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Article Original

Poor Uptake of NT-proBNP and Factors Associated with Elevated Values among Acute Heart Failure Patients in Sub-saharan Africa: a post hoc Analysis of the Douala Heart Failure Registry (Do-HF)

Mauvaise absorption du NT-proBNP et facteurs associés à des valeurs élevées chez les patients atteints d'insuffisance cardiaque aiguë en Afrique subsaharienne : une analyse post-hoc du registre d'insuffisance cardiaque de Douala (Do-HF)

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Keywords: Heart Failure, Cardiac biomarker, Natriuretic Peptides, BNP, Heart function.

ABSTRACT

Introduction. Heart Failure (HF) is a major worldwide public health problem. International HF guidelines recommended using amino-terminal congeners (BNP or NT- proBNP) as the biomarker of choice for management of HF, but provider uptake remains low in Africa. We aim to assess NT-proBNP provider's uptake and determine factors associated with elevated values in HF patients in Douala. **Methodology**. We conducted a cross-sectional study with retrospective data gathering at three hospitals in Douala. All patients with HF managed in our settings between January 2016 and December 2022 were included. Elevated NT-proBNP values were defined based on the age-stratified cut-off recommended by the European Society of Cardiology guidelines. Associations were evaluated using logistic regression analysis with significant p value < 0.05. **Results**. Out of 1108 files with HF, 165 (16%) files had NT-proBNP results. The median age was 64 years with a female predominance 53.9%. The median NT-proBNP value was 1103pg/ml and elevated NT-proBNP was prevalent in 58.8% of the population. Elevated NT-proBNP values were found to be significantly associated with NYHA stage III dyspnea (OR=3.325, p=0.044) and Acute decompensated chronic HF (OR=5.004 p=0.028). **Conclusion**. NT-proBNP was used in less than one-quarter of HF patients having HF, but elevated values were prevalent in two of every three patients. Furthermore, this elevated NT-proBNP values was associated with the severity and time-course of HF. Clinicians must be sensitized on the utility of this cardiac biomarker.

RÉSUMÉ

Introduction. L'insuffisance cardiaque (IC) est un problème de santé publique majeur. Les recommandations internationales sur l'IC suggèrent d'utiliser le BNP ou le NT-proBNP comme biomarqueur de choix pour sa prise en charge. Notre but était d'évaluer l'adoption du NT-proBNP par les cliniciens et déterminer les facteurs associés à des valeurs élevées chez les patients atteints d'IC à Douala. **Méthodologie**. Il s'agit d'une étude transversale avec collecte de données rétrospectives dans trois formations sanitaires de Douala. Tous les patients atteints d'IC et pris en charge entre janvier 2016 et décembre 2022 ont été inclus. Les seuils de NT-proBNP ont été définis sur la base des critères de la Société européenne de cardiologie. Les associations ont été évaluées à l'aide d'une analyse de régression logistique avec une valeur p significative <0,05. **Résultats**. Sur 1 108 dossiers avec HF, 165 (16 %) avaient des résultats NT-proBNP. L'âge médian était de 64 ans avec 53,9 % de femmes. La médiane du NT-proBNP était de 1 103 pg/ml et le taux de NT-proBNP était élevé chez 58,8 % de la population. Des valeurs élevées de NT-proBNP étaient associées à la dyspnée de stade III de la NYHA (OR = 3,325, p = 0,044) et à l'IC chronique décompensée (OR = 5,004, p = 0,028). **Conclusion**. Le NT-proBNP était utilisé dans notre contexte chez moins d'un quart des patients atteints d'IC, mais deux patients sur trois avaient des valeurs élevées. Ces valeurs élevées de NT-proBNP étaient associées à la gravité de l'IC et à l'évolution dans le temps. Les cliniciens doivent être sensibilisés sur l'utilité de ce biomarqueur cardiaque.

CAPSULE SUMMARY

What is known about the subject

The clinical diagnosis of heart failure (HF) can be challenging, as several conditions may present with similar symptoms and signs.

The question addressed in this study

To determine the uptake of NT-proBNP uptake in our setting and factors associated with elevated values among HF patients in Douala.

What this study brings new

1. 165 (16%) files had NT-proBNP results
2. Elevated NT-proBNP values were found to be significantly associated with NYHA stage III dyspnea (OR=3.325, p=0.044) and Acute decompensated chronic HF (OR=5.004 p=0.028).

Implications for practice, policy or future research.

Clinicians must be sensitized on the utility of this cardiac biomarker. The implementation of a wide use of cardiac biomarkers can help improve survival as proven elsewhere

INTRODUCTION

Heart failure (HF) is a major worldwide health problem affecting around 2-3% the western population [1] In Africa, its true burden is unknown but studies have shown a rising HF related morbidity and mortality [1]. Contrary to the western world where the etiology of HF is largely ischemic [2] several studies including the major contemporary and multicentric study of HF in Africa, the THESUS-HF demonstrated that causes of HF in this region of the world are still predominantly non-ischemic, dominated by hypertension, rheumatic heart disease, and dilated cardiomyopathy, though a rising burden of ischemic heart diseases [3].

