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The Progressive Study of Various Risk Factors on Insulin Resistance in Type 2 Diabetic Mellitus

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Abstract

Objective - The current study have undertaken to explore the effect of various factors like non vegetarian diet, alcohol consumption, smoking and lack of physical activates which will going to an increased risk of insulin resistance

Material and Method - The study were conducted 78 subjects of type 2 diabeties in urban and rural area of meerut city. Fasting plasma glucose, fasting plasma insulin and HOMA- IR were analyzed. Three groups of subjects were made according to no of risk factor associated with insulin resistance.

Results - The study showed that Maximum HOMA-IR value were find in group c (Non- Vegetarian, Alcoholic, smoker with less physical work activates subjects) as compared to group a (Non- Vegetarian) and group b (Non- Vegetarian with Alcoholic). It is also found there were significant correlation between HOMA-IR value and no of risk factors $p < 0.001$.

Conclusion - There is convincing evidence that non vegetarian diet, alcohol consumption, smoking and less physical activates are related to an increased risk factors for insulin resistance in type 2 diabetes. The study concluded a significant progressive relationship between number of risk factor with respect to HOMA-IR levels which is an indices of insulin resistance.

***Keywords*: Alcohol, Homeostasis model assessment (HOMA-IR), Insulin resistance, physical activity, smoking, type 2 diabetes.**

Introduction

Globally, an estimated 422 million adults are living with diabetes mellitus, according to the latest 2016 data from the World Health Organization (WHO).[1] Diabetes prevalence is increasing rapidly; previous 2013 estimates from the International Diabetes Federation put the number at 381 million people having diabetes.[2] In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in second and third place respectively.[3] Studies show that South Asians are inherently at high risk for type 2 diabetes.[4] World Health Organization(WHO) report says that India is expected to house a major portion of these patients and almost 22% of patients with type 2 diabetes will be in India by 2030.[5]

Insulin resistance is defined as decreased sensitivity in responsive metabolic actions of insulin to stimulate glucose utilization and inhibition of hepatic glucose production in diabetic patients.[6] Insulin resistance is closely associated with high blood pressure, obesity, coronary artery disease, dyslipidemia, metabolic syndrome and other disorders that characterized as metabolic syndrome.[7] The diagnosis of insulin resistance in humans is important for epidemiological, clinical, basic and applied scientific research and clinical trials. There are lot of direct [Euglycemic Hyperinsulinemic Clamp (EHC) and insulin suppression tests] and indirect methods [Glucose Tolerance Test (GTT), Oral Glucose Tolerance test (OGTT), meal tolerance test, and Homeostasis Model of Assessment-IR (HOMA-IR)] are commonly used in laboratory to check insulin resistance.[8] Most of the methods are depend on analysis of fasting glucose and fasting insulin concentration and HOMA-IR index is widely used in medicine for clinical studies.[9]

The current study have undertaken to explore the effect of factors like non vegetarian diet, alcohol consumption, smoking and lack of physical activates which will going to an increased risk of insulin resistance.

Material and Method

Material

This study was conducted during the period from the Jan 2016 until the end of Dec 2017 in Chhatrapati Shivaji

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Hospital, Subharti Medical College Meerut, U.P. India. A total of 78 subjects of type 2 diabeties having an age group of 40-65 years were participated from urban and rural area of meerut. Patients with cardiovascular, thyroid function disorder and other hormonal disorders that may exagerrated the insulin resistance in type 2 diabetes were excluded from the study. 5 ml of venous blood was obtained after a 12 hour fast from type 2 diabetic patients. Blood samples was transferred into tube, allowed to stand for 15 minutes at room temperature, centrifuged at 3500 rpm for 10 minutes.

Methods

Determination of Fasting Glucose

Fasting glucose concentration was measured by the enzymatic colorimetric method (GOD–POD).[10]

Determination of Fasting Insulin

Fasting insulin concentration was measured by enzyme linked immune sorbent assay (ELISA) method based on the sandwich principle.

Determination of Insulin Resistance

The insulin resistance was calculated by a homeostasis model assessment (HOMA-IR) index = Fasting plasma glucose (mg/dl) X fasting plasma Insulin (uU/ml) / 405, as described by Matthews and colleagues 1985.[11]

Stastical Analysis:

Data analysis was performed using Epi info software version 3.5.1. Descriptive statistics, including mean, range, and standard deviations, were calculated for all variables. Proportions were compared using Chi- square tests and chi square for trend at 0.05 level of significance.

Results

Table no1: Distribution of T2DM subjects (n=78) according to age

Age group (Years)	No of patients	Percentage
40-50	21	26.92%
51-60	25	32.05
61 and above	32	41.03%

Table no-1 shows the distribution of patients according to age group. The result shows maximum patients (32) 41.03% were in the age group of 61 and above years followed by (25) 32.05% were in age group of 51-60 years, while the least (21) 26.92 % were in age group of 40-50 years.

