RESEARCH ARTICLE

METABOLIC SYNDROME PREVALENCE AMONG TYPE 2 RURAL DIABETIC PATIENTS OF CAMEROON

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Cameroon.

ABSTRACT

Background: The simultaneous presence of Metabolic syndrome and type 2 diabetes among individuals is a favorable field for development of cardiovascular diseases. The aim of this study was to evaluated metabolic syndrome magnitude (MetS) among members of type 2 diabetic community of a Cameroonian rural area.

Methods: A cross sectional study with a total of 100 known diabetic patients (37 women and 63 men) participated in the study at Mbaré’ district hospital, they were aged between 32-68 years. Anthropometry, blood pressure and fasting blood glucose were measured. Metabolic syndrome was diagnosed using Adult Treatment Panel-III (ATP-III) 2001 guidelines.

Results: The prevalence of MetS among this rural diabetic community was 41.23% (45.95%) for women and (36.51%) for men. Among the diabetic men a total 88.89% of patients had low HDL (52%), 42.62% had hypertension, 18.03% had increased waist circumference. The most common abnormalities among diabetic women were low HDL (91.89%) increased waist circumference (59.45%) and hypertension (56.76%).

Conclusion: This study shows that metabolic syndrome is less frequent among diabetes patients of rural Cameroon therefore cardiovascular risk is still low.

INTRODUCTION

Metabolic syndrome (MetS) is the cluster of several risk factors for cardiovascular disease (CVD) such as hypertension, dyslipidemia, obesity, insulin resistance and high fasting plasma glucose and it physiopathology is not well understood (Zimmet PZ and Kelly, 1992; Lorenzo et al., 2003, Resnick et al., 2003). Type 2 diabetes is a metabolic disorder linked to obesity and is developed among individuals over 40 years. With obesity pandemic, the incidence of type 2 diabetes is increasing seriously worldwide and sub-Saharan Africa countries are concerned. Statistics show that in 2030 more than more than 23.9 will be diabetic patients in Africa (Whiting et al., 2011, King et al., 1998). In Cameroon, the prevalence of type 2 diabetes is 6% and at the same time countries are facing the fatal double burden of infectious and non communicable diseases. With the UN meeting focusing on type 2 diabetes management, much consideration is accorded to diabetes care but with it high economic cost limited access to diagnosis and medical monitoring is accorded to diabetes and this is more concuspicious in high urban centers. Therefore, private initiatives for medical monitoring of diabetes are occasionally proposed. The coexistence of diabetes, and metabolic syndrome among individuals is a favorable field for cardiovascular diseases them However in Cameroon, they are limited data dealing with diabetes and metabolic syndrome in rural areas. Our study objective was to estimate the prevalence of metabolic syndrome among diabetic patients who attended

MATERIALS AND METHODS

Ethics

The cross sectional study was approved by the head of Mhare hospital and the Education Planning Commission of Fouda Medical Foundation of Yaounde. After their verbal consent, type-2 diabetics’ out-patients were recruited during the activities of 2016 international diabetes day week. Admission to the study was based solely on voluntary participation of diabetes patients. Females were excluded from the study if they were pregnant or lactating. All participants in the study provided verbal informed consent. All measurements and questionnaire were in accordance with the Helsinki Declaration (1983 version).

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Subjects

This descriptive study was conducted at the district hospital of Mbaré. All male and female type-2 diabetics regularly attending the glycemic control aged between 35-65 years old were included in the study. Patients informed consent was taken from study subject and basis of the study was also explained. A detailed history including age, gender, duration of DM and compliance with medication was taken. Fasting Plasma Glucose (FPG) was measured using a portable hand held gluco-meter GlucoPlus™ in Mbaré after at least 8 fasting hours while lipid profile was measured at the biological laboratory of the Andre Fouda Medical Foundation in Yaoundé. The data collection comprised healthcare questionnaire, anthropometric measurement of weight, Height, and waist circumference, health examination and a well trained nurse drew 5 ml of fasting morning blood samples from the examinee’s arm dispensed into vacutainer® plain tubes for laboratory test in fasting state for lipids. After centrifugation at 3000 g for 10 min, the plasma were stored at -4°C until then transferred at Yaounde for lipids assayed. Total cholesterol and triglycerides in plasma were measured using previously described standard methods. [Allain et al., 1974, Buccolo and David, 1974] High Density Lipoprotein cholesterol was determined using a heparin manganese precipitation of Apo B-containing lipoproteins. [Warnick and Albers, 1978] Height, weight, and waist circumference were all measured using standardized techniques and calibrated equipment. BMI was calculated by dividing weight by height squared (kg/m²) classified according to WHO rules≥30. [WHO, 1997]. Standardized techniques were used to obtain the blood pressure measurements after at least 10 min of rest. Waist circumference was taken with the subject in a standing position, to the nearest millimetre, using a non-stretchable tape measure at the mid-point between the lowest rib and the iliac crest in expiration. The height was measured in standing position using tape meter while the shoulder was in a normal position to the nearest millimetre (Siber Hegner, Zurich, Switzerland). Body weight was determined in 12-h fasted participants (with very light clothing on and without shoes) using a Jocca™ scale.