The clinical diagnosis of heart failure (HF) can be challenging, as several conditions may present with similar symptoms and signs. Several clinical criteria have been suggested (Framingham, National Health and Nutrition Examination Survey [NHANES], modified Boston, Gothenburg, and International Classification of Disease 9th Revision). The Framingham clinical criteria are the most sensitive (90–92%), but with 40–79% specificity [4,5] . Echocardiography is paramount for the detection of cardiac abnormalities in patients presenting with symptoms of heart failure such as dyspnea but can be inconclusive. A biomarker to aid in the diagnosis of HF was therefore welcomed since the early 1980s, following the discovery of natriuretic peptides which are now a mandatory diagnostic tool in all international HF guidelines [6,7] . In African countries where access to echocardiography is still luxurious due to limited availability and affordability of machines and trained health staff, easily measured cardiac biomarkers may even have a potential further importance in direct patient management but this has yet to be largely investigated [8, 9].

Natriuretic peptides including Brain Natriuretic Peptide (BNP) and N-terminal Pro - Brain Natriuretic Peptides (NT Pro-BNP) are protein biomarkers secreted by the cardiomyocytes in response to volume overload, which are widely available and can be performed using a simple blood test. Numerous studies from high-income countries showed that NT-proBNP levels differ with etiology and type of HF, NYHA class, and time-course of HF, age, body mass index. There is a dearth of data on cardiac biomarkers in Africa. One of the rare studies conducted in sub-Saharan Africa (SSA) revealed that NT-proBNP values were significantly higher in hypertensive HF patients with reduced left ventricular ejection fraction (LVEF) compared to those with preserved ejection fractions [9]. In this study, we aimed to determine the uptake of NT-proBNP uptake in our setting and factors associated with elevated values among HF patients in Douala.

METHODS

Study design and clinical setting

The Douala Heart Failure (DoHF) registry has been described in details elsewhere [10,11]. In brief, it was a prospective, multicenter, observational data collection on HF patients between January 2016 and December 2022 in four cardiology centers in Cameroon, including the Douala General Hospital (DGH), the Douala Cardiovascular Center (DCVC), the Fondation Coeur et Vie and the Deido district hospital. Centers were selected centers based on the availability of a cardiologist who can conduct echocardiography and with experience in conducting cohort studies. In this particular secondary analysis of data collected on the use of NT-pro-BNP, we included only the two centers where the test was available in either the setting or the immediate vicinity during the study period (DGH and DCVC).

Eligibility criteria

Patients 21 years of age or older with clinical signs and symptoms consistent with congestive heart failure (i.e., pedal edema, elevated jugular venous pressure, pulmonary congestion, and tender hepatomegaly) and patients willing to be followed up. We received ethical approval from the Cameroon National Ethical Committee of Research for Human Health and the study conformed to the principles outlined in the Declaration of Helsinki.

Study procedure and data collection

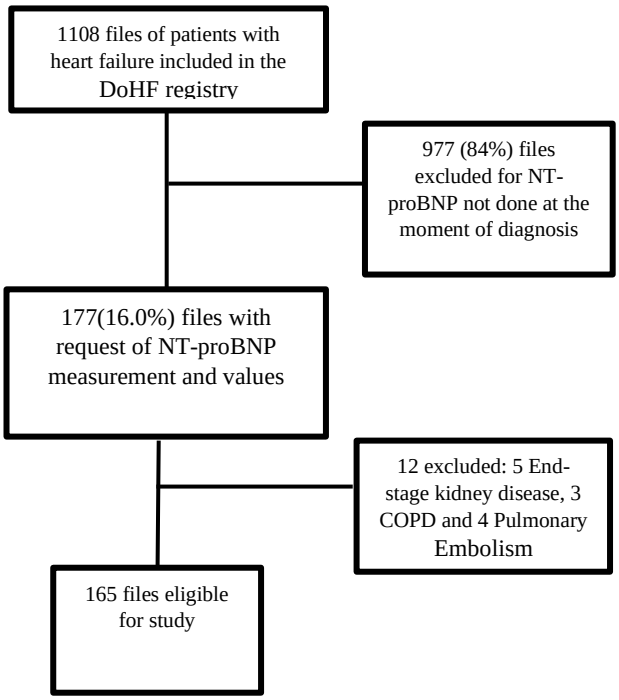
In the DoHF registry, HF diagnosis was done based on the 2016 ESCG guidelines for diagnosis of HF. All patients were reviewed by a cardiologist for a clinical examination and an echocardiography but the requirement of a biomarker was left to the judgement of the attending physician. If requested, NT-proBNP was performed at the laboratories in any of the two centers using VIDAS® NT-proBNP2, a point of care assay. This was an automated quantitative test for the determination of the N-terminal fragment of brain-type natriuretic peptide in human serum or plasma using the ELFA (Enzyme-Linked Fluorescent Assay) technique. This device has been validated and shown to result in significant cost savings for healthcare structures due to shorter stays in the laboratory [12]. For this analysis, data extracted from the DoHF registry database systematically included information on HF at the moment of the diagnosis, both clinical and echocardiography, while data on NT-ProBNP was extracted when available. Patients were excluded if they had any of the following clinical condition at time of performing NT pro-BNP: stage 4 and 5 chronic kidney

