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To Determine the Relationship between Hba1c and Serum TSH Levels

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ABSTRACT

Background: Nutritional Iodine deficiency leading to problems of development and endemic goiter were thought to be confined to Himalayan and Sub Himalayan regions. Isolated studies by independent investigator (9, 10) as well as multi-centric national study by the Indian council of Medical research in the eighties showed country wide.

Aims & Objectives: To study the relationship between HbA1c and serum TSH levels

Methods & Materials: Santosh Medical College and hospital, Ghaziabad, Department of Medicine, on patients who will be visiting the Medicine OPD of Santosh Hospital Ghaziabad. Due to the fact that this hospital serves all segments of society, the sample taken from this hospital accurately represents the Indian population from 1 June 2019 to 31 May 2020. The trial will comprise 500 individuals with type-2 diabetes mellitus who randomly present to the Santosh hospital, regardless of age or gender**.**

Results: Correlation between HbA1c and TSH is .345, which is a weak positive correlation. The correlation between two variable is significant with a P value .001. Table shows as the TSH value increases HbA1c also increases but with a weak positive correlation.

Conclusion: 54 individuals, or 10.8% of the overall study population, are between the ages of 50 and 59, which has the highest incidence of thyroid abnormalities among type 2 diabetes patients. A total of 73 individuals, or 14.6% of the overall study group, had a duration of diabetes between 1 and 5 years. The current analysis demonstrates a clear female preponderance, with an overall prevalence of 34%. On the basis of the findings of the present study, it is advised that individuals with type 2 diabetes undergo screening for thyroid disorders. However, further data is required, which can be obtained through other, larger studies.

Keywords: diabetes ,Pathogenic, pancreas, Nutritional Iodine

1. INTRODUCTION

In India most common endocrine disease are the Thyroid disorders (1). Western literature studies shows different types of thyroid disorder in the community with highest among them

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is the microscopic nodules (2-5). Despite the coverage of National Iodine Deficiency control program (NIDDCP) in India, iodine deficiency is still prevalent in many parts of India (6-7).

Nutritional Iodine deficiency leading to problems of development and endemic goiter were thought to be confined to Himalayan and Sub Himalayan regions. Isolated studies by independent investigator (8-10) as well as multi-centric national study by the Indian council of Medical research in the eighties showed country wide.

Prevalence of Endemic Goiter

In females thyroid dysfunction is more common than men. In reproductive age group 2-4% Prevalence of hypothyroidism is seen and has been shown to be the cause of infertility and habitual abortion. Subclinical hypothyroidism is as high as 9.4%, in women, the prevalence is even higher, at 11.4% when compared with men, in whom the prevalence is 6.2%. People aged 46-54 year shows highest prevalence of hypothyroidism i.e. 13.1% , with people aged 18- 35 years being less affected (7.5%).The prevalence of hypothyroidism in India is 11% compared with only 2% in the UK and 4.6% in the USA (11).

In 1979, the association between diabetes and thyroid dysfunctions was first published (12, 13). Since 1979 to estimate prevalence of thyroid dysfunction in patients having diabetes lot of studies have been tried in different countries (14, 15). Prevalence of 2.2 to 17 % is reported in diabetes with thyroid disorder. In another study among type 2 diabetes, 31% patients reported higher prevalence of abnormal TSH concentration. In addition, frequency of thyroid disorder more common in diabetic women then, men. It has been shown that sub- clinical hypothyroidism affects almost one in 20 women with type 2 diabetes mellitus (16).

Diabetes mellitus is marked by abnormal thyroid hormone levels (17). Insulin and iodo-thyronines regulate the metabolism of carbohydrates, proteins, and lipids; the lack of these hormones slows the development of diabetes, whereas elevated amounts are diabetogenic. Insufficiency or excess of Insulin and thyroid hormones causes dysfunction (18).

Despite this, hypothyroidism is associated with a variety of alterations in glucose metabolism. Subclinical hypothyroidism exacerbates the dyslipidemia observed in type2 diabetes, but adequate thyroxin replacement reverses it, hence reducing the risk of cardiovascular disease. (19). The published data on thyroid illness in diabetes originate from inpatients, outpatients, and general practise samples, and longitudinal data are scarce. However, Indian studies on thyroid abnormalities in type 2 diabetic patients are poor, and such studies among diabetic populations do not exist in this region of the country; so, we conducted this study.

2. METHODS & MATERIALS

Glycosylated hemoglobin can be calculated by ion exchange high performance liquid chromatography (HPLC) - Lysis of blood is performed first. The samples are incubated at 37 degree celcius to eliminate the unstable aldimine form. After centrifugation the supernatant is injected into the HPLC system. The gradient separation via HPLC at 30 degree celcius last 5 minutes. The chromatograms are recorded by an UV-detector.[15-17] The quantification is performed with the delivered blood calibrator, the concentration is calculated via integration of the peak heights respectively areas.A detailed clinical evaluation of each case will be done for the evidence of thyroid disorder.

