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METABOLIC AND BLOOD PRESSURE CONTROL IN TYPE 2 DIABETES MELLITUS PATIENTS ATTENDING A TERTIARY DIABETES CLINIC IN NIGERIA

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ABSTRACT

BACKGROUND

Cardiovascular disease is one of the leading causes of death in many developed and developing countries among patients with Type 2 Diabetes Mellitus (T2DM). Persons with T2DM have two to four fold increased risk for developing cardiovascular disease than non-diabetics. They also have increased risk of co-morbidities like hypertension, dyslipidaemia and obesity. Complications of diabetes can be prevented or progression delayed by intensive glycaemic, blood pressure and lipid control. Glycaemic control has been demonstrated in the UKPDS, MRFIT and STENO studies to reduce microvascular and macrovascular complications.

AIMS AND OBJECTIVES:

The purpose of the study was to determine the percentage of patients who had their HbA1c, BP and Lipids treated to target among patients attending a tertiary government medical centre in Lagos, Nigeria.

SUBJECT, METHODS, MATERIALS:

Type 2 diabetes mellitus patients attending the Lagos University Teaching Hospital (LUTH) diabetes clinic, Lagos, Nigeria were recruited. Information such as; gender, age, duration of diabetes mellitus, blood pressure, HbA1c, fasting lipids values were obtained from clinical examination and case notes. Data collected was analyzed using SPSS version 17.

RESULTS:

218 subjects (41.3% males, 58.7% females) seen in the diabetes clinic in July and August 2012 were recruited for the study. Mean age of the cohort was 59.08±11.02 years. Mean diabetes duration was 8.51 ± 7.37years. 47.7% of patients had good glycemic control using HbA1c of <7%, 40.8 % of patients had good BP Control of <

130/80mmHg and 80.7% had dyslipidaemia. 78.9% had central obesity.

CONCLUSION:

Metabolic control in our environment though improving compared to a similar study 6 years earlier is still sub-optimal, and dyslipidaemia seems to be the least well controlled metabolic parameter.The poor lipid control can be attributed to under treatment of this problem as POC machines to measure lipids are not readily available and where lipids are measured this is the costliest metabolic parameter to monitor and treat in DM.. The poor blood pressure control is also of great concern considering that this is the most important factor in stroke aetiopathogenesis. It is believed that achieving all round metabolic and BP control with improve all cause DM mortality rates by reducing heart attacks, strokes and lower extremely amputations.

KEYWORDS:

Type 2 Diabetes Mellitus, Glycemic Control, Dyslipidaemia, Blood Pressure, HbA1c

INTRODUCTION

Diabetes Mellitus is a chronic metabolic disorder characterized by chronic hyperglycaemia due to deficiency of insulin or reduced insulin action. Type 2 diabetes mellitus (T2DM) is the most prevalent form of Diabetes Mellitus and its prevalence has been on the increase worldwide even in Nigeria due to increasing obesity and sedentary lifestyle which is secondary to industrialisation (1,2).

About 415 million people worldwide were estimated to have Diabetes in 2015 and this is expected to increase to 642 million in 2040 (3). In Sub saharan Africa it was estimated about 20 million Africans had Diabetes in 2015, and is expected to increase to 41.4 million by the year 2040 (3).

At diagnosis of T2DM some patients usually have some (obvious or hidden chronic) complications of the disease due to the long duration between asymptomatic metabolic abnormalities and overt clinical symptoms (4,5).

Persons with Type 2 Diabetes Mellitus (T2DM) have two to four fold increased risk for developing cardiovascular disease than non-diabetics (6,7). They also have increased risk of co-morbidities like hypertension, dyslipidaemia and obesity which may predate the DM or occur later in the course of the disease. Complications of diabetes can be prevented or the rate of progression delayed by tight glycaemic, blood pressure and lipid control coupled with regular monitoring for early detection of complications. Glycaemic, lipid and blood pressure control has

been demonstrated in the UKPDS, MRFIT and STENO studies to reduce microvascular and macrovascular complications (8-11).

In Nigeria, studies done show that glycaemic control is inadequate due to economic, patient and physician related factors. Lack of good diabetes education is common to both patients and their healthcare providers in the country (12,13).

ADA recommends levels of HbA1c less than 7%, blood pressure readings less than 130/80 mmHg, HDL levels greater than 50 mg/dl in women, 40mg/dl in men and LDL less than 100mg/dl (14). Worldwide majority of studies reveal non attainment of these targets in several patient cohorts (15).

