

Study of Serum Amylin Level in Impaired Glucose Tolerance Subjects

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Abstract: *The aim of study was to measure serum level of amylin in impaired glucose tolerance subjects and compare with healthy control subjects. In this study 160 IGT and 160 healthy subjects (age and gender matched) were enrolled. BMI, Glucose, HOMA IR, Insulin and amylin were assessed. Serum amylin levels were higher in impaired glucose tolerance subjects compared with healthy controls (7.4 ± 2.7 pmol/l vs 4.0 ± 0.6 pmol/l, respectively, $P < 0.0001$). Increased levels of amylin can assess diabetes at an early stage.*

Keywords: Amylin, IGT, Diabetes.

1. Introduction

Diabetes Mellitus is one of the main threat to human health in the twenty-first century and therefore should be controlled and managed early to avoid its complication. Type 2 diabetes is preceded by a pre-diabetes (PD) is a dysmetabolic state of glucose level between diabetes mellitus and normal glucose tolerance. Prediabetes is a serious health problem and a high-risk state associated with diabetes development and cardiovascular complications. Prediabetes is a condition of fasting hyperglycemia, IFG and IGT where glycemic parameters are higher than normal but do not reach the diabetes threshold.

According to American Diabetes Association (2017), Impaired glucose tolerance (IGT) is defined as two-hour glucose levels of 140 to 199 mg per dL (7.8 to 11.0 mmol/L) on the 75g oral glucose tolerance test. These glucose levels are above normal but below the level that is diagnostic prevention for diabetes. IGT is commonly associated with both obesity and disturbances in insulin secretion and/or insulin resistance. It is characterized by reduced peripheral insulin sensitivity, near normal hepatic insulin sensitivity, and progressive loss of beta cell function.

Amylin has important role in regulation of glucose levels in humans. It has been shown that amylin has insulin-mimetic effects on glucose metabolism by activating the insulin signal transduction pathway through the direct binding to the insulin receptor at a site different from that of insulin. Recent studies also demonstrated that serum amylin levels were significantly higher in diabetic compared with non-diabetic group.

Although there are many evidences linking obesity, serum amylin and type 2 diabetes. Data about serum amylin concentration in Impaired Glucose Tolerance is limited. Therefore, present study was undertaken to evaluate serum amylin levels in patients with IGT and to compare it with healthy controls.

2. Materials & Methods

160 impaired glucose tolerance subjects were recruited in this study from the OPD of Department of Medicine, Jawahar Lal Nehru Medical College and Associated group of Hospitals, Ajmer. The subjects were considered as IGT based on the ADA guidelines (2017). Age and gender matched 160 healthy subjects without a family history of diabetes were also recruited in this study to serve as the controls. On a prescheduled morning, the subjects were requested to arrive after overnight fast (at least 10 hour) to provide a fasting blood sample. After collecting fasting blood samples, the subjects were given 75g of glucose dissolved in 250ml of water. The blood was drawn via venepuncture 2h after glucose load. After 30 mints of collection, the blood sample was centrifuged for 10-15 mints at 3000rpm to obtain the serum. BMI was determined following standard procedures. Glucose was measured using the glucose oxidase method, HOMA-IR was calculated by formula $IR_{HOMA} = (I_0 \times G_0)/22.5$, Insulin and serum amylin were measured using an enzyme linked immunosorbent assay (ELISA) technique. The quantitative variables were expressed as the Mean \pm SD (Standard deviation) median (range). The baseline characteristic between IGT and healthy subjects were assessed using student's t-test for continuous variables (as applicable). All P-values were based on a two sided test of statistical significance. Significance was accepted at the level of $p < 0.05$.

3. Results and Observation

In this study, 160 cases of impaired glucose tolerance were compared with 160 healthy controls.

Table 1: Anthropometric parameters of IGT subjects & Healthy controls

| Parameters | IGT Cases (Mean \pm SD) | Healthy Controls (Mean \pm SD) | P-Value |
|--------------------------|------------------------------|-------------------------------------|-------------|
| AGE (yrs) | 44 \pm 4.5 | 40 \pm 2.5 | 0.644 (NS) |
| WEIGHT (kg) | 58 \pm 3.5 | 52 \pm 4.2 | - |
| HEIGHT (cm) | 156 \pm 7.5 | 159 \pm 10 | - |
| BMI (kg/m ²) | 25.3 \pm 3.0 | 19.6 \pm 2.1 | <0.001 (HS) |

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Table 2: Biochemical parameters of IGT subjects & Healthy subjects

| Parameters | IGT Cases (Mean \pm SD) | Healthy Controls (Mean \pm SD) | P-Value |
|--------------------------------|------------------------------|-------------------------------------|--------------|
| Fasting Plasma Glucose (mg/dl) | 115.0 \pm 7.2 | 76.0 \pm 6.6 | <0.0001 (HS) |
| HOMA-IR | 3.2 \pm 2.5 | 1.4 \pm 0.3 | <0.0001 (HS) |
| Serum Insulin (μ IU/ml) | 9.2 \pm 5.1 | 6.2 \pm 1.7 | <0.0001 (HS) |
| Serum Amylin (pmol/l) | 7.4 \pm 2.7 | 4.0 \pm 0.6 | <0.0001 (HS) |

P value <0.0001 is considered highly significant while $p < 0.01$ is considered significant

Basic anthropometric parameters of IGT subjects and healthy subjects are summarized in table-1. There was no significant difference between IGT subjects and healthy subjects regarding mean age (44 ± 4.5 vs. 40 ± 2.5 yrs.). BMI mean \pm SD in kg/m^2 in IGT and healthy subjects was (25.3 ± 3.0 vs. 19.6 ± 2.1) and it was highly significant. Biochemical parameters of IGT subjects and healthy subjects are presented in table-2. IGT subjects had higher Amylin levels compared to healthy subjects (7.4 ± 2.7 vs. 4.0 ± 0.6 , $P < 0.0001$). Serum glucose, insulin, HOMA-IR were significantly high in IGT subjects ($P < 0.0001$).

4. Discussion

In the present study, IGT subjects have significantly higher levels of amylin as compared to healthy control subjects. A number of articles have reported increased levels of serum amylin in type 2 diabetes and obese patients, but impaired glucose tolerance subjects have not been studied extensively to know whether the increase in the circulating amylin levels begin before the onset of diabetes. Our findings are in agreement with Nishimura et al. (1991), who found that amylin concentrations were significantly higher in type 2 diabetic group than the Normal Glucose Tolerance group, suggesting a possible association between circulating amylin concentration and glucose tolerance. Rebecca I. et al. (2004) also reported that plasma levels of amylin in patients with Prediabetic and Type 2 diabetic were significantly higher than these in patients with Normal Glucose Tolerance. Results of this study suggest that plasma levels of amylin are increased in patients with IGT and T2DM.

5. Limitations of Study

Our sample size was relatively small.

6. Acknowledgements

NIL

7. Conflicts of Interest

We have no competing interests.

8. Funding

NIL

9. Conclusion

From the present study it is concluded that serum amylin levels gets increased prior to onset of diabetes. amylin serve as a valuable marker along with glucose for early diagnosis of diabetes at pre-diabetic stage. It could be considered among therapeutic agents used in the prevention of diabetes and in the prevention or reduction of its critical complications.

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