third World Medicine. 2007; Volume 5, Number 1.

[7] Amoah AG, Kallen C. Aetiology of heart failure as seen from a National Cardiac Referral Centre in Africa. Cardiology 2000; 93 (1-2): 11-18.

[8] Owusu IK, Boakye YA (2013) Prevalence and Aetiology of Heart Failure in Patients Seen at a Teaching Hospital in Ghana. J Cardiovasc Dis Diagn 1: 131. doi:10.4172/2329-9517.1000131

[9] Mendez GF, Cowie MR (2001) The epidemiological features of heart failure in developing countries: a review of the literature. Int J Cardiol 80: 213-219.

[10] Damasceno A, Cotter G, Dzudie A, Sliwa K, Mayosi BM. Heart failure in sub-saharan Africa: time for action. J Am Coll Cardiol 2007; 50(17): 688-93.

[11] Toure LA, Salissou O, Chapko MK. Hospitalisations in Niger (West Africa) forcomplications from arterial hypertension. Am J Hypertens 1992, 5: 322-324.

[12] Cooper RS, Amoah AG, Mensah GA. High blood pressure: the foundationfor epidemic cardiovascular disease in African populations. Ethn Dis. 2003; 13 (2 Suppl 2): S48-S52.

[13] Isezuo AS, Omotoso ABO, Gaye A, et al. One year survival among sub-Saharan Africans with hypertensive heart failure. Tropical Cardiology 2000; 26/n° 103: 57-60.

[14] Kizer, JR, Arnett, DK, Bella, JN, et al. Differences in left ventricular structure between black and white hypertensive adults: the Hypertension Genetic Epidemiology Network study. Hypertension 2004; 43:1182.

[15] Van Hoeven, KH, Factor, SM. A comparison of the pathologic spectrum of hypertensive, diabetic and hypertensive-diabetic heart disease. Circulation 1990; 82:848.

[16] Dzau, VJ. Tissue renin-angiotensin system in myocardial hypertrophy and failure. Arch Intern Med 1993; 153:937.

[17] Araoye MA, Olowoyeye O. The clinical spectrum of hypertensive heart failure: a point score system for solving an old problem. East Afr. Med J. 1984; 61:306-315.

[18] McKee PA, Castelli WP, McNamara PM, Kannel WB (1971) The natural history of congestive heart failure: the Framingham study. N Engl J Med 285: 1441-1446.

[19] Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, et al. (2003) The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA 289: 2560-2571.

[20] Lemogoum D, Seedat YK, Mabadeje AF, Mendis S, Bovet P, et al. (2003) Recommendations for prevention, diagnosis and management of hypertension and cardiovascular risk factors in sub-Saharan Africa. J Hypertens 21: 1993-2000.

[21] Scott R. C. The electrocardiographic diagnosis of left ventricular hypertrophy. Am Heart J. 1960; 59:155.

[22] Owusu IK. Treatment Of Heart Failure In A Teaching Hospital In Ghana, West Africa. The Internet Journal of Third World Medicine. 2007 Volume 4 Number 2.

[23] Isezuo AS, Omotoso AB, Araoye MA, Carr J, Corrah T. Determinants of prognosis among black Africans with hypertensive heart failure. Afr J Med Sci. 2003 Jun; 32 (2): 143-149.

[24] Oyoo GO, Ogola EN. Clinical and socio demographic aspects of congestive heart failure patients at Kenyatta National Hospital, Nairobi. East Afr Med J. 1999 Jan; 76 (1): 23-27.

[25] Owusu IK. Electrocardiographic Left Ventricular Hypertrophy In Patients Seen With Hypertensive Heart Failure . The Internet Journal of Third World Medicine. 2007 Volume 6 Number 1.

[26] Task Force report. Guidelines for the diagnosis and treatment of chronic heart failure, European Society of Cardiology. Eur Heart J (2001) 22, 1527-1560.

[27] Ho KKL, Pinsky JL, Kannel WB, Lery D. The epidemiology of heart failure: The Framingham study. J Am Coll Cardiol 1993; 22 (Supplement A): 6A - 13A.

[28] Kolo PM, Jibril YB, Sanya EO, et al. Hypertension-Related Admissions and Outcome in a Tertiary Hospital in Northern Nigeria. International Journal or Hypertension volume 2012.

[29] Psaty BM, Furberg CD, Kuller LH, et al. Association between blood pressure level and the risk of myocardial infarction, stroke and total mortality: The Cardiovascular Health Study. Arch Intern Med 2001; 161:1183-1192.

[30] Ike SO, Onwubere BJ. The relationship between diastolic dysfunction and the level of blood pressure in Blacks. Ethn Dis. 2003; 13(4): 463 - 469.

[31] Oyati IA, Danbauchi SS, Alhassan MA, Isa MS. Diastolic Dysfunction in Persons with Hypertensive Heart Failure. Journal of the National Medical Association, 2004; Vol. 96, No. 7.