disease, pulmonary embolism, chronic obstructive pulmonary disease. Variables of interest included age, sex, occupation, marital status, history of hypertension or diabetes mellitus, Body mass index (BMI), history of atrial fibrillation, arrhythmias, ECG findings, echocardiography findings and NT-proBNP levels.

Statistical analysis

Statistical package for social sciences (SPSS) version 25 was used for analysis. Baseline characteristics were compared by patient Gender. Categorical variables were presented as frequencies and percentages. In contrast, continuous variables were presented as mean and standard deviation as well as the median and interquartile range where necessary for skewed variables. Continuous variables were expressed as means and standard deviations while categorical variables were expressed as frequencies and proportions. Student's t- tests was used to compare continuous data between study groups and Fischer's exact test or chi square was used to compare categorical data. A 95% confidence interval with p-value<0.05 was set and considered as statistically significant.

RESULTS



COPD: Chronic Obstructive Pulmonary Disease, DoHF: Douala Heart Failure

Figure 1. Flow chart outlining participant files inclusion

General characteristics of the study population

Out of 1108 files of patients diagnosed with acute heart failure, only 177 (16.0%) had a clear documentation of request and NT-pro BNP values, among which 12 were excluded (Figure 1). The remaining 165 were analyzed for NT-pro BNP levels and associated factors.

The mean age of participants was 64.0 (IQR 58-75) years; 89 (53.9%) were females. The male participants tend to be relatively younger than the females. Almost all patients had dyspnea (94.5%) with 64.2% presenting in NYHA class III-IV. The most prevalent signs were pulmonary edema (51.5%), pulmonary crackles (35.5%) and palpitation (25.5%). Hypertension was the most prevalent cardiovascular risk factor (66.1%) with no difference between men and women. Likewise, acute decompensated HF (ADHF) (87.3%) and HF with preserved ejection fraction (HFpEF) (43.8%) were the most prevalent clinical and echocardiographic types of HF respectively but with no gender differences. The median NT-proBNP was 1103 (325-3305) pg/ml with no difference between men and women (Table I).

NT-proBNP levels and comparison of median values with different Heart Failure Classifications

NT-proBNP levels ranged from 8pg/ml to 44777 pg/ml with median NT-proBNP value of 1103 (324.5 – 3305) pg/ml. Following the age stratified cut-off points recommended by the ESC Guidelines, 97 (58.8%) patients had elevated NT-proBNP levels. As shown in figure 2 below the median NT-proBNP value was highest in HFrEF fraction compared to patients with HFpEF. When classified based on the time-course of HF, the median NT-proBNP value was highest among patients with ADCHF/De novo HF 1306 (359 – 3669) pg/ml compared to patients with Stable chronic heart failure 290 (107 – 850) pg/ml (Figure 3). NT-proBNP values increased across classes of the NYHA (Figure 4).

Factors associated with Elevated NT-proBNP

Patients with acute decompensated chronic heart failure were 5 times more likely to have elevated NT-proBNP values than those with stable chronic HF (p=0.001). On the other hand, having stage 2 and 3 dyspnea was associated with a 4 and 11 – fold increase in NT-proBNP levels respectively.

Patients who were obese were 3 times more likely to have elevated NT-proBNP values than patients whose BMI were within the normal range (p=0.04, OR=3.20). There was no significant association between the other clinical factors and Elevated NT-proBNP values.

There was no significant association between biological parameters and elevated NT-proBNP values. Having QRS complex abnormalities was significantly associated with a 2-fold increase of having elevated NT-proBNP values (OR= 2.196, p= 0.025). Heart failure with reduced ejection fractions (HFrEF) was significantly associated with elevated NT-proBNP levels (OR= 2.8, p = 0.01) when compared to HFpEF (Table II).

Levels of NT-proBNP in heart failure

After adjusting for age and gender, the strongest independent factor associated with elevated NT-proBNP values was Acute decompensated chronic heart failure (OR= 5.004, p= 0.028). In addition, having NYHA stage III dyspnea was independently associated with elevated NT-proBNP values. Details are shown on Table III.

