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**OXIDANT AND ANTIOXIDANT STATUS AND URIC ACID IN HYPER TENSION,
DIABETES MELLITUS AND METABOLIC SYNDROME**

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ABSTRACT

Diabetes represents a major public health burden, both locally and globally. From 1985 to 2000, the number of people living with diabetes globally rose from 30 million to 171 million. Future projections have estimated the prevalence of diabetes to exceed 300 million cases by 2030, with the majority of growth occurring in developing countries. Free radicals are highly reactive molecules generated by biochemical redox reactions that occur as part of normal cell metabolism and in the course of free radical mediated diseases such as arthritis, renal, cardiovascular, inflammatory, infectious, neurological diseases, diabetes mellitus and cancer. An antioxidant is a molecule capable of slowing (or) preventing the oxidation of other molecules. Early research on the role of anti oxidants in biology of focused on their use in preventing the oxidation of unsaturated fats, which is the cause of rancidity. The production of this aldehyde is used as a biomarker to measure the levels of oxidative stress in an organize. Malondialdehyde mainly exists in the enol form. A substantial portion of the population of the United States has

the Metabolic Syndrome, a condition that greatly increases risk for cardiovascular disease and diabetes. Insulin resistance, and the resulting compensatory hyperinsulinemia, is the principal pathophysiologic abnormality underlying the majority of these cases. Different physiological processes associated with various components of the metabolic syndrome contain unique information about diabetes risk. Microalbuminuria is more likely to be a complication of the type 2 diabetes or hypertension than a marker of the metabolic syndrome. Moreover, easily applicable testing to diagnose insulin resistance accurately in the general population is currently not feasible. It is therefore necessary to broaden the criteria that define the metabolic syndrome to include other conditions associated with the presence of insulin resistance. Such conditions include the following: a family history of type 2 diabetes or coronary artery disease in first- or second-degree relatives, signs of an over active sympathetic nervous system, and elevated concentrations of uric acid. By recognizing these "other conditions," appropriate lifestyle changes and medication can be recommended to help prevent cardiovascular disease and diabetes from developing in these high risk patients.

Keywords: Diabetes Mellitus, Antioxidant, Uric acid, Metabolic Syndrome

INTRODUCTION

Diabetes represents a major public health burden, both locally and globally. From 1985 to 2000, the number of people living with diabetes globally rose from 30 million to 171 million. Future projections have estimated the prevalence of diabetes to exceed 300 million cases by 2030, with the majority of growth occurring in developing countries. It is well known that diabetes is associated with significant morbidity and mortality. For these reasons considerable resources have been invested to improve diabetes management [1]. Diabetes is not one disease, but rather is a heterogeneous group of syndromes [2] characterized by

hyperglycemia due to absolute (or) relative deficiency of insulin [3]. Diabetes mellitus (DM) is also characterized with disturbance of carbohydrate, fat, and protein metabolism, resulting from defects in insulin secretion, insulin action (or) both. When the effects of DM include long term damage, dysfunction and failure of various organs, especially the eyes, kidneys, heart and blood vessels. DM may present with characteristic symptoms such as thirst, polyuria, blurring of vision, weight loss, and polyphagia, in its most severe forms with ketoacidosis (or), nonketotic hyperosmolarity, which in the absence of effective treatment leads to stupor coma and death [4]. Free radicals are the

chemical species (molecules (or) molecular fragments) that possess one (or) more unpaired electrons and have an independent existence.

Conventionally, Biological oxidations ensure that molecular oxygen is completely reduced to water. However, partial reduction of O₂ generates reactive oxygen species (ROS) which are more commonly referred to as free radicals [5]. Free radicals are highly reactive molecules generated by biochemical redox reactions that occur as part of normal cell metabolism and in the course of free radical mediated diseases such as arthritis, renal, cardiovascular, inflammatory, infectious, neurological diseases, diabetes mellitus and cancer [6].

Reactive oxygen species degrade polyunsaturated lipids, forming malondialdehyde [7]. This compound is a reactive aldehyde and is one of the many reactive electrophile species that cause toxic stress in cells and form advanced glycation end products [8]. The production of this aldehyde is used as a biomarker to measure the levels of oxidative stress in an organism [9, 10]. Malondialdehyde mainly exists in the enol form [11]. MDA and other “thiobarbituric reactive substances” (TBARS) condense with two equivalents of thiobarbituric acid to give a fluorescent

red derivative that can be assayed spectrophotometrically [11-12] 1-Methyl-2-phenyl indole is an alternative more selective antigen. An antioxidant is a molecule capable of slowing (or) preventing the oxidation of other molecules. Early research on the role of anti oxidants in biology focused on their use in preventing the oxidation of unsaturated fats, which is the cause of rancidity [13]. The possible mechanism of action of an oxidant were first explored when it was recognized that a substrate with anti-oxidative activity is likely to be one that is itself readily oxidized [14]. Often by scavenging reactive oxygen species before they can damage cells [15]. However, it was the identification of vitamin A, C and E as antioxidants that revolutionized the field and led to the realization of the importance of [16, 17] antioxidants in the biochemistry of living organisms.

