SUMMARY

Background: In spite of declining incidence of stroke and mortality among western populations due to prompt and proper stroke management, in addition to treatment of modifiable risk factors, stroke incidence and mortality is on the increase among patients in sub Saharan Africa. Studies have shown that admission hyperglycaemia correlates with infarct size and consequent deleterious outcome of stroke among Caucasians. This study is aimed at determining the relationship between admission blood glucose level and the infarct size in patients with acute ischaemic stroke among Nigerian Africans.

Method: This study was carried out at the University of Maiduguri Teaching Hospital, Maiduguri (UMTH), Borno State. Consecutive patients presenting to the hospital with acute ischaemic stroke from January, 2007 to December, 2008 were enrolled into the study. All of the patients had CT and/or MRI of the brain and the infarct size measured as the product of the widest diameters. All patients had blood samples taken immediately on admission for sugar estimation using glucose oxidase method. Admission RBS was correlated with the infarct size. The infarct size was dichotomized into those with larger infarcts (>1000mm²) and smaller infarcts (≤ 1000mm²). A multiple logistic regression was performed to assess the influence of hyperglycaemia on infarct size, Adjusted odds ratios were obtained after the adjustment for confounding factors such as age, sex and diastolic BP. Stroke severity on admission and discharge was assessed using the National Institute of Health Stroke Scale (NIHSS), modified Rankin Scale (mRS) and the Barthel's ADL index. The mRS and NIHSS was dichotomized into those with severe stroke on admission (mRS 3 to 6; death was graded 6 and NIHSS >14) and less severe stroke (mRS 0, 1, or 2 and NIHSS ≤ 14). These outcome measures was correlated with admission RBS. A regression analysis was done to assess the influence of hyperglycaemia
30-day fatalities were also recorded, odds ratio was obtained for the risk of death in patients with hyperglycaemia.

**Results:** A total of 62 patients (40 males and 22 females) were enrolled into the study. The mean age was 56.4 ± 11.7 years (range 24 – 80 years). Admission hyperglycaemia (>7mmol/l) was present in 14 (22.6%) of the patients, 17.5% of males and 31.8% of females. There was a positive correlation between admission RBS and Infarct size (r=0.302, p=0.017). The mean infarct size among those patients with RBS ≥ 7mmol/L was 3442.8 ± 2565.5mm² and among those with sugar level < 7 mmol/l was 1668.6 ± 1831.6mm² (p=0.005). Patients with hyperglycaemia had three and half times increased risk of larger infarct size (OR=3.46, 95% CI=0.800–14.972).

There was a positive correlation between admission RBS and admission NIHSS (r=0.288, p=0.023), discharge NIHSS (r=0.314, p=0.015), admission mRS (r=0.258, p=0.043), discharge mRS (r=0.326, p=0.012). However correlation was negative between admission Barthel's index (r= -0.211, p=0.099) and discharge Barthel's (r= -0.309, p=0.017). The mean stroke severity on admission and discharge between patients with hyperglycaemia compared to normoglycaemic patients showed: Admission NIHSS – 21.08±8.78 vs 14.71±7.01, p=0.006; Admission mRS - 4.08±0.86 vs 3.46±0.99 (p=0.038); Discharge NIHSS – 27.00±16.46 vs 10.90±12.92 (p=0.000); Discharge mRS – 4.67±1.83 vs 2.74±1.73 (p=0.000); Discharge Barthel's index - 24.58±37.51 vs 60.65±32.69, (p=0.001).

Patients with hyperglycaemia have more than twice increased risk of more severe stroke, NIHSS ≥14 (OR=2.30, 95% CI=0.633- 8.359) and MRS ≥ 3 (OR=2.40, CI=591–9.757). The 30-day fatality rate was 25.81% of the total patients. The fatality rate of patients with hyperglycaemia was 50% compared to 18.8% in normoglycaemic patients (p= 0.019).

Patients with hyperglycaemia have more than 4-fold risk of death. (OR=4.33, 95% CI=1.212–15.491)
**Conclusion:** The prevalence of admission hyperglycaemia (RBS ≥ 7.0 mmol/L) was 22.58%. There was a positive correlation between admission RBS and infarct size. Those with hyperglycaemia (RBS > 7 mmol/L) had larger infarct size. A positive correlation also exists between admission RBS and increasing stroke severity. Those with admission hyperglycaemia had worse stroke when compared with those with normoglycaemia.

Admission hyperglycaemia is a predictor of the risk of 30-day fatality.