Background: Insulin resistance (IR) is a state of reduced responsiveness to normal circulating concentrations of insulin and a precursor of type 2 diabetes mellitus (T2DM), cardiovascular diseases and metabolic syndrome (MS). Identification of IR using gold standard techniques is tedious, expensive, and unsuitable for clinical settings. Several simple surrogate markers (SSMs) of IR have been proposed which comprise of anthropometric and routine biochemical markers. Studies have been done in different parts of the world about the use of cost effective and readily available SSMs to detect IR. Few studies however have been done about the use of SSMs to detect IR in Nigeria. The reason to embark on this study emanates from the need to identify cost effective and readily available SSMs of IR. This will help in the easy detection of IR in low resource setting and in clinical practise.

Aim: The aim of this study was to determine the role of SSMs in identifying IR among T2DM subjects. The study objectives are to determine the prevalence of IR in Nigerian patients with T2DM; the relationships among SSMs of IR, components of the MS, glycaemia, pancreatic beta-cell function and the ability of SSMs to predict the presence of IR.

Methods: This was an analytical cross-sectional study involving T2DM and apparently healthy (control) participants. Data obtained on each participant included socio-demographic variables, anthropometric indices and other relevant information pertaining to the study. Fasting venous blood samples from all participants was assayed for insulin, c-peptide, lipids and other biochemical indices. A combination of hormone based surrogates of IR [homeostasis model assessment of IR using insulin (HOMA-IR), homeostasis model assessment of IR using c-peptide (HOMA-IR (CP), quantitative insulin sensitivity check index (QUICKI), fasting insulin (FI), fasting c-peptide (FCP) and fasting glucose to insulin ratio (GIR)] was used to develop an IR score for measuring IR. The predictive abilities of the SSMs {lipid accumulation product (LAP), waist circumference (WC), waist to height ratio (WHtR), visceral adiposity index (VAI), triglyceride to high density lipoprotein cholesterol ratio (THR) and total bilirubin} in identifying subjects with IR were compared against this score. Data analysis was done with SPSS version 20. Results were expressed as mean (SD) and median (95% CI). Differences between groups were regarded as significant at p < 0.05.
**Results:** The prevalence of IR among T2DM subjects and controls in this study were 41.6% and 28.4% respectively using IR score. The prevalence of IR among T2DM subjects was 79.2%, 72%, 70.4%, 65.6%, 52.8% and 48% using HOMA-IR, FI, HOMA-IR (CP), FCP, GIR and QUICKI respectively. Of the six SSMs of IR used in this study, WC, WHtR, LAP, THR and VAI had strong to moderate significant relationship with components of metabolic syndrome in decreasing order of frequency. The THR, WC and LAP had moderate significant relationship with glycaemia. The THR had the strongest negative relationship with beta-cell function while all the other surrogate markers have weak, non-significant relationship with beta-cell function. The VAI was the best surrogate marker to predict the presence of IR among the studied male participants with area under the ROC analysis curve (0.648) while WC was the best to predict the presence of IR among the total female studied participants with area under the ROC analysis curve (0.658).

**Conclusion:** The findings in this study show that IR is common among subjects with T2DM. The study shows that there is strong to moderate relationship between some of the studied SSMs, components of the MS, glycaemia and beta-cell function. Simple surrogate markers such as VAI and WC can be used to predict the presence of IR in routine clinical practise. There is need for more studies in the future to clarify these findings.

**Keywords:** Insulin Resistance, Metabolic Syndrome, Surrogate Markers, Type 2 DM, Nigerians.