

# PREVENTION OF DIABETES – THE INDIAN ANGLE

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The prevalence of NIDDM is increasing all over the world, especially in the developing countries [1,2]. According to the recent WHO report, by the year 2025 there will be 84-224 million diabetic subjects in the developing countries and the highest number of diabetics would be in India (57 million), China and U.S. Our recent epidemiological studies in urban, native Indians showed a 40% increase (8.2 to 11.6%) in its prevalence during a five year period [3,4] Considering the magnitude of the population, the number likely to suffer from morbidity due to this disorder would be very high. Therefore, prevention is the most important factor in the crusade against the disorder. Prevention of NIDDM is a possibility with changes in life style [5,6]. It includes genetic counselling, health promotion and specific protection. Genetic and environment factors are of equal importance in the causation of diabetes.

## GENETIC COUNSELLING:

Though genetic counselling is one of the accepted methods for prevention of any hereditary disorder, it has not got into practice in the case of diabetes because the exact genetic mechanisms are unknown. In light of the evidence already present, it is known that stronger the family history, the higher the incidence of diabetes [7,8]. Hence, marriage between two diabetics is not advisable.

## IDENTIFICATION OF HIGH RISK GROUPS:

Various epidemiological studies have shown that people with positive family history, obesity/central adiposity and early biochemical abnormalities, form a high-risk group for NIDDM.

## FAMILIAL AGGREGATION:

Asian Indians have strong familial aggregation of diabetes, with a high prevalence of diabetes amongst the first-degree relatives and vertical transmission through two or more generations. It was found that 45% of the Indians compared to 38% of the Europeans have positive family history of diabetes. A study of family history in the NIDDM patients attending the Diabetes Research Center, Madras, India, showed that 54% of the probands had a parent with known diabetes and in an additional 22.8% of siblings had diabetes [9].

The prevalence of diabetes increased with increasing family history of diabetes. The offspring of diabetic parents developed the disease at least a decade earlier than their parents. In a survey, in a South Indian population, it was noted that 43% of the diabetic patients had first degree family history of diabetes. Individuals at a high risk of developing diabetes can be identified from a detailed analysis of their family history. Uncovering hidden diabetes becomes extremely successful, if families are screened periodically for diabetes.

## DETECTION OF EARLY BIOCHEMICAL ABNORMALITIES:

In the natural history of diabetes, several sub-clinical stages are present before it finally manifests as clinical diabetes. Definite abnormalities of glucose tolerance and hormonal secretion and action (especially of insulin) have been detected in genetic prediabetic individuals, several years before clinical diabetes is detected.

The identifiable biochemical markers are [10,11]

- Elevated plasma insulin with normoglycemia
- Fasting and area of glucose under the curve in the upper limit of normal-higher than control subjects
- Low insulin to glucose ratio at 2h in IGT
- Low incremental insulin to glucose ratio at 30 minutes (insulinogenic index)

By proper screening procedures, these abnormalities have to be detected early and corrective measures have to be instituted. These measures help to improve insulin sensitivity.

## IMPAIRED GLUCOSE TOLERANCE (IGT):

An improvement observation made in the Madras Diabetes survey was that, although the prevalence of diabetes was four times lower in the rural population, the prevalence of IGT was almost similar in both urban and rural populations

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(8.7% and 7.8% in the urban and rural areas respectively) [12]. This observation of a high prevalence of IGT assumes great significance in view of our earlier observation that about 35% of the subjects with IGT become diabetic during a mean period of five years. With increasing urbanization, there would be a higher conversion rate from IGT to diabetes and the prevalence of diabetes is expected to rise in future. IGT can be easily identified by oral glucose tolerance test and individuals with IGT should be advised preventive measures.

### **CORRECTION OF ENVIRONMENTAL (DIABETOGENIC) FACTORS :**

Having identified the high-risk group, the next step will be to avoid or minimize the influence of the environmental factors. While the genetic factor is not amenable for correction, the environmental factors can definitely be modified to a great extent. Several factors are known to predispose to diabetes in a susceptible population. These factors are 1) obesity, 2) excessive intake of calories and free sugar and 3) lack of physical activity. Modernisation, leading to more consumption of energy, refined carbohydrates and fats and also reduced physical activity has resulted in adverse conditions causing obesity and insulin resistance. Thus the energy balance has tilted towards conservation of energy as depot fat, which is rarely utilised. High carbohydrate diet, as several studies have shown, produces high insulin sensitivity. However, this occurs mostly with complex carbohydrates and soluble food fiber. The western diet, rich in energy and low in fiber, promotes weight gain and insulin resistance, even in the low risk population such as the Europeans. The mechanisms responsible for this might operate more strongly in the high-risk populations, who already have insulin resistance. A programme involving alteration in life style complemented by pharmacological interventions, especially in those having impaired glucose tolerance and / or strong family history of diabetes has to be implemented. A study by Prof. Viswanathan at the Diabetes Research Center, Madras conducted on 262 non-diabetic offspring of non insulin dependent diabetic patients, registered under the prevention program, showed that rate of development of diabetes was greater in those who gained body weight, in comparison with those who lost weight or showed no change [13] (Table1). Reduction in body weight even in non-obese individuals helps to prevent the onset of NIDDM. Although the rate and degree of obesity is less among Indians. It has been observed in several earlier studies, that even a minor increase

in body mass index, increased the risk of diabetes. Results of another analysis of the data showed that lack of exercise, presence of mental stress and high 2h plasma glucose were the factors associated with development of diabetes. Therefore, it was inferred that prevention strategies such as weight control by proper diet and exercise help greatly in the crusade against diabetes.

**Table 1 Effect of change in body weight on glucose tolerance. Period of follow-up 8 ± 4.2 years.**

Body Weight at follow – up	n	Diabetic* %	IGT** %
No Change	69	7.2	37.7
Decreased	82	8.5	29.3
Increased	111	22.5	25.2

\* = Trend  $X^2 = 9.4$ ,  $P = 0.002$

\*\* =  $X^2 = 3.04$ ,  $P = 0.08$

### **REGULAR FOLLOW-UP AND MOTIVATION:**

Regular follow-up and constant motivation are required to ensure that the preventive measures are put into practice over a number of years. Education regarding diabetes has to be imparted not only to diabetic has to be imparted not only to diabetic patients but also to their families and the community in general, to remedial measures one loses the chance of a life-time, by allowing the disease to progress into the overt form.

### **CONCLUDING REMARKS:**

An inexplicable inertia exists today in accepting diabetes as a preventable disease, though many other chronic diseases have been submitted to an effective preventive regimen. The need of the hour is a drastic change in our approach, with more emphasis on the preventive aspects of diabetes for the benefit of the community.

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