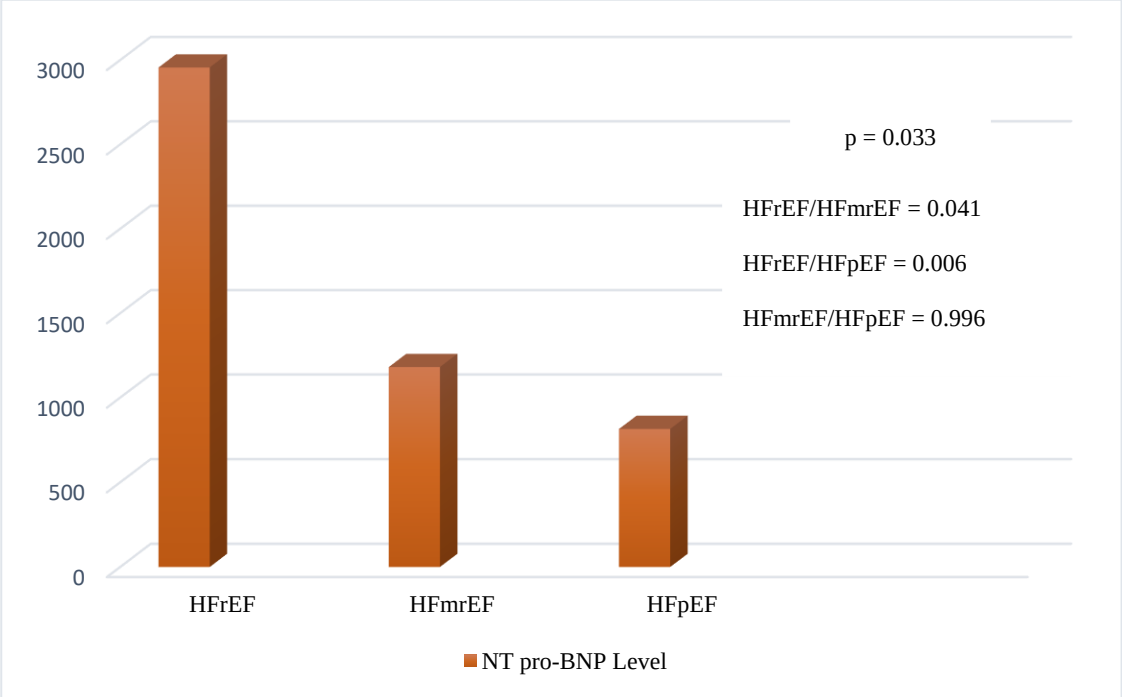


Figure 2: NT-proBNP values across left ventricular ejection fraction categories
HFrEF: Heart Failure reduced ejection fraction, HFmrEF: Heart Failure with midrange election fraction, HFpEF: Heart Failure with preserved ejection fraction, NT pro-BNP: N-terminal pro-Brain Natriuretic Peptide.