Definition of Metabolic Syndrome

Type 2 diabetes patients were considered to have Metabolic Syndrome if they had three or more of the five following criteria, according to the ATPIII definition [NCEP, 2005]

1. Abdominal obesity, defined as a waist circumference in women ≥ 88 cm (35 inches), in men ≥ 102 cm (40 inches)
2. Hypertriglyceridaemia ≥ 150 mg/dL (1.7 mmol/L) or drug treatment for elevated triglycerides
3. HDL cholesterol level <50 mg/dL (1.3 mmol/L) in women, <40 mg/dL (1mmol/L) in men or drug treatment for low HDL-C
4. Blood pressure ≥ 130/85 mmHg or drug treatment for elevated blood pressure
5. Fasting plasma glucose (FPG) ≥ 110 mg/dL (6.1mmol/L) or drug treatment for elevated blood glucose. It’s important to remembered that all patients were known diabetic patient on anti-diabetic medications and were considered to have diabetes even when their blood glucose was in the normal range.

Statistical analysis

All data were analyzed by STATA® 8.2. Continuous variables are reported as means ± standard deviations (SD) and categorical variables are presented as percentages or numbers. A p value less than 0.05 was considered statistically significant. Quantitative and qualitative variables were tested using Student’s t-test and the chi-square test respectively. P value <0.05 was considered statistically significant.

RESULTS

Of a total of 100 diabetic patient were received during the campaign, 63 were men and 37 the rest consist of women our study. According to table 1, the mean age for diabetic men was 48.49±: 16.69 while the mean age of diabetic women was 47.56±: 15.06 years. Abdominal circumference and high triglycerides level was significant higher among diabetic women comparatively to men. In table 2, considering the diabetics status of the population study, the prevalence of rest of individual’s components of metabolic syndrome among diabetic men was shown to be: 18.03% for high waist circumference 42.62 for high blood pressure 88.89% for low high density lipoprotein-cholesterol 1.59% for triglyceride. Among diabetic women, high blood pressure was reported among 56.76%, high waist circumference among 59.45%, low high density lipoprotein-cholesterol among 91.89% and no (0.00% women) with high triglyceride levels.

Table 1. Demographic, clinical and biochemical characteristics of Diabetics Men and Women

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Diabetic Men</th>
<th>Diabetic Women</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>63</td>
<td>37</td>
<td>-</td>
</tr>
<tr>
<td>Age (years)</td>
<td>48.49±: 16.69</td>
<td>47.56±: 15.06</td>
<td>0.784</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>26.59±: 6.99</td>
<td>27.07±: 7.38</td>
<td>0.715</td>
</tr>
<tr>
<td>WC, cm</td>
<td>88.70±: 13.49</td>
<td>94.42±: 12.95</td>
<td>0.045*</td>
</tr>
<tr>
<td>SBP, mmHg</td>
<td>124.90±: 30.68</td>
<td>133.37±: 26.94</td>
<td>0.168</td>
</tr>
<tr>
<td>DBP, mmHg</td>
<td>77.37±: 15.66</td>
<td>82.29±: 17.90</td>
<td>0.156</td>
</tr>
<tr>
<td>FBS, mg/dl</td>
<td>96.52±: 25.17</td>
<td>102.91±: 25.33</td>
<td>0.332</td>
</tr>
<tr>
<td>TG, mg/dl</td>
<td>38.66±: 28.41</td>
<td>52.37±: 31.26</td>
<td>0.027*</td>
</tr>
<tr>
<td>T-Chol, mg/dl</td>
<td>235.46±: 69.71</td>
<td>227.27±: 79.16</td>
<td>0.591</td>
</tr>
<tr>
<td>HDL-Chol, mg/dl</td>
<td>18.02±: 5.87</td>
<td>16.29±: 7.50</td>
<td>0.612</td>
</tr>
</tbody>
</table>
*Significant difference between diabetic men and diabetic women

