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To Evaluate the Connection between Hba1c and Serum TSH Concentrations

Dr. Shivani Bansal[1*], Dr. Ashok Kumar[2], Dr. Naresh Kumar[3]

[1*]Professor, Department of General Medicine, Santosh Medical College & Hospital, Santosh Deemed to be University, Ghaziabad.
[2]Professor, Department of General Medicine, Santosh Medical College & Hospital, Santosh Deemed to be University, Ghaziabad.
[3]Professor, Department of General Medicine, Santosh Medical College & Hospital, Santosh Deemed to be University, Ghaziabad.

Corresponding Author : [1*]Dr. Shivani Bansal

ABSTRACT

Background: It was believed that nutritional iodine deficiency, which causes developmental issues and endemic goitre, was restricted to the Himalayan and Sub-Himalayan regions. In the 1980s, both isolated studies by individual investigators (9, 10) and a multi-centric national study by the Indian council of Medical research demonstrated countrywide prevalence.
Aims and Objectives: To investigate the association between HbA1c and serum TSH levels.
Materials & Methods: Santosh Medical College and hospital, Ghaziabad, Department of Medicine, on patients who will be visiting the Santosh Hospital Ghaziabad, Department of Medicine Outpatient Department. Due to the fact that this hospital serves all parts of society, the sample obtained from this institution accurately represents the population of India from 1 June 2019 to 31 May 2020. The trial will include 500 participants with type-2 diabetes mellitus, regardless of age or gender, who randomly appear at the Santosh hospital.
Results: HbA1c and TSH have a correlation of.345, which is a weakly positive connection. With a P value of.001, the correlation between two variables is statistically significant. As the TSH value increases, the HbA1c value likewise increases, albeit the link is modest.
Conclusion: Ten percent of the whole study group, or 54 individuals, are between the ages of 50 and 59, which has the highest frequency of thyroid problems among type 2 diabetes patients. A total of 73 participants, or 14.6% of the entire study group, had diabetes for between 1 and 5 years. With an overall incidence of 34%, the current study indicates a definite female preponderance. On the basis of the findings of this study, it is recommended that persons with type 2 diabetes receive thyroid disease screening. However, additional information is required, which can be gathered from larger investigations.

Keywords: Diabetes,Pathogenic, Pancreas, Nutritional Iodine.

1. INTRODUCTION

In India, thyroid diseases are the most prevalent endocrine ailment (1). The most prevalent thyroid condition in the population, according to analyses of Western literature, is tiny

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nodules (2-5). Despite the coverage of the National Iodine Deficiency Control Program (NIDDCP) in India, iodine deficiency persists in several regions of India (6-7).
It was believed that nutritional iodine shortage resulting to developmental issues and endemic goitre was restricted to the Himalayan and Sub-Himalayan regions. In the 1980s, both isolated studies by individual investigators (8-10) and a multi-centric national study by the Indian council of Medical research demonstrated countrywide prevalence.

Prevalence of Endometriosis

Thyroid dysfunction is more prevalent in women than in men. 2-4% prevalence of hypothyroidism is observed in the reproductive age group, and it has been demonstrated to be the cause of infertility and recurrent abortion. The prevalence of subclinical hypothyroidism is as high as 9.4%, and it is much greater in women, at 11.4%, compared to 6.2% in men. The prevalence of hypothyroidism is highest among those aged 46-54 (13.1%), whereas those aged 18-35 (7.5%) are least afflicted. In India, 11% of the population has hypothyroidism, compared to 2% in the United Kingdom and 4.6% in the United States (11).
The link between diabetes and thyroid dysfunctions was originally published in 1979. (12, 13). Numerous international studies have been conducted since 1979 to determine the frequency of thyroid dysfunction in people with diabetes (14, 15). According to reports, the prevalence of diabetes with thyroid problem ranges from 2.2 to 17%. In a separate study, 31% of individuals with type 2 diabetes had a greater prevalence of aberrant TSH levels. In addition, thyroid disorders are more prevalent in diabetes women than in diabetic men. It has been demonstrated that subclinical hypothyroidism affects about one in twenty women with type 2 diabetes (16).
Diabetes mellitus is characterised by abnormal levels of thyroid hormone (17). Insulin and iodo-thyronines govern the metabolism of carbs, proteins, and lipids; the absence of these hormones slows the progression of diabetes, while increased levels are diabetogenic. Insufficiency or excess of Insulin and thyroid hormones is responsible for malfunction (18).
Despite this, hypothyroidism is related with a number of glucose metabolism changes. Subclinical hypothyroidism worsens the dyslipidemia observed in type 2 diabetes, but adequate thyroxin replacement reverses it, hence decreasing the risk of cardiovascular disease. (19). The published data on thyroid disease in diabetes are derived from samples of inpatients, outpatients, and general practitioners, and longitudinal data are rare. Nevertheless, Indian studies on thyroid anomalies in type 2 diabetic patients are inadequate, and such studies among diabetic populations do not exist in this portion of the country; so, we did this study.