Materials and Methods

This was a prospective cross sectional study involving consecutively presenting T2DM patients attending the Lagos University Teaching Hospital (LUTH) diabetes clinic, Lagos, Nigeria. These were fairly stable, fit out-patients who gave informed consent. Subjects with complete records were recruited between the period of 1st July 2012 – 31st August 2012. Strict confidentiality was maintained as patient hospital numbers and initials only were used.

HBA1c was measured using boronate affinity method on the Clover A1c point of care device after regular calibration and standardisation. Fasting lipid profile done using Randox kits on a standard CX5 clinical chemistry analyser in the Department of Medicine, LUTH research laboratory. These tests were performed as the patients were being recruited or test results of the patient done in the same laboratory within the previous 6 months used.

Clinical examination done included anthropometry (weight, height, waist circumference, hip circumference), blood pressure using an electronic Omron sphygmomanometer (Model M3) with appropriate sized cuff after adequate rest. The average blood pressure was recorded after 3 measurements.

Non consenting patients, pregnant women, acutely ill or hospitalised patients and patients with incomplete data were excluded.

Statistical Analysis

Data pertinent to the study was entered into study data forms and then inputed into Microsoft Excel spread sheets for cleaning and storage.Calculations and analysis were done using the IBM SPSS version 17.0 software. Continuous variables were expressed as means ± standard deviation. Pearson's correlation coefficient analysis was used to determine associations between continuous data. The level of statistical significance was taken as $P < 0.05$

218 subjects comprising 90(41.3%) males and 128 (58.7%) females seen in the diabetes clinic in July and August 2012 were recruited. Mean age of the cohort was 59.08±11.02 years. Mean diabetes duration was 8.51 ± 7.37years, the range of DM duration was a month to 40 years. The age range was 31 -93 years. None of the patients were current smokers but 11.9% were ex smokers.

104 (47.7%) patients had good glycemic control using HbA1c of <7%, 40.8 % of patients had good BP Control of < 130/80mmHg (mean BP of the cohort 136/81) and 80.7% had dyslipidaemia.

Results:	
Anthropometric & Metabolic Characteristics	**T2DM(n= 218)**
Age in years(mean ± SD)	59.08±11.02
Sex (%) • **Females** • **Male**	 58.7 41.3
Duration of Diabetes in years (mean ± SD)	8.51 ± 7.37
HbA1c (mean ± SD)	7.56 ± 2.42.
Smoking status (%) □ **Never Smoked** □ **Ex-Smokers** □ **Current Smokers**	80.1 11.9 nil
Systolic Blood pressure mmHg(mean ± SD)	135.63 ± 18.70
Diastolic Blood pressure mmHg(mean ± SD)	81.31 ± 11.49
BMI kg/m^2 (mean ± SD)	27.98 ± 4.95
Waist Circumference cm (mean ± SD)	98.35 ± 13.56
Central obesity (%)	78.90%
Total Cholesterol mg/dl(mean ± SD)	210.07 ± 59.25
HDL mg/dl(mean ± SD)	58.05 ± 16.33
LDL mg/dl(mean ± SD)	138.70 ± 56.36
Triglyceride mg/dl(mean ± SD)	82.25 ± 49.22

172 (78.9%) had central obesity. The range of waist circumferences of the subjects was 63 - 133 cm, mean waist circumference was 98.35 ±13.56cm. Concerning the weight of the subjects 39 (1.8%) of the patients were under-weight, 47 (21.6%) had normal weight, 95 (43.6 %) were overweight, 51 (23.4%) had obesity class 1 17 (7.8%) had obesity class 2 while only 3 or 1.4% had obesity class 3. For other details see table above.

Discussion:

rIn the STENO study (10), a prospective study of 160 white Danish patients with type 2 DM and persistent microalbuminuria randomised to conventional and intensive multi factorial treatment the results have shown that intensified intervention aimed at multiple cardiovascular risk factors reduced the risk of CVD and microvascular events by about 59%. Even the UKPDS and DCCT studies have shown the beneficial effect of intensive glycaemic control. Despite evidence of the beneficial effects of risk factor control in T2DM, optimal glycaemic control is not achieved in many patients (15). In our study, we found that 47.7% of our study population had a HbA1c reading of <7%. Mean HbA1c was 7.56 ± 2.42. This was a good result compared to what obtains in countries with better healthcare funding. This result is similar to another study done by Unadike et al in Benin, Nigeria (16), which reported good glycaemic control in 54% of subjects. However these results may not be telling the whole story as those who can do HBA1c tests in these observational studies are probably the more affluent and more educated of the patients in these clinics. Probable reasons for poor control in subjects in that study (Unadike et al) included; poor health seeking behaviour, low level of literacy, poverty, poor adherence with follow up visits and medications amongst others. Coker and Fasanmade (17) in an earlier study documented poor glycaemic control amongst persons with diabetes in Lagos, Nigeria with a mean HbA_{1c} level of 10.5% in their study cohort. A major limitation of that study was however the small number of patients with complete results including HBA1c.

The lipid esults in our study revealed about three quarters of the persons with diabetes having dyslipidaemia. This is not surprising when other Nigerian studies are compared with this study's results. An earlier study by Jarikre et al had demonstrated similar high levels of dyslipidaemia (18). Ogunleye et all found a clustering of hypertension and dyslipi mia and diabetes in a quarter of all the patients of his cohort. Dyslipidaemia and diabetes occurred in 58.9% of the patients (19). Ogbera and Fasanmade et al (20) also demonstrated high prevalence of dyslipidaemia in their cohort study in Lagos, Nigeria with over 75% of the subjects having at least one abnormal lipid fraction. Oguejiofor et al (21) in the southern Nigerian study similarly demonstrated dyslipidaemia in 60-90% of his review article of dyslipidaemia prevalence amongst diabetics spread across several regions in Nigeria. A retrospective study in the Lagos metropolis by Fasanmade et al also revealed that over 90% of the cohort of 278 patients seen in the teaching hospital had dyslipidaemia (22).

This study revealed that only about 40% of the study subjects achieved good blood pressure control. This is similar to studies in most parts of the world. For instance in a review article by Pinchevsky Y et al (23)which analysed metabolic and glycemic control in about 26,000 subjects in a period 2009-2014 only 35.2% were able to achieve a blood pressure target of less than 130/80mmHg. This is worrisome when one considers the fact that the single most important

factor in stroke prevention in diabetics is normalisation of blood pressure (24). This however confirms several local and international studies that demonstrate the high frequency of cardiovascular risk factors and consequent rise in cardiovascular complications in persons diabetes (19,23). This study however did not evaluate other cardiovascular risk factors like Hs-CRP and homocysteine levels which are also known to significantly affect cardiovascular morbidity (25). Several researchers have however warned and highlighted that the high cardiovascular disease burden of diabetes are macrovascular changes which antedate the date of diagnosis of DM (26,27).

Its unfortunate that as easy as it is to monitor and treat hypertension many patients are not treated to target. More health education is required in this area.

Care of persons with diabetes should move from the era of blindly treating patients without evaluating the quality of care. Various cardiovascular risk factors have to evaluated and treated to target if life expectancy in the diabetic is to increase (28-30).

Coronary artery disease which was once considered rare in Africa has since increased in prevalence with the progressive westernisation of the populace in sub saharan Africa (31-32). Africans can scarcely afford a coronary artery disease epidemic as many countries have rudimentary cardiac support services. Thus a case for primordial prevention should be pushed. Primordial prevention starts from utero, adequate maternal healthcare services and healthy nutrition and development of the children of this generation will go a long way in arresting coronary ischaemia (33).

Conclusion:

Metabolic control in our environment though improving compared to a similar study 6 years earlier than this one is still sub-optimal, and dyslipidaemia seems to be the least well controlled metabolic parameter. Glycaemic control appears to be similar to the general picture in other countries which demonstrate about a third of patients or slightly more get to the goal HBA1c of <7%. The poor lipid control can be attributed to under treatment of this problem as POC machines to measure lipids are not readily available and where lipids are measured this is the costliest metabolic condition to manage in DM. The seeming asymptomatic nature of dyslipidaemia in the early phases of life further compound the neglect of this dire condition. Concerted efforts (use of point of care devices for blood sugars, HBA1c and lipids, greater dietary management and lifestyle changes) need to be put in place to address metabolic control of persons with DM especially dyslipidaemia while diabetes education will help to raise awareness in healthcare providers and patients alike.

Most especially healthcare providers and patients need to be educated on the importance of treating blood pressure to target. this can be achieved by empowering the patients to check and monitor their blood pressures and strive to attain the targets.

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