Section: General Medicine

Original Research Article

STUDY OF TESTOSTERONE LEVELS IN TYPE-II DIABETES MELLITUS, MALE PATIENTS IN SOUTH KARNATAKA POPULATION

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Abstract

Background: Type-II Diabetes is major health problem globally which affects cardio-vascular including lipid profile and also impairs hormonal uptake like insulin, androgens in males which affects sexual life in adults suffering with type-II DM. **Materials and Methods:** 300 type-II DM male aged between 30-50 years were studied and compared with 200 controlled groups. The clinical investigation included. FBS, PP Blood urea, Serum creatiinine, HBA1C, lipid profile, Urine for albumin, creatinine ratio, and Serum testosterone was estimated by using chemilumine science immune assay and HbA1c by HPLC. **Result:** BMI, Age, HBA1C serum testosterone was compared with controlled group and p value was highly significant. **Conclusion:** The present study has confirmed that type-II DM patients have significant lower testosterone higher, the sugar level and lower the testosterone is proved.

INTRODUCTION

Type-2 diabetes which accounts for approximately 90% of diabetes cases is a bipolar disease.[1] It is characterised by the impaired insulin action and abnormal secretion. The role of insulin is colossal in regulating glucose homeostasis though a highly orchestrated constellation of glucose uptake in peripheral tissues such as muscle and fat suppressing hepatic glucose output, and regulating lipid metabolism.[2] It is also noted in the recent studies that, androgen deficiency associated with testosterone levels with certain common systemic illness type-II DM being one of them.[3]

In general it is reported that, higher endogenous testosterone concentrations to be associated with cardio vascular profile, including higher HDL, cholesterol, and lower triglyceride concentrations, blood glucose, blood pressure, and Body mass Index.[4] But high dosage of exogenous testosterone or other anabolic steroids have been associated with adverse health outcomes including sudden cardiac death and hepatic diseases.[5] The reduced testosterone levels in type II DM men aged between 30-50 years has severely impaired sexual life and latest data is available regarding significant correlation between type-II DM and testosterone level hence attempt was made to evaluate the serum level testosterone in type-II DM patients with different parameters.

MATERIALS AND METHODS

300 males aged between 30-50 years known diabetes Mellitus regularly visiting to SS Institute of medical sciences & Research centre Davanagere-577005 were studied.

Inclusive Criteria

Type-II DM patients irrespective of duration of diabetes currently on oral hypoglycaemic drugs or insulin.

Exclusion Criteria

Patients age less than 30 years with type-II DM and patients of corticosteroids, testosterone, thyroid supplements, and chronic renal disease, cirrhosis of liver and immune-compromised patients were excluded from the study.

Method: Detailed history, occupation, clinical examination and investigation included CBC, Fasting and post-parandial blood sugar. Blood urea, serum creatinine HBA1C, lipid profile, Urine for albumin creatinine ratio, Diabetes mellitus was defined by ADA guide lines.[5] Serum testosterone levels (Morning sample were estimated using chemiluminescence immunoassay). Low testosterone was defined as serum testosterone level < 241 mg/dl and the prevalence of its deficiencies was calculated. Estimation of HbA1C (4.2-6.2%) performed by High performance liquid chromatography (HPLC). All important parameter like age BMI, Mean HBA1C, serum testosterone

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were compared in healthy volunteers (controlled group).
The duration of study was from January-2022 to January-2023

Statistical Analysis

Various parameters in type-II DM patients were studied and compared with controlled group. The statistical analysis was carried out in SPSS software.

RESULTS

[Table 1]: Clinical manifestation in type-II DM male patients.

Age – 56.16 (±10.15), BMI 25.40 (± 2.30), P-Y – 8.90 (± 12.70), Mean HBA1C 8.80 (± 1.92), Mean Cholestrol 184.03 (± 70.25), Mean HDL 50.15 (± 10.20). Mean LDL 113.24 (± 45.03). Mean S. creatinine 2.5 (± 2.40), Mean Albumin ratio -2080 (± 4389), Mean serum testosterone 118.10 (± 85.44)

[Table 2]: Comparison of clinical manifestation type-II DM with controlled group.

