Microalbuminuria among diabetic patients with the Metabolic Syndrome

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Abstract
Microalbuminuria, an important component of the Metabolic Syndrome, has been found to predict mortality from cardiovascular disease among diabetic patients. We determine the prevalence of microalbuminuria among patients with type 2 diabetes with and without the Metabolic Syndrome. Microalbuminuria was more common among patients with the Metabolic Syndrome than in those without (45% vs 21%, respectively, p<0.05).

Introduction
Microalbuminuria may be defined as an urinary albumin excretion rate >20 µg/min or albumin creatinine ratio (ACR) >30 mg/g. It has been shown to predict the development of diabetic nephropathy among patients with type 2 diabetes. Microalbuminuria has been related to insulin resistance and can occur prior to the onset of diabetes. Clinical trials showed improved cardiovascular risk and reduced microalbuminuria with the use of agents that affect the renin-angiotensin system. There has been much debate as to whether microalbuminuria should be included as a major component of the Metabolic Syndrome. We determine the prevalence of microalbuminuria among patients with type 2 diabetes with and without Metabolic Syndrome.

Patients and methods
One hundred and ninety-two (192) patients with type 2 diabetes between the ages of 30 and 70 years, attending the Diabetic Clinic of Lagos University Teaching Hospital (LUTH), Lagos, Nigeria, were randomly selected for the study after informed consent was obtained. The diagnosis of Metabolic Syndrome was made based on the World Health Organization (WHO) criteria of the presence of type 2 diabetes, systemic hypertension (BP ≥140/90 or patients on anti-hypertensive medication), and obesity (body mass index ≥30 kg/m² and/or waist to hip ratio in males ≥0.9, in females ≥0.85). Urine samples were collected for the spot assessment of the urinary microalbuminuria using the Micral test strip, a semi-quantitative method for the assay of microalbuminuria. An albumin concentration detection over 20 mg/l is considered consistent with microalbuminuria (albumin excretion >30 mg/day).

Results
Half of the 192 patients (96) studied were diagnosed with Metabolic Syndrome, out of which 61 were females. Forty-seven (47) of the control subjects were females. Patients with Metabolic Syndrome were older (mean age 58±12 years) than the control subjects (mean age 52±15 years). The duration of diabetes was longer in patients with Metabolic Syndrome than the control subjects (7±5 vs 6±4 years, respectively p<0.05). Forty-five per cent (45%) of those with Metabolic Syndrome had microalbuminuria compared to 21% of those without (p<0.05) (see Table 1). Furthermore, abnormal ECG findings were more common among the Metabolic Syndrome patients (see Table 1). Systolic BP was classed as unsatisfactory (≥140 mmHg) in 56% of Metabolic Syndrome patients with microalbuminuria, while 51% also had an unsatisfactory (≥90 mmHg) diastolic BP. None of the control subjects was hypertensive. The mean systolic and diastolic BP were 163±31 mmHg and 93±15 mmHg for Metabolic Syndrome patients with microalbuminuria, while the control subjects had values of 119±22 mmHg and 72±13 mmHg respectively.

Discussion
The prevalence of microalbuminuria was higher among patients with Metabolic Syndrome (45%) than the controls (21%). The higher prevalence could be due to the fact that microalbuminuria is a major predictive index for cardiovascular mortality. Mykkanen et al reported a prevalence of 28% among patients with type 2 diabetes, which is similar to the figure obtained from this study.