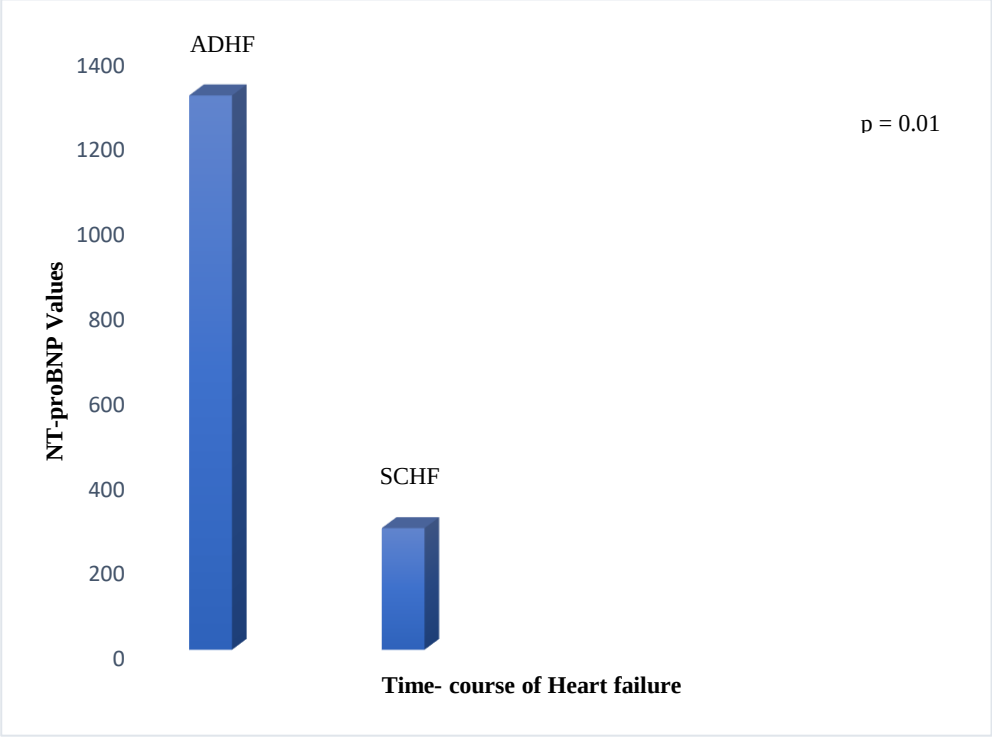


Figure 3: NT-proBNP values across the time-course of heart failure.
ADHF: Acute Decompensated Heart Failure, NT pro-BNP: N-terminal pro-Brain Natriuretic Peptide, SCHF: Stable Chronic Heart Failure.

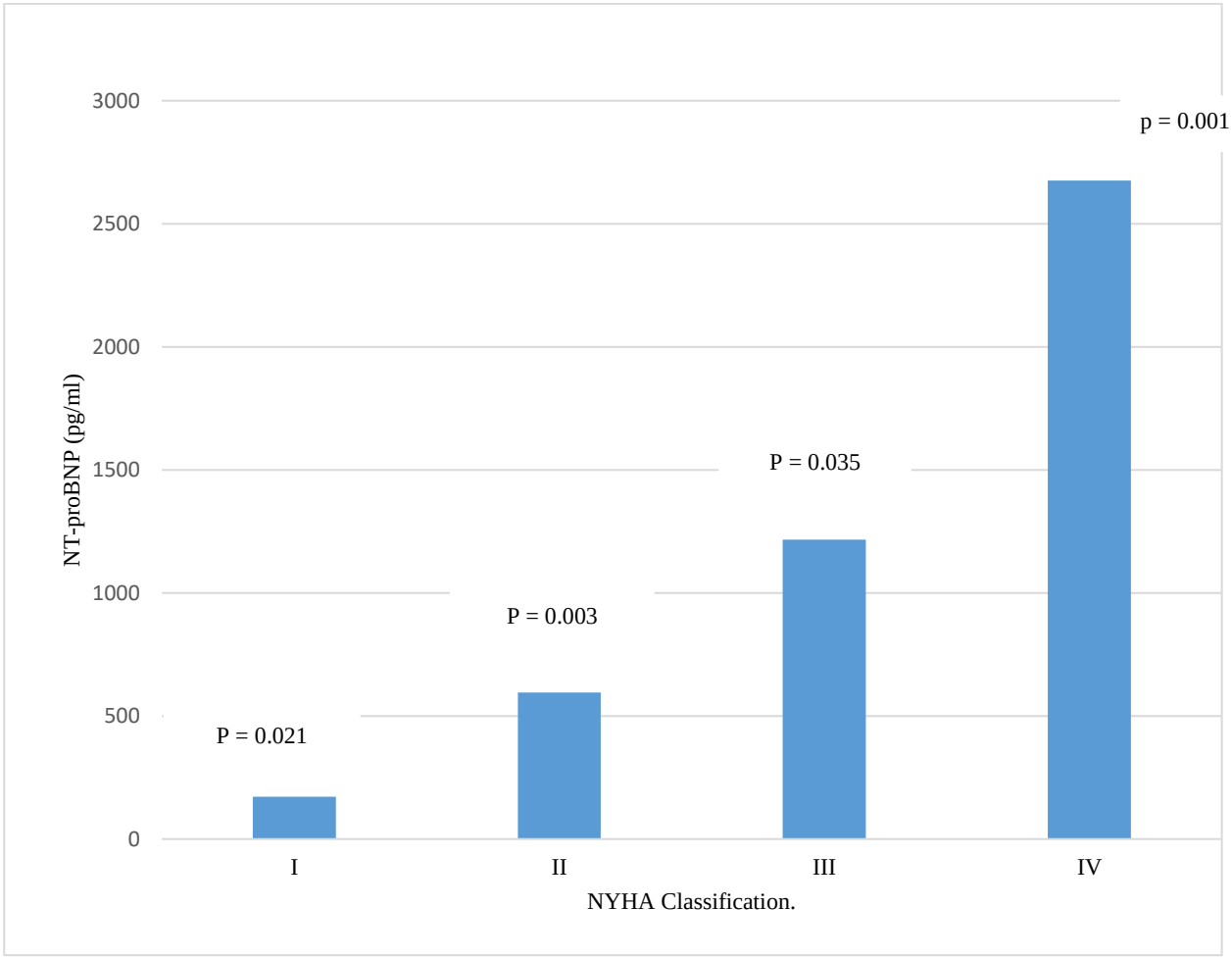


Figure 4: NT-proBNP values by New York Heart Association Classification.
NYHA= New York Heart Association