Age – 56.16 (± 10.15) in type-II DM group, 38.76 (± 7.80) in controlled group. T test 21.6 and p<0.001

BMI – 25.40 (± 2.30) in type-II DM, 24.88 (± 3.20) in controlled, t test 1.96 and p<0.001

Mean HBA1C 8.80 (± 1.92) in type-II DM, 4.80 (± 0.40) in controlled group, t test 34.9 and p<0.001

Serum testosterone – 118.10 (± 85.4) in type-II DM, 403 (± 170.5) in controlled group, t test 21.8 and p<0.001.

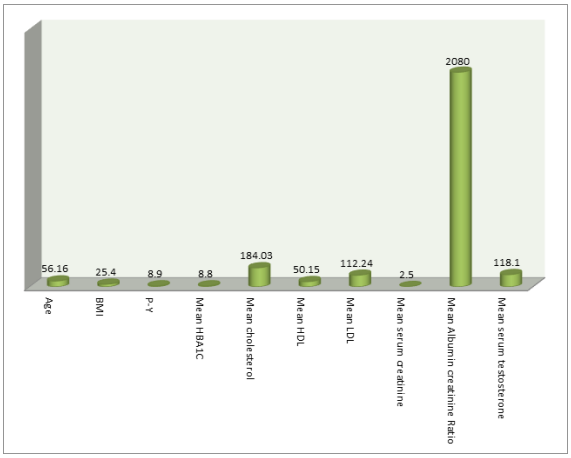

Figure 1: Clinical Manifestations in diabetic patients

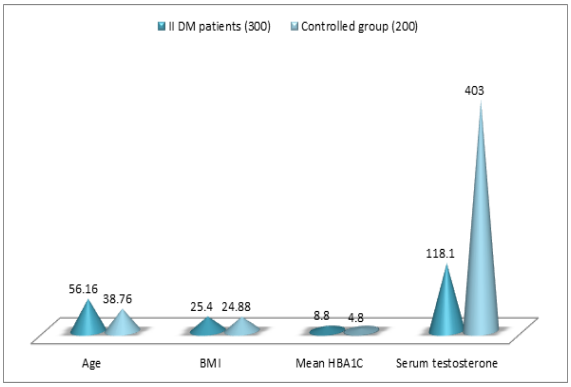

Figure 2: Comparison of clinical Manifestations in type-II DM patients with controlled group

Table 1: Clinical Manifestations in diabetic patients (Total No. of patients: 300)

Manifestations	Mean ±SD
Age	56.16 (± 10.15)
BMI	25.40 (± 2.30)
P-Y	8.90 (± 12.70)
Mean HBA1C	8.80 (± 1.92)
Mean cholesterol	184.03 (± 70.28)
Mean HDL	50.15 (± 10.2)
Mean LDL	112.24 (± 45.03)
Mean serum creatinine	2.5 (± 2.40)
Mean Albumin creatinine Ratio	2080 (± 4389)
Mean serum testosterone	118.10 (± 85.44)

High Mean HBA1C and least level of serum testosterone was observed P-Y pack year (year of smoking multiplied by average number of packs or fractions).