Table 2. Prevalence of Metabolic Syndrome individual components

<table>
<thead>
<tr>
<th>Individual components</th>
<th>Diabetic Men</th>
<th>Diabetic Women</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperglycaemia</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Low HDL</td>
<td>88.89</td>
<td>91.89</td>
<td>0.821</td>
</tr>
<tr>
<td>High Triglycerides</td>
<td>1.59</td>
<td>0.00</td>
<td>0.342</td>
</tr>
<tr>
<td>Abdominal Obesity</td>
<td>18.03</td>
<td>59.45</td>
<td>0.043*</td>
</tr>
<tr>
<td>Hypertension</td>
<td>42.62</td>
<td>56.76</td>
<td>0.746</td>
</tr>
</tbody>
</table>
* P<0.05 considered significant

Table 3. Metabolic Syndrome Items

<table>
<thead>
<tr>
<th>Parameters</th>
<th>All</th>
<th>Diabetic Men</th>
<th>Diabetic Women</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 criteria (%)</td>
<td>41.23</td>
<td>36.31</td>
<td>43.95</td>
<td>0.000</td>
</tr>
<tr>
<td>4 criteria (%)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>/</td>
</tr>
<tr>
<td>5 criteria (%)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>/</td>
</tr>
<tr>
<td>Metabolic Syndrome (%)</td>
<td>41.23</td>
<td>36.51</td>
<td>45.95</td>
<td>0.000</td>
</tr>
</tbody>
</table>
The most frequent abnormalities were low high density lipoprotein-cholesterol and hypertension for men and low high density lipoprotein-cholesterol and high waist circumference for women 45.95 women and 36.5% men had metabolic syndrome with 3 abnormalities nobody exhibit four or five abnormalities.

**DISCUSSION**

Diabetes is the four leading cause of mortality among developing countries. With cowardly medical monitoring only 60% of diabetes cases are undiagnosed. Many people discover their diabetic status after many years of unknown illness and this may favor long term complications such as cardiovascular diseases. In Cameroon there is an urban rural discrepancy among diabetes prevalence. Few Cameroonians studies have already focused on diabetes and metabolic syndrome, this is the first report focusing on metabolic syndrome prevalence among type 2 rural diabetics. Based on NCEP definition, the overall prevalence of metabolic syndrome among studied type 2 diabetic patients was 41.23%. Our prevalence is lower than the one reported in many studies 83% in Pakistan (Imam et al., 2007), the prevalence in Bruno et al., 2004 study; among inidian migrants (Foucan et al., 2006), the reported prevalence of 86% from Iraq (Mansour 2007), 56% in Saudi Arabian (Akbar, 2002), 51% in Lagos (Azediran et al., 2007) and 60.4% in urban Cameroon. (Kegne et al., 2012) Some factors that may justify the relative lower prevalence of metabolic syndrome among this diabetic population of our study comparatively to previous studies, are the area of study. It is a rural area were urbanization level and transition is low, the majority of the studied population were farmers, therefore they are strongly physical active towards, they all belong to rural area where access adoption of unhealthy westernized lifestyle is reduced. The metabolic syndrome prevalence among female diabetic patient is significant higher among the majority of the studied population were farmers, therefore this was consistent with many previous studies Ashraf et al., 2006; Janghorbani et al., 2007) Through their lifetime women are face to many hormonal stage in women that may explained the higher abdominal circumference, metabolic syndrome prevalence among women multiple pregnancies, gestational diabetes mellitus, preeclampsia, lactation, hormonal contraceptives, and menopause. The most prevalent risk factor in this study was low HDL-CH, abdominal obesity and hypertension and this is in agreement with previous studies (Zana, 2011; Alshkri and Elmehdawi, 2008). The main limitation of this study was it cross sectional nature and diabetes was not diagnostic through oral glucose tolerance test.

**Conclusion**

Metabolic Syndrome was present in 41.23% of the diabetic population of Mbaré. Metabolic Syndrome was most common in the female patients. The most commonly occurring finding was a decreased HDL-c. Lipid profile of rural diabetic patients should be frequently evaluated for a better management of prevention of cardiovascular diseases in rural areas.

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Damaris Enyegue Mandob and Essoh Vanessa Falonne, Metabolic syndrome prevalence among type 2 rural diabetic patients of Cameroon