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An Observational Study to Evaluate Total Testosterone Levels in Serum of Type 2 Diabetes Patients Who Are Having Erectile Dysfunction

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ABSTRACT

Aim & Objective: Diabetes mellitus (DM) is having reportedly high frequency of erectile dysfunction (ED) in present days. Hypogonadism or testosterone deficiency syndrome is defined by low testosterone levels in men. Some of the symptoms of type 2 diabetes are similar to number of the symptoms of low testosterone and health statistics indicate that the two conditions associated with each other. The aim of the study is to evaluate total testosterone levels in serum of type 2 diabetes patients who are having sexual dysfunction.

Method: This is an observational study conducted at Patna Medical College endocrinology clinic among 185 patients with a mean age of 40±11 years.

The patients were presented in clinic with symptoms of erectile dysfunction. Total and free testosterone levels were calculated in these patients.

Results: There were varying degrees of erectile dysfunction found in study participants. Among 185 patients evaluated 56.8% patients were having low total testosterone levels, 70.3% were having low free testosterone levels and 76.8% were having both low and free testosterone levels

Conclusion: Severe forms of erectile dysfunction were found to be very high among patients with T2Dm and ED. For ED, testosterone deficiency and poor glycemic control is major preventable risk factor which need an immediate attention for further management process.

Keywords: Type 2 Diabetes, Testosterone, Glycemic control, Erectile dysfunction

INTRODUCTION

By the year 2035, 592 million individuals will have diabetes based on current trends, the International Diabetes Federation projects [1]. Low testosterone levels in men one of the complication of diabetes which is rapidly increasing day by day. Insulin sensitivity is regulated by metabolism of glucose, plasma lipids and influenced by some inflammatory factors. Various studies have suggested in improving glycemic status of individuals testosterone replacement therapy to hypogonadal male plays a very effective role [2].

Testosterone, secreted into the circulation by Leydig cells of testicles, a steroidal hormone from androgen group which plays an important part in various biological functions during the course of male life. Inverse relationship between hyperglycemia, insulin resistance and testosterone had been identified by numerous trials [3-5]. Hypogonadism associated with type 2 diabetes by reducing libido and mood and further compromising penile vascular reactivity and lipid metabolism might exacerbate sexual dysfunction. Type 2 DM patients with erectile dysfunction testing circulating testosterone are strongly recommended [6]. Not only the risk of developing type 2 DM is increased in men with low testosterone levels but also it is lower in poorly controlled glycemic condition and further worsening erectile dysfunction status [7,8].

Diabetes mellitus (DM) is having reportedly high frequency of erectile dysfunction (ED) in present days. Hypogonadism or testosterone deficiency syndrome is defined by low testosterone levels in men. Some of the symptoms of type 2 diabetes are similar to number of the symptoms of low testosterone and health statistics indicate that the two conditions associated with each other. The aim of the study is to evaluate total testosterone levels in serum of type 2 diabetes patients who are having sexual dysfunction.

METHOD

This is an observational study conducted at Patna Medical College endocrinology clinic among 185 patients with a mean age of 40±11 years. The patients were presented in clinic with symptoms of erectile dysfunction. Total and free testosterone levels were calculated in these patients.

Abridged version of the International Index of Erectile Function (IIEF-5) was completed by all subjects. Erectile domain of male sexuality was addressed by this questionnaire of 5-stem. 0 to 25 is the score range. Subjects' erectile dysfunction status was classified as follows: erectile dysfunction normal (score>21), erectile dysfunction mild (score 17-21), erectile dysfunction mild-to-moderate (score 12-16), erectile dysfunction moderate (score 8-11) and erectile dysfunction severe (score< 8).

Based on chemiluminescence on Beckman coulter access 2 immunoassay system (time for collection of sample was between 7am to 11am) total Testosterone Levels and Free Testosterone Levels were measured.

Microsoft Excel spreadsheet was used to record the data and SPS version 16.0 statistical software were used to do the statistical analysis. Statistical significance was established at $P < 0.05$.

RESULTS

Among 185 patients 124 (67%) patients having history of smoking and 46 (24.85%) patients were alcoholic. 40±11 was the average age of the study population with 83±8.9 kg average weight. 6.0±4.2 years was the mean duration of diabetes and almost 121 (65%) patients were having history of hypertension. All demographic characters were listed in table 1.