Table 2: Comparison of clinical Manifestations in type-II DM patients with controlled group

Parameters	II DM patients (300)	Controlled group (200)	t test	p value
Age	56.16 (± 1015)	38.76 (± 7.80)	21.6	P<0.001
BMI	25.40 (± 2.30)	24.88 (± 3.20)	1.96	P<0.004
Mean HBA1C	8.80 (± 1.92)	4.80 (± 0.40)	34.9	P<0.001
Serum testosterone	118.10 (± 85.4)	403 (± 170.50)	21.8	P<0.001

Lowest serum testosterone observed in type-II DM patients

DISCUSSION

Present study of testosterone levels in type-II Male patients of South Karnataka population. The age of the patients mean value (SD±) was 56.16 (± 10.15) BMI, 25.40 (± 2.30) P-Y 8.90 (± 12.70), Mean HBA1C was 8.80 (± 1.92), Mean cholesterol – 184.03 (± 70.28), Mean HDL 50.15 (± 10.2), Mean LDL 113.24 (± 45.03), mean S. creatinine 2.5 (± 2.40%), Mean Albumin creatinine ratio 2080 (± 4389) serum testosterone 118.10 (± 85.40) (Table-1). Comparison of clinical manifestation in type-II DM with controlled group Age – 56.16 (± 10.15 in type-II, 38.76 (± 7.80) in controlled, t test 21.6 and

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p<0.001, BMI 25.40 (±2.30), 24.88 (± 3.20) in controlled, t test 1.96 and p<0.004, Mean HBA1C 8.80 (± 1.92) I type-II DM, 4.80 (±0.40) in controlled, t test 34.9 and p<0.001, Serum testosterone 118.10 (±85.4) in type-II DM, 403 (± 170.50) in controlled, t test 21.8 and p<0.001 (Table-2). These findings are more or less in agreement with previous studies.[6-8]

Defining the lower limit of normal for S. testosterone level poses a challenge for physicians. The adverse clinical outcomes occur in type-II DM is not known.[9] Testosterone in men is synthesized and secreted into circulation almost exclusively by cells of leydig of the testes. It is mostly bound to plasma proteins. S. testosterone composed of 0.5 to 3% of free testosterone unbound to plasma proteins, 30-44% sex hormone binding globulin (SHBG) – bound testosterone and 54-60% albumin bound testosterone.[10] Moreover variations in S. testosterone metabolism associated with environmental and / or genetic factors.[11]

It is experimented in lower animals (mouse) that, testosterone therapy in increase, the muscle mass and reduce the fat mass both of which were expected to decrease insulin resistance. It is also observed in mice that, testosterone regulated skeletal muscle genes involved in glucose metabolism that led to decreased systemic insulin resistance.[12]

It can be hypothesized that, low S. testosterone level could contribute to development of obesity and type-II DM through changes in body composition. In obese men, the peripheral conversion from testosterone to oestrogen could attenuate the amplitude of luteinizing hormone pulses and centrally inhibit testosterone production. Moreover leptin and adipokine has shown to be inversely correlated with serum testosterone level in men.

Low testosterone level can be perpetuated through defects in the (HPG) axis. Hence type-II DM patients had hypogonatropic hypo-gonadism. Aging is also well known to result in a decline of sex hormone level and is likely a combination of testosterone and pituitary hypothalamic defects. In elderly men, there is reduced testicular response to gonado-trophins with suppressed and altered pulsality of the hypothalamic pulse generation.

Low testosterone is commonly associated with high prevalence of metabolic risk factors including insulin resistance, hypertension, dyslipidemia and obesity (particularly central adiposity), CVD and type-II DM, because testosterone has been shown to dilate coronary vessels in animals and men, suggesting that it might be an important regulator of vasculature compliance and modifier of blood pressure.

Limitation of study

Due to tertiary location of research centre, small number of patients and lack of latest techniques, we have limited findings and results.

CONCLUSION

Present study of serum testosterone level in type-II DM patients causes insulin resistance, Obesity and vascular dysfunction and inflammation. As there is high prevalence of type-II DM patients across the world. Further study of genetic, hormonal, nutritional, pharmacological is required to clarify whether low testosterone is merely a reflection of poor cardio-vascular risk factors control or is really causing adverse clinical outcomes or higher viscosity of blood in type-II DM patients may prevent or retard the flow of testosterone leads to low testosterone hormone is still un-clear.

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