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3. RESULTS

Table 1 : Distribution of Thyroid disorders on the basis of HbA1c in diabetic patients

Age in years	Type 2 diabetes patients	% of Total patients
40-49	97	19.4
50-59	173	34.6
60-69	146	29.2
70-79	55	11
80-89	29	5.8
Total	500	100

Glycosylated hemoglobin and types of thyroid disorder are associated (p-value<.001). Further to detect the kind of association/correlation, ANOVA has been performed which is highly significant (p-value< .001) and we conclude that various types of thyroid disorder have significantly different HbA1c values.

Table 2: Summarizing statistics of types of thyroid disorders with HbA1c

Variable	**Subclinical Hypothyroidism**	**Hypothyroidism**	**Hyperthyroidism**	**P- value**
HbA1c(%)	7.68± 0.77	7.96 ±0.74	7.88 ± 0.87	0.001

TSH and types of thyroid disorders are associated (p-value< .001) Further to detect the kind of association/correlation, ANOVA has been performed which is highly significant (p-value 0.001) and we conclude that the various types of thyroid's is significant different with TSH values.

Table 3: Summarizing statistics of thyroid disorders with TSH

Variable	Subclinical Hypothyroidism	Hypothyroidism	Hyperthyroidism	P- value
TSH (mcIU/ml)	6.94 ± 0.59	11.33± 1.94	0.016±0.029	0.001

Table 4: Summarizing correlation between HbA1c and TSH

Correlation between HbA1c and TSH is .345, which is a weak positive correlation. The correlation between two variable is significant with a P value .001. Table shows as the TSH value increases HbA1c also increases but with a weak positive correlation.

Group1	Group2	Correlation (r)	P- value
HbA1c	TSH	0.345	0.001

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4. DISCUSSION

In our study 95 patients with type2 diabetes mellitus had hypothyroidism. The sex distribution showed the preponderance of female patients. The preponderance was 14.4% in our study compare to 9.5% in the Smithson study. The same sex distribution was also noted in Ridgway study.

A screening programme by J.J. Diez et al shows highest prevalence of hypothyroidism 15.1%, followed by 10.7% sub clinical hypothyroidism and least are the hyperthyroid 3.5%. Frequencies of thyroid dysfunction found by J.J. Diez et al. 2011 found result similar to our study, but our results notably higher than those found by other authors in diabetic patients receiving care in the community (Smithson 1998) or in population based cohort studies (Chubb et al. 2005). Furthermore, we also found higher prevalence than that found by other investigators in patie refered to a hospital diabetic clinic (Perros et al.1995; Chen et al.2007; Ishay et al.2009). The overall prevalence of hypothyroidism was 10.3% in the survey of Chen et al. (2007). Ishay et al. (2009) found that the prevalence of known and newly diagnosed subclinical hypothyroidism was 9% which is approximately same as ours.[18-19]

The detailed study by Perros et al (1995) showed that 6.9% of males and 10.9% of females with type2 diabetes mellitus had thyroid dysfunction, our study showed that 11% males and 22.8% females had thyroid disorders. Perros et al found a prevalence of hypothyroidism of 5.8% in males and 8.9% in female patients we had 4.6% in males and 14.4% in females this might be because our study had more female patients. Perros et al found prevalence of Hyperthyroidism in1.1% male and 2% in female and in our study was 1.8% male and 1.4% in female.

Different geographical locations, epidemiological factors, ethnic group and dietary iodine intake create differences between our findings and those in other studies which influence the results.

5. CONCLUSION

The study was done in 500 patients who were type2 diabetics, at Santosh hospital for a period of 2 years showing prevalence of thyroid dysfunction, sex preponderance in 170 diabetic patients with thyroid dysfunction was also determined.

1. There was a clear cut female preponderance in the study group, the Prevalence was 64% among total number of diabetic patients.
2. Between 50-59 years of age maximum number of patients with diabetes come under this age.
3. 19.2% of the total study group patients were hypothyroidism which is maximum followed by 11.6% subclinical hypothyroidism.
4. There is female preponderance (22.8% of total study group) among diabetic patients having thyroid disorders.
5. Among the gender distribution of different types of thyroid disorders in type2 diabetes mellitus patients 72 female patients (14.4% of the total study group) had hypothyroid and 35 female patients (7% of total study group) had subclinical hypothyroid. Among males 24 (4.8% of total study group) had hypothyroidism and 23(4.6% of study group) had subclinical hypothyroidism.

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6. 54 patients ie 10.8% of the total study group come under the age group of 50-59 years, which has maximum number of thyroid disorders among patients of type2 diabetes.
7. Patients with duration of diabetes of 1-5 years were maximally affected a total of 73 patients i.e. 14.6% of total study group.
8. Current study shows clear cut female preponderance, with 34% prevalence of overall thyroid disorder. Screening of thyroid disorder in patients with type2 diabetes is recommended on the basis of findings seen in the present study it further requires more evidences which can be achieved by other larger study.

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