Prevalence of hypogonadism and its relation with glycemic control, body mass index in type 2 diabetes mellitus

Abhishek Shrivastava

Assistant Professor, Dept. of Design, Indian Institute of Technology, Guwahati

Abstract

Background and aims: There is an increased prevalence of hypogonadism in men with type 2 diabetes mellitus. The objective of this study was to estimate prevalence of hypogonadism in adult patients with type 2 diabetes mellitus and examine relation of glycosylated haemoglobin, and body mass index with hypogonadism in these patients. Material and methods: In this cross sectional study, 50 adult male patients (30-60 years of age) with type 2 diabetes were included.. Patients were divided into two groups; those with hypogonadism and without hypogonadism. Level of glycosylated haemoglobin between two groups was compared. Similarly, comparison of BMI was done between two. Results: The mean (+SD) age of the patients in the study was 45.98 (+7.93) years. The mean (+SD) HBA1C of total study population was 8.31 (+1.70)% and mean testosterone was 399.64 (+158.36) ng/dl respectively. The mean (+SD) level of HBA1C in patients with hypogonadism was 8.89 (+1.84)% and with normal total testosterone level the mean (+SD) level of HBA1C was 7.84 (+1.86)%. The difference in mean glycosylated haemoglobin between two groups was not statistically significant. The mean (+SD) body mass index of patients with hypogonadism was 26.35 (+1.87) kg/m2 and without hypogonadism was 26.09 (+2.53). There was no significant difference in the BMI of both groups. Conclusion: Patients with type 2 diabetes mellitus showed high prevalence of hypogonadism. Level of glycosylated haemoglobin was not significantly high in patients with hypogonadism.

Keywords: : Cardiovascular risk; coronary artery disease; diabetes; hypogonadism; testosterone.*Accepted on November 24, 2021*

Introduction

Calculated free testosterone was derived by using serum total testosterone and sex hormone-binding globulin. Those patients with 2 calculated free testosterone values but 64.8 pg/mL were diagnosed as having hypogonadism.

Of the 100 patients with T2DM, 15 (15%) were found to possess hypogonadism7 of 29 (24%) between 31 and 40 years old and eight of 67 (12%) between 41 and 50 years old. None of the 4 patients between 25 and 30 years old had hypogonadism. Eleven patients (73%) had hypogonadotropic hypogonadism, and 4 (27%) had hypergonadotropic hypogonadism. Among the control subjects, the prevalence of hypogonadism was 10%. compared with Western data, we found a better prevalence of hypogonadism in patients with T2DM, especially in those within the 4th decade of life. The prevalence of hypogonadism was higher in obese patients, although it didn't reach statistical significance. No statistically significant correlation was observed between hypogonadism and age, duration of diabetes, glycemic control, androgen deficiency symptoms, or microvascular complications.

The prevalence of hypogonadism was higher within the patients with diabetes than within the control subjects, although the difference didn't reach statistical significance.There was no correlation of hypogonadism with components of the metabolic syndrome or microvascular complications of DM One of the complications from chronic hyperglycemia and insulin resistance due to type 2 diabetes mellitus (T2DM) on the hypothalamic-pituitary-gonadal axis in men is the

high prevalence of hypogonadotropic hypogonadism (HH). Both T2DM and hypogonadism are associated with impaired bone health and increased fracture risk but whether the combination results in even worse bone disease than either one alone is not well-studied. It is possible that having both conditions predisposes men to an even greater risk for fracture than either one alone. Given the common occurrence of HH or hypogonadism in general in T2DM, a significant number of men could be at risk. To date, there is very little information on the bone health men with both hypogonadism and T2DM. Insulin resistance, which is the primary defect in T2DM, is associated with low testosterone (T) levels in men and may play a role in the bidirectional relationship between these two conditions, which together may portend a worse outcome for bone. The present manuscript aims to review the available evidences on the effect of the combination of hypogonadism and T2DM on bone health and metabolic profile, highlights the possible metabolic role of the skeleton, and examines the pathways involved in the interplay between bone, insulin resistance, and gonadal steroids. The frequent association between hypogonadism and metabolic disorders, such as obesity, insulin resistance, metabolic syndrome (MetS), and type 2 diabetes mellitus (T2DM), is well-known and has been described in multiple studies (1–7). In particular, hypogonadism is common in men with T2DM, and about one-third of men with T2DM men have low serum testosterone (T) levels . However, other estimates show that the prevalence of low T could be as high as 64% in men with T2DM . The hypothetical mechanism for this association has been suggested in a study by Dhindsa et al. showing that as much as 75% of men with T2DM have either low or normal luteinizing hormone (LH) or follicle stimulating hormone (FSH) or both indicating suppression of the hypothalamic-pituitary-gonadal axis likely from chronic hyperglycemia . On the other hand, some studies also suggest that the association between T2DM and hypogonadism could be bidirectional.

Diabetes is fast becoming the epidemic of the 21st century. Type-2 diabetes mellitus (T2DM), which is more prevalent and the main driver of the diabetes epidemic, now affects 5.9% of the world's population. In India, as per the 2011 estimates reported by the Indian Council of Medical Research, India diabetes study, 62.4 and 77.2 million people have diabetes and prediabetes, respectively.

Hypogonadism is defined as a clinical syndrome which consists of clinical symptoms, with or without signs and associated with biochemical evidence of testosterone deficiency.Male hypogonadism is a recognized medical condition that remains underdiagnosed by clinicians. Several large studies over the last few years have reported a high prevalence of low testosterone levels in men (hypogonadism) with T2DM. It has been demonstrated that free testosterone levels, which are independent of sex hormone-binding globulin (SHBG), are low in one-third of diabetic men.

Visceral obesity is an important cause of insulin resistance which is an important feature of T2DM. Studies have shown that free testosterone levels are low in obese men and correlates inversely with the degree of obesity. There is increased deposition of abdominal adipose tissue in hypogonadal patients, which in turn leads to a further decrease in testosterone concentrations, through conversion to estradiol by aromatase estradiol further favors abdominal fat deposition and perpetuates testosterone.

References

1. Prevalence of hypogonadism in male type 2 diabetes mellitus patients with and without coronary artery disease. Madhu SV, Aslam M, Aiman AJ, S 2017 .
.

2. Clinical and biochemical assessment of hypogonadism in men with type 2 diabetes: Kapoor D, Aldred H, Clark S Diabetes Care. 2007;

3. The association between premature coronary artery disease and level of testosterone in young adult males. Alkamel A, Shafiee A . 2014.

4. Prevalence of hypogonadotropic hypogonadism in type 2 diabetes male patients. Afkhamizadeh M, Ghaderian SB, . 2015;

5. Erectile dysfunction and type 2 diabetes mellitus in northern Pakistan. Ahmed I, Aamir Au.

***Correspondence to:**
Abhishek Shrivastava
Assistant Professor, Dept. of Design, Indian Institute of Technology, Guwahati
+91-361-258-2471
shri @ iitg. Ac.in