Table 1: socio-demographic and Clinical Characteristics by Gender

Characteristic	All (n=165)	All (n=165)	Female (n=89)	P value
Age (years)	64 (58 – 75)	61 (57 – 66)	71 (61 – 80)	0.630
Presenting findings, n (%)				
Cough	34(24.3)	11(32.4)	23(67.6)	0.155
Orthopnea	55(41.0)	26(47.3)	29(52.7)	0.734
Dyspnea	137(94.5)	61(44.5)	76(55.5)	0.093
Palpitation	27(25.5)	14(51.9)	13(48.1)	0.497
Pulmonary crackles	43(35.5)	16(37.2)	27(62.8)	0.280
Pedal edema	69(51.5)	30(43.5)	39(56.5)	0.398
Modifiable cardiovascular risk factors, n (%)				
Hypertension	109(66.1)	49(45.0)	60(55.0)	0.691
Diabetes Mellitus	23(13.9)	14(60.9)	9(39.1)	0.125
BMI Categories, n (%)				
Normal	22(23.9)	14(63.6)	8(36.4)	0.673
Overweight	26(28.3)	15(57.7)	11(42.3)	0.675
Obese	44(47.8)	23(52.3)	21(47.7)	0.382
NYHA Dyspnea Class, n (%)				
Stage 1-2	59(35.8)	27(63.6)	32(36.4)	0.98
Stage 3	67(28.3)	30(57.7)	37(42.3)	0.97
Stage 4	39(47.8)	19(52.3)	20(47.7)	0.85
Types of heart failure, n (%)				
ADHF/ De novo HF	144(87.3)	66(45.8)	78(54.2)	0.88
SCHF	21(12.7)	10(47.6)	11(52.4)	0.38
HFrEF	52 (36.1)	31(59.6)	21(40.4)	0.02
HFmrEF	29 (20.1)	13(44.8)	16(55.7)	0.54
HFpEF	63 (43.8)	24(38.1)	39(61.9)	0.07
NT-proBNP pg/ml	1103(325-3305)	1672(299-3727)	881(325-2985)	0.283

ADHF: Acute Decompensated Heart Failure (HF), BMI: Body Mass Index, NYHA: New York Heart Association, HFmrEF: Heart Failure with mid-range Ejection Fraction, HFpEF: Heart Failure with preserved ejection fraction, HFrEF: Heart Failure with reduced Ejection Fraction, NT pro-BNP: N-terminal pro-Brain Natriuretic Peptide, values are median (25^{th} – 75^{th} percentile), SCHF: Stable Chronic Heart Failure

Table 2: Association between Elevated NT-proBNP levels, socio-demographic and Clinical Characteristics.

Variable	Odds Ratio (OR)	P value	95% C.I
Age (years)	1.006	0.593	0.983 – 1.031
Gender			
Male	0.715	0.293	0.382 – 1.336
Hypertension	0.808	0.521	0.421 – 1.551
Type 2 Diabetes mellitus	0.904	0.827	0.367 – 2.228
Body mass index categories			
Overweight	2.286	0.182	0.679 – 7.699
Obese	3.20	0.04	1.054 – 9.712
Presenting symptoms			
Cough	1.603	0.256	0.710 – 3.621
Orthopnea	1.721	0.138	0.841 – 3.523
Presenting signs			
Pedal edema	0.852	0.654	0.422 – 1.718
Pulmonary Crackles	0.528	0.119	0.236 – 1.179
Palpitation	0.739	0.510	0.301 – 1.816
Heart failure etiology			
Dilated cardiomyopathy	1.615	0.610	0.26 – 10.23
Hypertensive Cardiomyopathy	2.500	0.287	0.46 – 13.50
Ischemic heart disease	1.500	0.733	0.15 – 15.46
Types of heart failure			
SCHF (ref)			
ADCHF	5.662	0.001	1.96 – 16.34
NYHA dyspnea class			
Stage I (ref)		0.001	
Stage II	4.603	0.001	1.81 – 11.70
Stage III	11.667	0.006	2.05 – 66.41
Stage IV	1.742	0.226	0.71 – 4.28
Ejection Fraction			
HFpEF (ref)		0.033	
HFrEF	2.801	0.01	1.28 – 6.16
HFmrEF	1.659	0.306	0.63 – 4.37