2. METHODS & MATERIALS

Blood is lysed prior to calculating glycosylated haemoglobin using ion exchange high performance liquid chromatography (HPLC). Incubating the samples at 37 degrees Celsius removes the unstable aldimine form. The supernatant is fed into the HPLC system after centrifugation. The gradient separation using HPLC at 30 degrees Celsius lasts for five minutes. An UV-detector captures the chromatograms. [15-17] The blood calibrator is used to do the measurement, and the concentration is determined by integrating the peak heights and

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regions. Each case will undergo a comprehensive clinical evaluation for signs of thyroid disease.

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

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.

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Table 4: Summarizing correlation between HbA1c and TSH

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

4. DISCUSSION

In our study, 95% of type 2 diabetes patients had hypothyroidism. The gender distribution revealed that female patients predominated. In our study, the majority was 14.4%, compared to 9.5% in the Smithson study. In Ridgway's study, the similar sex distribution was also seen. A screening programme by J.J. Diez et colleagues reveals a prevalence of 15.1% for hypothyroidism, 10.7% for subclinical hypothyroidism, and 3.5% for hyperthyroidism. Similar frequencies of thyroid dysfunction were discovered by J.J. Diez et al. in 2011, however our results were significantly higher than those discovered by other researchers in diabetic patients getting care in the community (Smithson 1998) or in population-based cohort studies (Chubb et al. 2005). Among addition, we identified a higher prevalence than other researchers in patients referred to a hospital diabetic clinic (Perros et al.1995; Chen et al.2007; Ishay et al.2009). In the survey by Chen et al., the prevalence of hypothyroidism was found to be 10.3%. (2007). Ishay et al. (2009) discovered that the prevalence of known and newly diagnosed subclinical hypothyroidism was 9 percent, which is comparable to our findings. [18-19]

Perros et al. (1995) found that 6.9% of men and 10.9% of females with type 2 diabetes mellitus had thyroid dysfunction. Our study found that 11% of males and 22.8% of females with type 2 diabetes mellitus had thyroid problems.[19-20] Perros et al. identified a prevalence of hypothyroidism of 5.8% in male patients and 8.9% in female patients; our prevalence was 4.6% in males and 14.4% in females; this may be due to the fact that our study included more female patients.[22-23] In their investigation, Perros et al. determined the prevalence of hyperthyroidism to be 1.1% in males and 2% in females, whereas our results were 1.8% in males and 1.4% in females.

Different geographical areas, epidemiological characteristics, ethnic groups, and dietary iodine intake produce variances between our findings and those of other studies, which impact the outcomes.

5. CONCLUSION

1. The prevalence of thyroid dysfunction was studied in 500 type 2 diabetic patients at the Santosh hospital during a two-year period; sex preponderance in 170 diabetic patients with thyroid dysfunction was also identified.
2. There was a noticeable female preponderance in the study group, with 64% of the total number of diabetic patients being female.
3. The greatest number of people with diabetes are between 50 and 59 years old.
4. The largest number of patients with hypothyroidism was 19.2%, followed by 11.6% with subclinical hypothyroidism.
5. There is a majority of females (22.8% of the overall study population) among diabetes patients with thyroid problems.

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6. Among the gender distribution of different forms of thyroid diseases in patients with type2 diabetes mellitus, 72 female patients (14.4 percent of the entire study group) had hypothyroid and 35 female patients (7.0 percent of the total study group) had subclinical hypothyroid. 24 (4.8% of the entire study group) males had hypothyroidism and 23 (4.6%) had subclinical hypothyroidism.
7. 54 patients, 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.
8. A total of 73 patients, or 14.6% of the overall study group, had the longest duration of diabetes, between 1 and 5 years.
9. 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.

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