Table 1: Patient's demographics characteristics at baseline

Characteristics	N=185
Age (years)	40±11
Weight (Kg)	83±8.9
Waist circumference (cm)	98.1±9.2
Duration of diabetes (years)	6.0 ±4.2
Smoker (%)	124 (67%)
Alcohol consumption (%)	46 (24.85%)
History of hypertension (%)	121 (65%)
HbA1c (%)	7.7 ±0.7
SBP (mm/Hg)	130.9 ±12.7
DBP (mm/Hg)	83.8± 9.4
TG (mg/dl)	214.35 ± 98.58
Total cholesterol (mg/dl)	202.81 ± 50.68
LDL (mg/dl)	132 ± 40.40
HDL (mg/dl)	6.46 ± 7.43
Total testosterone levels (ng/dl)	367.70 ± 208.44
Free testosterone levels (ng/dl)	9.93 ± 6.83
OHA alone (%)	178
Insulin alone (%)	7
OHA + Insulin (%)	56

There were varying degrees of erectile dysfunction found in study participants.

Table 2: Erectile function scores of the study population

Erectile function status	Frequency	Percentage
Mild ED (IIEF-5 score 17–21)	55	29.7%
Mild-to-moderate ED (IIEF-5 score 12–16)	30	16.2%
Moderate ED (IIEF-5 score 8– 11)	14	7.6%
Severe ED (IIEF-5 score < 8)	86	46.5%
Total	**185**	**100%**

Among 185 patients evaluated 56.8% patients were having low total testosterone levels, 70.3% were having low free testosterone levels and 76.8% were having both low and free testosterone levels (Table 2).

Smoking specially for T2DM patients having high impact on severity of

ED. Table 4 describes the prevalence od ED severity among smokers and non smokers.

Table 3: Prevalence of low testosterone levels in type 2 diabetes mellitus.

Testosterone levels	Number of patients with normal level	Number of patients with low levels	(%)
Total testosterone levels	78	107	56.8%
Free testosterone levels	55	130	70.3%
Low total & free testosterone levels	43	142	76.8%

Table 4: Smoker and non-smokers with normal and low total testosterone levels

Smoker	No of patients with mild to moderate ED (N=99)	No of patients with Severe ED (N=86)	P Value
Yes (124)	69	55	<0.0001
No (61)	30	31	<0.0001

DISCUSSION

The study has demonstrated in men with type 2 diabetes mellitus both total and free testosterone levels has a high prevalence. Among 185 patients evaluated 56.8% patients were having low total testosterone levels, 70.3% were having low free testosterone levels and 76.8% were having both low and free testosterone levels. Previous studies showed that low serum testosterone levels are present among one-third of type 2 diabetic men [9,10]. Men with T2DM had low both total and free testosterone levels which had confirms in various studies done previously [11,12]. Studies have also confirmed that, relative to reference ranges based on healthy young men obese men with diabetes have low total or free testosterone in the absence of known testicular or pituitary pathology [13,14]. In a study conducted by Yeap et al confirms that as compared to men without diabetes mellitus diabetic men were found to have around two time' s lower testosterone levels [16]. Inverse relationship between hyperglycemia, insulin resistance and testosterone had been identified by numerous trials and low testosterone may be a marker in association of insulin resistance with type 2 diabetes mellitus [17-21].

There are many proposed mechanism through which insulin resistance ejected by testosterone. Testosterone regulating mature myocytes and adipocytes and may lower trigylceride uptake in human adipose tissue and lipoprotein lipase activity and followed by increase lipolysis induced by catecholamines [22].

A large number of patients who were involved in this trial were affected with severe erectile dysfunction which in line with the other trial which confirms that one of the most common complications of DM in men is ED [23-25].

Like normal healthy men even for patients with type 2 diabetes cigarette smoking is a well recognized risk factor for ED [26]. Main pathogenic pathway for vasculogenic ED is the acceleration of atherosclerosis which aggravated by smoking habit. In like with the mentioned previous studies even in current observation it had noticed that smoking having high impact on severity of ED. This study has shown the fact that risk factors for ED in the diabetic population like poor glycemic control, autonomic neuropathy, testosterone deficiency is modifiable. As per the finding of this observational study author recommend for periodic assessment of erectile function during routine diabetes care treatment to manage modifiable risk factors.

CONCLUSION

Severe forms of erectile dysfunction were found to be very high among patients with T2Dm and ED. For ED, testosterone deficiency and poor glycemic control is major preventable risk factor which need an immediate attention for further management process.

Conflict of Interests: The authors declare that there is no conflict of interests.

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