ORIGINAL ARTICLE

Comparison of Insulin Resistance in Type 2 Diabetic Males with Type 2 Diabetic Females

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ABSTRACT

Aim: To determine the insulin resistance in type 2 diabetic male and female patients and to compare Insulin resistance in type 2 diabetic males with type 2 diabetic females
Study design: Cross-sectional study
Place and duration of Study: Department of Medicine Unit 4, Services Institute of Medical Sciences, Lahore from 1st June 2020 to 30th November 2020.
Methodology: One hundred and forty patients of both genders with age ranging between 25 to 65 years were included by non-probability sampling. Patients demographics details like age, gender and body mass index were recorded after taking written informed consent. Insulin and serum glucose levels were observed at fasting state amongst patients. HOMA-IR was used to calculate IRI (insulin resistance indices) in patients.
Results: Mean age of the patients was 38.14±8.39 years with mean BMI 22.41±4.22 kg/m^2. Sixty-three (45%) were males and majority 77 (55%) cases were females. Serum glucose levels in males were increased 12.84±7.98 mmol/L and insulin resistance were 6.51±9.113 as compared to females10.48±12.64 mmol/L with insulin resistance indices5.48±3.148. Statistically no difference was observed with respect to gender (p<0.005).
Conclusion: In our study, no comparative difference is found in insulin resistance of Type 2 diabetic males and females. Further larger scale studies with larger sample size including genetic data are required to address whether confounding variables are influencing gender variation in insulin resistance or not.
Keywords: Diabetic type 2, Insulin resistance, Hyperglycemia, Hyperinsulinemia

INTRODUCTION

There has always been great focus on addressing gender disparities over the last few years in medical diseases.[1] Although gender in real sense is people's social roles, but it depends on basic biological differences affecting the physiological and pathophysiological mechanisms of men and women. The mechanisms that are actually the core of the study involve sex steroid hormones and sex chromosomes, and also sexual specificities in fetal/ neonatal services. Therefore, recent recommendations stress the need to take these disparities of gender into account to prevent the conventional male predominance in these approaches.[2]

It is observed that the pathology of type 2 diabetes is greatly influenced by gender. The dimorphic feature is the prevalence of diabetes, the predominance of which has been documented by men and most animals, with women being relatively shielded against metabolic disorder.[3]

Contradictory evidence is found whether men have more resistance to insulin than women or not. Gender disparity is found in mice[4] and humans with respect to insulin resistance.[5,6] The older obese men have shown that they are more resistant to insulin than older obese women, although they have lower total body fat, less subcutaneous fat and greater free fat mass.[7] However, the evidence is less compelling if type 2 diabetes is considered an insulin resistance manifestation.[8]

Previous studies have showed that the sensitivity to insulin increases with weight loss.[9,10] However, a gap in literature is found regarding influence of gender and gender disparity in insulin resistance. Establishing a strong positive or negative relationship of insulin resistance with gender may bring different treatment modalities and strategies for either gender.

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PATIENTS AND METHODS

This cross-sectional study was conducted at Department of Medicine, Unit 4 Services Hospital Lahore from 1st June 2020 to 30th November 2020 and 140 patients were selected through non-probability sampling technique. After taking written consent, demographics details like age, gender and body mass index were recorded. Pregnant, lactating mothers and those with chronic liver disease, chronic kidney disease and patients known to have malignancy on history or clinical records were excluded. Presented patients were aged between 25-65 years of age. Serum glucose level of patients was measured in mmol/L, levels of insulin in mIU/L and insulin resistance indices IRI was calculated by Homeostasis Model Assessment for Insulin Resistance (HOMA-IR). Blood sample was taken from all cases to separate serum from blood after being centrifuged. Complete data was analyzed by SPSS 22.0 version.

RESULTS

Mean age of the patients was 38.14±8.39 years with mean BMI 22.41±4.22 kg/m^2. Sixty three (45%) were males and 77 (55%) were females (Table 1). In males, serum glucose levels was12.84±7.98 mmol/L, Serum insulin levels IU/mL

was 13.94±1.22 and insulin resistance indices were 6.51±9.11 while in females serum glucose levels was 10.48±12.64 mmol/L, serum insulin levels IU/mL was 11.88±5.63 and insulin resistance indices were 5.48±3.14 (Table 2).

Table 1: Detailed demographics of presented cases of diabetes type 2 (n=140)

Variable	No.	%
Gender		
Males	63	45.0
Females	77	55.0
Mean age (years)	38.14±8.39	
Mean BMI (kg/m^2)	22.41±4.22	

Table 2: Distribution of glucose serum levels, insulin levels and IRI with respect to gender

Diabetes type 2 mellitus	Males	Females	P value
Serum glucose levels mmol/L	12.84±7.98	10.48±12.64	0.18
Serum insulin levels IU/mL	13.94±1.22	11.88±5.63	< 0.001
Insulin resistance indices	6.51±9.11	5.48±3.14	0.40

DISCUSSION

This research did not reveal any major media gaps between men and women for insulin resistance index. This means that the resistance to insulin in both sexes is the same. However, the disparity in the number of males and females is obvious and if we had included few more males in our study with a fairly higher insulin tolerance, we might have found gender disparity in our study. Previously done studies conducted not in our part of the world have suggested that males are more insulin-resistant than females. In our study total 140 patients of type 2 diabetes mellitus with age group 25-65 years were presented, in which 45% were males and 55% were females with mean age 38.14±8.39 years, these findings were comparable to the previous studies.[7,11]

In the present study, the mean insulin resistance index for males was 6.51±9.11 and females was 5.48±3.14 (p=0.40). The insulin resistance index (IRI) was >2. Insulin resistance in Asians is found quite high. We do observe racial difference in value of insulin resistance indices. These findings indicate that the insulin resistant to our population is greater than the IRI reference value (>2). The metabolic characteristic of our people along with other factors elsewhere may be responsible for different outcomes[12] and the findings were not also important for differences in serum insulin and serum glucose based on gender. Type 2 diabetes is calculated to be 77% heritable.[13] Therefore a reduced HOMA-IR response after equal loss of weight could be predicted if a higher proportion of males had genes that predisposed them to diabetes than females in the trial. During the current analysis, no genetic data was collected. Recent reviews have clearly depicted that insulin sensitivity has been associated with racial inequalities both of genetic and environmental origin.[14]

The gender variations of body fat distribution may be better inferred to explain the gender differences. The ratio of subcutaneous fat to visceral adipose fat (VAT) seems to be sexually and age-related with a higher proportion of females than males and younger than old people.[15] This gender disparity seems to be caused by the function of oestrogen, with subcutaneous fat having higher levels of oestrogen receptor and VAT having higher androgen receptor concentrations. Another research showed that higher prevalence of type 2 diabetes was associated with a greater VAT in older men than older women (14.6% versus 9.1%).[16,17] Therefore, fat distribution that clearly influences insulin resistance differs in both genders.

CONCLUSION

No comparative difference is found in insulin resistance of type 2 diabetic males and females. Further larger scale studies with larger sample size including genetic data are required to address whether confounding variables are influencing gender variation in insulin resistance or not.

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