Plasma Insulin and Insulin Resistance in Diabetes Mellitus Type 2

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Abstract

Background : Diabetes is being recognized as number one disease of mankind especially in India with a heavy toll on individuals, family and country. Diagnosing Diabetes Mellitus Type 2 by hyperglycemia may be too late for interventions aimed at reducing the burden of diabetes and its complications.

Methods: A total of 857 subjects from three groups, students between ages 10 and 17, Non diabetic and diabetic individuals with stroke and angiography proven Coronary Artery Disease and individuals from Master Health Check were recruited. Insulin resistance was calculated in all the above groups from fasting insulin and fasting blood sugar. A follow up was conducted on available students from the first group after intervention with folic acid and exercise.

Results: Of 507 children tested, four already exhibited hyperglycemia. Insulin Resistance was high in a third and fasting plasma insulin in 42.6%. Acanthosis Nigricans, Body Mass Index and waist circumference were associated with high fasting plasma insulin and insulin resistance. The percentage of high insulin resistance and fasting plasma insulin among hyperglycemic Coronary Artery Disease is 92.9 (p=0.001). The percentage of abnormal values is higher in non hyperglycemics also. In Master health check, we found over 50% prevalence of high insulin resistance and plasma insulin even if they were not hyperglycemic.

Conclusion: High Insulin Resistance and high Fasting Plasma Levels are found at early age and it is possible to identify these in children from external characteristics. Intervention can be started at that age hopefully to abort or delay onset of hyperglycemia and/or the vascular complications of Diabetes. There is indirect evidence that individuals with high insulin resistance become hyperglycemic eventually. High insulin resistance and plasma insulin are seen in patients even before hyperglycemia is evident. Hence we suggest inclusion of insulin estimation in Master Health check and in investigation of diabetes type 2.

Keywords: Diabetes Mellitus; DM, Insulin Resistance; Acanthosis Nigricans; Intervention; Medical Health Check; Insulin

Abbreviations: IR: Insulin Resistance; BMI: Body Mass Index; AN: Acanthosis Nigricans; FPI: Fasting Plasma Insulin; DM:Diabetes Mellitus; CAD: Coronary Artery Disease; WC: Waist Circumference; MHC: Medical Health Check

Background

According to world Diabetes Atlas 2012, worldwide more than 370 million people have diabetes and 4.8 million people die due to diabetes and its complications [1]. In India it is 63 million and over one million people respectively. In India total figure is likely to go up to 80 million by 2025 according to Diabetic Foundation of India [2]. The major proportion of the increase in people with diabetes will occur in developing countries of the world where the disorder predominantly affects younger adults in the economically productive age group [3]. Studies show that South Asians are inherently at high risk for type 2 diabetes [4,5].World Health Organization(WHO) report says that India is expected to house a major portion of these patients and almost 22% of patients with DM 2 will be in India by 2030 [6].

The high prevalence of Diabetes Mellitus 2 (DM 2) was reported even in the rural population of state of Kerala in India [7]. Kerala has been acknowledged to be in the forefront in terms of providing health care to all citizens but could not create an impact on diabetic tragedy [8]. Ninety percent of Diabetic clients who seek medical care at Malabar Institute of Medical Sciences (MIMS), an NABH (National Accreditation Board for Hospitals) and NABL(National Accreditation Board for Laboratories) accredited tertiary care hospital in Calicut district of Kerala State, present with one or more complications related to heart and kidneys .

The burden of cost of treatment of diabetes on the state and family is very high. It was roughly estimated that a family with one diabetic spends an average of Rs.1500 per month additionally. Therefore as in any other epidemic, prevention and early intervention is the answer.

Interventions aimed at reducing this burden have been put in place such as reducing smoking [9,10]. But interventions designed to reduce incidence based on known risk factors, if started at age 40 years cannot have significant effect as the disease has become well established by that time. Therefore the age at which such interventions should start is before the disease becomes established, ie: the second decade of life. It is generally agreed that the immediate causative factor in patients with DM-2 is increased Insulin Resistance [11].Therefore it is prudent to identify Insulin Resistance at much younger age so that intervention strategies can be instituted.

Early identification of risk factors may help to target individuals at risk and direct interventions to prevent or delay the disease. Most people with diabetes die of macro- and micro-vascular complications of the disease such as ischemic heart disease, stroke and renal failure [12]. Our hospital records show that euglycemic persons also develop macro vascular complications. This prompted us to look critically at the prevalence of Insulin Resistance among them.

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