(LVEDD= Left Ventricular End Diastolic Diameter, LVESD= Left Ventricular End Systolic Diameter, IVSS= Interventricular Septal Systolic Diameter, IVSD= Interventricular Septal Diastolic Diameter, LPSD= Left Posterior Wall Systolic Diameter, LPDD=Left Posterior Wall Diastolic Diameter, LVEF= Left Ventricular Ejection Fraction, HFrEF= Heart Failure with reduced Ejection Fraction, HFmEF= Heart Failure with mid-range Ejection Fraction, HFpEF= Heart Failure with preserved Ejection Fraction).
(ECG= Electrocardiography, NT pro-BNP= N Terminal pro Brain Natriuretic Peptide, AF= Atrial Fibrillation, LVH= Left Ventricular Hypertrophy). Natriuretic Peptide, eGFR= Estimated Glomerular Filtration Rate).
(ref = reference category, NT-proBNP = N terminal pro Brain Natriuretic Peptide, NYHA: New York Heart Association, HFrEF= Heart Failure with reduced Ejection Fraction, HFmEF= Heart Failure with mid-range Ejection Fraction, HFpEF= Heart Failure with preserved Ejection Fraction, ADCHF= Acute Decompensated Chronic heart failure, SCHF =Stable Chronic Heart Failure)

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Ejection Fraction			
HFpEF (ref)		0.033	
HFrEF	2.801	0.01	1.28 – 6.16
HFmrEF	1.659	0.306	0.63 – 4.37
Biology			
Hemoglobin < 12 g/dl	1.586	0.180	0.808 – 3.11
eGFR	0.741	1.004	0.996 – 1.01
Electrocardiographic abnormalities			
AF	1.821	0.190	0.744 – 4.461
ST segment abnormalities	0.636	0.385	0.229 – 1.766
LVH	1.806	0.090	0.911 – 3.578
Presence of Ectopic beats	1.436	0.444	0.569 – 3.629
PR Interval abnormalities	1.980	0.061	0.970 – 4.043
QRS Complex abnormalities	2.196	0.059	0.103 – 4.370
Echocardiographic measurements			
LVEDD	2.174	0.051	0.10 – 4.75
LVEDD	2.174	0.051	0.10 – 4.75
LVESD	4.346	0.239	0.70 – 5.08
IVSS	0.549	0.168	0.23 - 1.29
IVSD	1.919	0.364	0.47 – 7.85
LPDD	44	24	0.62 – 5.16
Left atrial diameter	1.575	0.330	0.63 – 3.93
Pulmonary artery pressure	2.357	0.078	0.91 – 6.12

(LVEDD= Left Ventricular End Diastolic Diameter, LVESD= Left Ventricular End Systolic Diameter, IVSS= Interventricular Septal Systolic Diameter, IVSD= Interventricular Septal Diastolic Diameter, LPSD= Left Posterior Wall Systolic Diameter, LPDD=Left Posterior Wall Diastolic Diameter, LVEF= Left Ventricular Ejection Fraction, HFrEF= Heart Failure with reduced Ejection Fraction, HFmEF= Heart Failure with mid-range Ejection Fraction, HFpEF= Heart Failure with preserved Ejection Fraction).
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Table 3: Multivariable analysis of variables associated with elevated NT-proBNP Values

Variable	Adjusted P value	Odds Ratio	95% C.I
NYHA Class			
1(ref)	0.209		
2	0.164	4.316	0.551 - 33.842
3	0.044	3.325	1.031 - 10.720
4	0.297	1.791	0.598 - 5.363
Time-course			
ADCHF	0.028	5.004	1.190 - 21.047
SCHF(ref)			
LVEF			
Preserved(ref)	0.963		
Midrange	0.943	0.960	0.31 - 2.97
Reduced	0.824	1.153	0.33 - 4.03

DISCUSSION

In this analysis of NT-proBNP levels and factors associated with elevated values among HF patients diagnosed by cardiologists using clinical history and imaging in a limited resourced setting, we identified three major findings:

1. In unselected patients presenting to our hospitals with HF, natriuretic peptides are not frequently utilized in the management of HF with only 16% benefiting from the NT-proBNP testing.
2. NT-proBNP plasma concentrations were generally high (58.8%) among those who had the testing with similar values between men and women.
3. Median NT-proBNP values were more elevated in patients with HFrEF vs HFmrEF and HFpEF, ADCHF vs SCHF and NYHA class III and IV of HF vs class II and I.

There is a dearth of data on the use of cardiac biomarkers in Africans; henceforth these findings attract some comments.