There are truly the scavengers of free radicals. The most important antioxidant enzymes are superoxide dismutase, catalase and glutathione peroxidase. Vitamin C (ascorbic acid), Vitamin E (tocopherol), Beta Carotene, Uric acid, Glutathione, Flavonoids, Ceruloplasmin, Caffeine, Ferritin, Transferrin, Bilirubin. The clustering of hypertension, dyslipidemia, glucose intolerance, insulin resistance,

hyperinsulinemia, microalbuminuria, and obesity, particularly central obesity, has been termed the metabolic syndrome [1]. Controversies still exist as to whether microalbuminuria is a component of the syndrome [2–4]. An important feature of the syndrome is insulin resistance, which is characterized by increased serum fasting insulin levels among nondiabetic individuals in epidemiological studies [5, 6]. Thus, it has been called syndrome X or insulin resistance syndrome [7, 8].

Despite that the underlying mechanism of the syndrome is not completely understood, obesity and sedentary lifestyle coupled with unbalanced diet and still largely unknown genetic factors interact to produce the syndrome [9, 10]. It has been proposed that this syndrome is a powerful determinant of type 2 diabetes and cardiovascular disease [7, 8, 11]. Recently, factor analysis, a statistical technique for studies including interrelating variables, has been applied to investigate the risk factor clustering in the metabolic syndrome [12–17] and to predict coronary heart disease or total and cardiovascular disease mortality. However, little information is currently available on the mechanism with which the major components of the metabolic syndrome, including urinary albumin

excretion rate (UAER), relate to each other in nondiabetic and diabetic individuals.

Furthermore, there are only few prospective studies evaluating the extent to which the metabolic syndrome or its individual components predict the development of type 2 diabetes. Therefore, some studies are applied factor analysis to investigate how the major components of the metabolic syndrome relate to each other and to the development of diabetes in a Chinese population. Our aim is to comparing the findings in women and men and in nondiabetic and diabetic participants separately.

DISCUSSION AND CONCLUSION

In Factor analysis one study findings revealed consistent clusters of variables that were different in nondiabetic and diabetic subjects in the Chinese population. Blood pressure was not linked with insulin resistance. Obesity and glucose/insulin factor were the strongest predictors of type 2 diabetes. These findings suggest that insulin resistance is not the single unifying factor for the clustering of the components of the metabolic syndrome. Different physiological processes associated with various components of the metabolic syndrome contain unique information about diabetes risk [8-10]. Microalbuminuria is more likely to

be a complication of the type 2 diabetes or hypertension than a marker of the metabolic syndrome. MS patients at the stage of DGT demonstrate intensified LPO, elevated concentration of the end metabolites NO-nitrates and conditions for endotheliocytes desquamation. These processes promote early development of angiopathy in DM. DGT are reversible, therefore, these MS patients are perspective for prophylaxis. The presence of oxidant stress in such patients should be considered in prescription of relevant medication. Plasma levels of TG most significantly reflect severity of basic clinical manifestations of MS: abdominal obesity, arterial hypertension, CM compensation. The presence of hypertriglyceridemia in MS patients can be considered as an indicator of high atherogenic potential of plasma [10-12].

The WHO criteria appear to identify a greater number of obese adults at risk for CVD. Nevertheless, the addition of an OGTT at least in nondiabetic patients with two ATPIII-defined metabolic risk factors may help to improve the association between the MS and CVD in obese adults. A substantial portion of the population of the United States has the Metabolic Syndrome, a condition that greatly increases risk for cardiovascular disease and diabetes [14, 15]. Insulin resistance, and the resulting compensatory

hyperinsulinemia, is the principal pathophysiologic abnormality underlying the majority of these cases. Based on the most recent recommendations of the National Cholesterol Education Panel, such patients can be identified by the presence of three or more of the following traits: impaired fasting glucose, abdominal obesity, hypertension, elevated levels of triglycerides, and low concentrations of HDL-cholesterol. However, a significant number of insulin resistant (and thus high risk) individuals will not be identified using these criteria [16].

This discrepancy occurs because insulin resistance is a continuous variable, without an absolute cut-off between normal and abnormal, and those fitting the definition are the most insulin resistant. Moreover, easily applicable testing to diagnose insulin resistance accurately in the general population is currently not feasible. It is therefore necessary to broaden the criteria that define the metabolic syndrome to include other conditions associated with the presence of insulin resistance. Such conditions include the following: a family history of type 2 diabetes or coronary artery disease in first- or second-degree relatives, signs of an over active sympathetic nervous system, and elevated concentrations of uric acid. By recognizing these "other

conditions," appropriate lifestyle changes and medication can be recommended to help prevent cardiovascular disease and diabetes from developing in these high risk patients. In our India MS, a condition that greatly increases risk for cardiovascular disease and diabetes. In our study findings are also related to this review (Author) findings.

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