Table no 2: Distribution of T2DM subjects (n=78) according to number of risk factor

Risk factor	No of patients	Percentage
Group A	23	29.49%
Group B	26	33.33
Group C	29	37.18.%

Group A - Non vegetarian

Group B - Non vegetarian + Alcoholic

Group C - Non vegetarian + Alcoholic + Smokers + lack Physical Activity

Table no-2 shows the distribution of patients according to no of risk factor for insulin resistance. The result shows maximum patients (29) 37.18% were in group C followed by (26) 33.33% were in group B while the least (23) 29.49 % were in group A.

Table 3: No of various factors affecting insulin resistance

Risk factor	No of patients	FPG(mg/dl) Mean ± S.D.	FP1(uU/ml) Mean ± S.D.	HOMA-IR Mean ± S.D.
Group A	23	178.65± 19.04	7.96± 1.98.	3.51± 0.09
Group B	26	180.23±18.47	8.98± 2.09	3.99± 0.10
Group C	29	182.12± 17.38	9.12± 2.03	4.11± 0.08

Comparison between:

A & B	**p value**	**<0.001**	**<0.001**	**<0.001**
B & C	**p value**	**<0.001**	**<0.001**	**<0.001**
A & C	**p value**	**<0.001**	**<0.001**	**<0.001**

Table no-3 shows relationship between no of risk factor of insulin resistance and HOMA-IR value in type 2 diabetic mellitus. The mean value of HOMA-IR in group A, B, and C were 3.51, 3.99 and 4.11 respectively. It is evident from data that there was significant increased HOMA-IR value in type 2 diabetic mellitus with increased no of risk factors.

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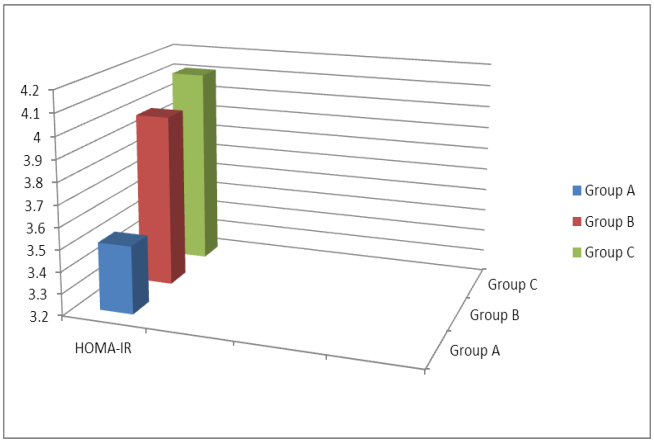

Discussion

Several modifiable & non modifiable factors increase the risk of insulin resistance. While some of these risk factors are associated with lifestyle changes can be modified, others are genetic or biochemical and therefore non modifiable. Insulin resistance is caused by a persistently high level of insulin over a prolonged period of time that eventually causes the body's sensitivity to insulin to decrease. Non vegetarian diet, alcohol consumption, smoking and less physical activates are related to an increased risk of insulin resistance.

The goal of this study was to identify the effect of no of various factors like non vegetarian diet, alcohol consumption, smoking and lack of physical activates which might affect on insulin resistance. Epidemiological data from different parts of India showed a rise in incidence of insulin resistance in type 2 diabetic mellitus. The present study have undertaken the progressive relationship between insulin resistance and modifiable risk factor i.e sedentary life style non vegetarian diet, alcohol consumption and smoking in type 2 diabetic mellitus. While similar study reported. HOMA-IR cut-off of 2.5 provided adequate sensitivity and specificity in diagnosing MS in both boys and girls as per ATP III and IDF criteria.[12,13] There are no previous studies from India which have tried to establish HOMA-IR cut-offs to identify MS in this subset of population. HOMA-IR values ranging from 2.22 to 3.16 have been reported as cut-off for identifying insulin resistance.[14] The present study found that progressive relationship between HOMA-IR value and no of risk factor.

During the study we made three group according to no of risk factor for insulin resistance. In group A subject who were only taking non vegetarian diet, group b subjects who were with one more risk factor like alcohol user and third group c included those subject who were with more risk factor liker smoking and less physical activity.

Our data indicated that value of HOMA -IR were increased according to no of risk factor. We compared all three groups and found there is significant correlation between them, progressive increased level of HOMA-IR with respect to increased number of risk factors.

In summary, there is convincing evidence that non vegetarian diet, alcohol consumption, smoking and less physical activates are related to an increased risk factors of insulin resistance in type 2 diabetes. It is evident from data that insulin resistance increased with no of risk factors. Thus it is recommended for decreasing or delaying the detrimental effects of insulin resistance on body. These includes lifestyle change and weight loss followed by diet modification.

Conclusion

In the present study it was observed that number of risk factors like non vegetarian diet, alcohol consumption, smoking and less physical activates are related to an increased risk factors of insulin resistance in type 2 diabetes. This study created awareness of diabetes and its risk factors in population of this region. The baseline data of the present study regarding insulin resistance and its associated risk factors could be useful for implementation of the National Program for control of Diabetes, cardiovascular diseases and Stroke (NPDCS). Therefore, future research in this direction is a need of the time.

Conflict of interest - No conflict of interest was declared.

Source of funding - Self

Ethical clearance - Taken

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