Utilization of NT-proBNP to diagnose heart failure

The natriuretic peptides, specifically BNP and NT-proBNP, provide a readily evaluable objective biochemical marker that reflects many aspects of the physiology of HF and disease progression. The use of natriuretic peptides as a tool to diagnose HF has been extensively studied and implemented as diagnostic and prognostic biomarkers in high-income countries [13-15]. With success of BNP and its key position in the diagnostic algorithm, the tests are increasingly available in few settings in Africa [9,10]. That testing rates lag behind in our study might be explained by several factors including limited access, financial constraints and poor knowledge and uptake of clinical guidelines and advancements in the field of HF biomarkers. This sounds like a huge missed opportunity because in low resource settings like ours, access to expensive and technical cardiac imaging is limited and confined to very limited HF populations, therefore NPs could aid in the diagnosis and management of HF, particularly in combination with point-of-care echocardiography. It must be recalled that even western countries, publications suggested that only one-third of patients with a clinical diagnosis of HF had echocardiography [16] and this puts emphasis on the use of NT Pro BNP as a diagnosis marker in places where echocardiography is not always available. In Cameroon, the lack of access to cardiovascular diagnostic tools is a critical issue, and with the expense and technical expertise required for echocardiography limiting access, a BNP strategy may play a major role here, though elevated levels with different types of HF and cut-off values would still be yet to de characterized.

Elevated NT-proBNP values and factors associated among Heart Failure patients

NT-proBNP levels was elevated in only 58.8% of our population with a median level of 1103pg/ml. In a study of the role of plasma NT-proBNP in assessing cardiac remodeling in Nigerian hypertensive subjects, the median NT-proBNP, Ojji et al., had a mean NT-proBNP level of 501.7pg/ml. This could be explained by the fact that all our patients had heart failure as opposed to their sample, which was made up of both patients with and without HF, or with less congestion. Indeed, myocardial wall stress during acute HF, cytokines, hormones, and ischemia all stimulate BNP gene expression. Finally, age tends to influence (increase) NT-proBNP levels. Differences in population aging can also account at least partially because our study population was nearly a decade older than that of Ojji et al.

On the other hand, a study by Mwita et al. on acute heart failure patients in Botswana [17] showed a higher median NT-proBNP reading (3313pg/ml) [18]. This could be explained by the fact that his study focused on patients with acute heart failure, who have been noted to markedly elevate NT-proBNP levels compared to those with Chronic Compensated HF. Furthermore, patients with end-stage kidney disease were included in their sample.

Comparison of median NT-proBNP values with different heart failure classifications

We observed that patients with HFrEF had the highest median NT-proBNP value, 2956pg/ml when compared to

those with HFmrEF, median 1181pg/ml and HFpEF, median 815pg/ml. In HFrEF, the rise of BNP results from myocardial stress and dilation of the ventricles leading to low cardiac output. In any case, diagnosis of HFrEF is easily made based on clinical presentation and the reduced ejection fraction on echocardiography. Contrarywise, HFpEF is common [19] and its diagnosis and management remains difficult. B-type natriuretic peptide (BNP) levels are mandatory to diagnose HFpEF in clinical practice and as an entry criterion for inclusion into trials. The diagnostic performance of NT-proBNP for the detection of HFpEF is reasonable, and they can also be used to rule out HFpEF as recommended in several clinical HF guidelines [6,20,21].

Also, patients with acute decompensated heart failure (ADCHF) and De novo heart failure had higher median NT-proBNP levels than those with Chronic Heart Failure, that is 1306pg/ml in ADCHF versus 209pg/ml in Chronic HF (p= 0.01). This is similar to a study conducted by Januzzi et al. who had a median NT-proBNP level of 4054pg/ml among patients with acute heart failure as opposed to 131pg/ml, among patients with non-acute heart failure. This is because patients with acute decompensated HF suffer more severe fluid overload leading to massive production of NT-proBNP from the cardiomyocytes of the distended ventricles [20].

Strengths and limitations

This was a retrospective analysis and we cannot rule out the fact that some the possibility of poorly reported NT-proBNP data in the files, which would therefor underestimate the uptake of NT-proBNP use by clinicians managing HF in our setting. Nevertheless, this was one of the first study in Cameroon to determine the uptake of NT-proBNP test, as well as levels and factor associated with of elevated NT-proBNP values, among heart failure patients in our setting. The underutilization of an evidence-based cardiac biomarker in HF management in our setting is a real concern because echocardiography is not always easy to obtain due to lack echo machines, unaffordability of the exam and a very low cardiologists/population ratio. Information from this study must be used to improve the management of HF patients in our country As HF is a growing public health problem in Cameroon and associated with a % mortality in 3 years (1), we are hopeful that the implementation of a wide use of cardiac biomarkers can help improve survival as proven elsewhere [22]. Our study will serve as a basis on which future research can be conducted.

CONCLUSION

We observed that less than one quarter of heart failure patients have results of NT-proBNP indicating its underutilization in our setting. In addition, median NT-proBNP values were highest in the group with more severe disease as per the HF classification used and elevated NT-proBNP values were significantly associated with the time-course of HF and the NYAHA classification of dyspnea. These findings warrant an urgent implementation of BNP guided management of HF as point-of-care kits in our health facilities for improvement in management of our HF patients. Further research should explore the prognostic significance of elevated NT-proBNP values in our HF populations.

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