SUMMARY

**Background and Aims** – Despite novel therapies in the management of patients with heart failure the condition has continued to be associated with high morbidity and mortality. Early detection and intervention are critical in order to improve outcome of these patients. Plasma brain type natriuretic peptide (BNP) is a cardiac biomarker which can be utilized for early diagnosis of heart failure (HF) especially at the primary healthcare level where Echo is not readily available.

This study therefore is aimed at determining the relationship between BNP and echocardiographic indices and also determines the sensitivity and specificity of the peptide in the diagnosis of HF using Echo as the gold standard.

**Methods;** The study design is a cross sectional study. One hundred and sixty subjects were recruited of which 80 were newly diagnosed HF patients and 80 age and sex-matched healthy controls. They had clinical evaluation for HF and laboratory evaluation for plasma BNP. Measurement of BNP was done using Phoenix BNP 32 human enzyme immunoassay (EIA) kit for all the 160 subjects and controls. Echocardiographic parameters were also obtained for both left ventricular (LV) systolic and diastolic indices in all the subjects and controls.

**Results;** The mean age of the patients (57.7±13.3yrs) was similar to that of the healthy controls (56.1±11.4yrs), P=0.448. The gender distribution of the patients and the controls were also similar P= 0.871. The mean BNP was significantly higher in the patients (1684.3±1185.3pg/ml) than the controls (79.8±47.7pg/ml), P <0.001. In a comparison of systolic HF and diastolic HF, lower BNP value was observed in the latter group. The mean BNP was observed to be higher in patients with
systolic HF (1851.4±1247.0pg/ml) than in the patients with HF with preserved systolic function (1406.2±1160.3pg/ml), P<0.001.

A gender difference was also observed in this study though not statistically significant with female healthy controls having higher mean BNP value (81.8±50.8pg/ml) than the male controls (77.1±43.7pg/ml), P= 0.665.

Plasma BNP had a significant correlation with LV dimension in diastole (LVIDd) (r =0.374, P <0.001), LV mass index (LVMI) (r=0.589, P<0.001) and E/A (r=0.214, P=0.007) and a negative correlation with ejection fraction (EF) (r= -0.622, P<0.001), Fractional shortening (FS) (r= -0.624, P<0.001), as the BNP increases the systolic functions decreases and deceleration time (DT) (r= -0.249, P=0.001). Also observed in this study is the positive correlation between the peptide and New York Heart Association (NYHA) functional class.

The systolic HF and plasma BNP had an area under receiver-operator curve (AUC) 0.909 (95 % CI=0.865-0.953), P<0.001. The sensitivity and specificity of BNP for systolic HF were 96.2% and 74.8% respectively. The HF with preserved systolic function and plasma BNP had AUC 0.956 (95% CI0.925-0.988), P<0.001. Sensitivity and specificity for HF with preserved systolic function were 88.9% and 92.4% HF respectively. The negative predictive values were 97.6 and 90.2% for systolic HF and HF with preserved systolic function respectively.

**Conclusions;** This study has demonstrated that there is correlation between plasma BNP levels and echocardiographic indices of LV systolic and diastolic dysfunction. There is an elevated plasma BNP level in patients with heart failure. The BNP level increases as the LV size increases with HF. The peptide level increases with progressive decline in LV systolic function. Plasma
BNP may therefore be used as a diagnostic tool for early detection of HF, especially in medical emergencies and primary healthcare centre in view of the appreciable sensitivity and specificity.