The duration of diabetes was higher among patients with Metabolic Syndrome. This may lead to an increase in the duration of oxidative stress on the vascular system, thereby making them more prone to the development of microalbuminuria. Microalbuminuria occurrence is also proportional to increased levels of both systolic and diastolic BP. High BP has been identified as a cause of oxidative stress and endothelial dysfunction in the
Table 1 Occurrence of microalbuminuria and abnormal ECG tracings in type 2 diabetic patients with and without the Metabolic Syndrome

<table>
<thead>
<tr>
<th></th>
<th>With metabolic syndrome</th>
<th>Without metabolic syndrome</th>
<th>Significance</th>
</tr>
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<tbody>
<tr>
<td>Microalbuminuria</td>
<td>43 (45%)</td>
<td>20 (21%)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Abnormal ECG</td>
<td>17 (18%)</td>
<td>7 (7%)</td>
<td>p&lt;0.05</td>
</tr>
</tbody>
</table>

pathogenesis of microalbuminuria. Patients with Metabolic Syndrome also had a higher occurrence of abnormal ECG (see Table 1). This may relate to hypertension and left ventricular hypertrophy. Microalbuminuria is a marker of renal disease, arteriosclerosis, and left ventricular hypertrophy, all of which are predictors of early mortality.

Rutter et al., in a study of 43 patients with type 2 diabetes and microalbuminuria showed that the majority of patients were male and in their sixties. This is similar to what was found in our report. In survival studies of type 2 diabetes, microalbuminuria predicts early mortality; in cross-sectional studies, it is associated with cardiovascular morbidity; and in longitudinal studies, it predicts the development of new clinical coronary artery disease (CAD). It seems likely that microalbuminuria and CAD are not causally related, but reflect a common determinant.

Microalbuminuria is a major risk factor for microvascular and macrovascular complications among diabetic patients.

References

In the news

**Diabetes ‘blocked by stem cells’**

Brazilian and US scientists have used transfusions of patients’ own stem cells to reverse type 1 diabetes. However, experts have warned that the study is preliminary and inconclusive.

The researchers, from the University of Sao Paulo, gave the patients powerful drugs to suppress their immune systems in an attempt to stop further destruction of pancreatic cells. This was followed by transfusions of stem cells taken from their own blood, in effect designed to restart the immune system. Some patients reacted more quickly to the treatment than others, and the length of the effect also varied. One patient was able to survive without insulin injections for 35 months, and four others for at least 21 months.

**Clear obesity gene link ‘found’**

Scientists say they have identified the clearest genetic link to obesity yet. They found people with two copies of a ‘fat’ version of a gene had a 70% higher risk of obesity than those with none, and weighed 3 kg more.

The work reported in *Science* by the Peninsula Medical School and Oxford University studied data from about 40,000 people. The authors say their work, funded by the Wellcome Trust, could improve understanding of obesity and eventually help prevent it, as well as an illness it is linked to.

Obesity is associated with an increased risk of type two diabetes, and the investigators first identified the FTO gene when looking for differences between the genomes of people with type two diabetes and people without diabetes.

**Fish pollutants: link to diabetes**

More evidence has emerged suggesting a link between pollutants found in oily fish and type 2 diabetes. An international team from Kyungpook National University and the University of Minnesota found high levels of persistent organic pesticides (POPs) in the blood correlated to insulin resistance. POPs are stored in fatty issue – the study suggested this may be why obese people are more vulnerable to diabetes.

Experts have said that the study published in *Diabetes Care* is far from conclusive, but lead author Professor Duk-Hee Lee said the evidence needed to be replicated and developed in other studies, and called for molecular studies to explain the links between pesticides and insulin resistance.

**Daisies good for diabetes control?**

The flowering plant known as milk thistle, a member of the daisy family, is believed to give some remedy for liver diseases, such as viral hepatitis. In a recent study, a daily supplement of extracts from milk thistle (Silybum marianum) lowered fasting glucose levels by 15% in people with type 2 diabetes. Fifty-one people with type 2 diabetes took part in a 4-month randomised, double-blind, placebo-controlled clinical trial. While they continued taking their conventional oral blood glucose-lowering medication, they received either a daily supplement of extracts from milk thistle or a placebo.

The results showed a significant decrease in HbA1c, fasting blood glucose, total and LDL cholesterol, and triglyceride levels in people treated with milk thistle extract, compared with those taking the placebo – as well as with values at the beginning of the study in each group.