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Assessment of glycated haemoglobin level in non-diabetic overt hypothyroid patient

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ABSTRACT:
Background: Dysfunction and anatomic abnormalities of the thyroid are among the most common diseases of the endocrine glands. Almost one-third of the world's population lives in areas of iodine deficiency and present study determines the association ofglycated haemoglobin level in non-diabetic overt hypothyroid patient.
Materials & Methods:130 subjects of both genders were divided into 2 groups. Group I comprised of 70 patients with overt hypothyroidism and group II were 60 subjects (control group) with no thyroid dysfunction. HbA1c was measured by immunoturbidimetry method by clinical chemistry analyzer and serum TSH and FT4 were measured by radio immune assay.
Results: Common clinical features were hoarseness of voice in 65%, fatigue in 53%, weight gain in 70%, depression in 42%, puffy face in 35%, non- pitting edema in 39%, cold intolerance in 31% and constipation in 22%. The mean TSH level in group I was 18.2 mIU/l and in group II was 3.4 mIU/l, FT4 level was 5.0 pmol/l in group I and 12.4 pmol/l in group II, HbA1c level was 5.9% in group I and 5.2% in group II and FBS level was 5.2 mmol/l in group I and 4.7 mmol/l in group II. The difference was significant (P< 0.05). There was correlation between TSH and HbA1c levels (r- 0.412, p< 0.05).
Conclusion: Hypothyroid patients had high level of glycatedhemoglobin level as compared to control subjects.
Key words: Glycatedhemoglobin, Subclinical hypothyroidism, puffy face

Introduction

Galaganda as mentioned in Susrutha Samhitha which was written in 1500BC gives the signs and symptoms of thyroid dysfunction and its treatment. Dysfunction and anatomic abnormalities of the thyroid are among the most common diseases of the endocrine glands.[1]Almost one-third of the world's population lives in areas of iodine deficiency. The prevalence of goitre in areas of severe iodine deficiency can be as high as 80%.[2] Subclinical hypothyroidism (SH) is defined as a condition with elevated serum levels of TSH and normal serum concentrations of thyroid hormones, T_4 and T_3 by the absence of clinical signs and symptoms. SH is more common in the elderly and is found more prevalent in women than in men.[3]

The American Diabetes Association (ADA) and World Health Organization (WHO) have recently approved the use of HbA1c for the screening and the diagnosis of diabetes. Both organizations have suggested that the level of HbA1c $\geq$ 6.5% is considered as diabetes and the ADA has also suggested that the level of HbA1c between 5.7 to 6.4% is diagnostic of pre-

diabetes.[4]The major form of the glycatedhaemoglobin is haemoglobinA1c (HbA1c). The HbA1c concentration not only depends on prevailing glycaemia but also the life span of the erythrocytes and so, the conditions which affect the erythrocyte turnover or survival leads to falsely high or low HbA1c levels.[5] The present study was conducted to assess glycated haemoglobin (HbA1c) level in non-diabetic overt hypothyroid patient.

Materials & Methods

We had conducted this study in Department of Medicine, U.P. University of Medical Sciences, Safai,U.P. ,during the period March 2019 to May 2019 .The present study comprised of 130 subjects of both genders. The study was commenced with the written consent of all subjects.

Data such as name, age, gender etc. was recorded. Subjects were divided into 2 groups. Group I comprised of 70 patients with overt hypothyroidism and group II were 60 subjects (control group) with no thyroid dysfunction. Fasting blood samples were collected with an aseptic blood collection technique. Samples were centrifuged within one hour at 1500 rpm for 15 minutes. Estimations of thyroid function tests (TSH, FT4,), FBS, HbA1c, and haemoglobin level was performed. HbA1c was measured by immunoturbidimetry method by clinical chemistry analyzer and serum TSH and FT4 were measured by radioimmune assay. Results of the study were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I Distribution of subjects

Groups	Group I	Group II
Status	Overt Hypothyroidism	Control
M:F	40:30	40:20

Table I shows that group I had 40 males and 30 females and group II had 40 males and 20 females.

Table II Clinical features in group I patients

Clinical features	Percentage	P value
Hoarseness of voice	65%	0.05
Fatigue	53%	
Weight gain	70%	
Depression	42%	
Puffy face	35%	
Non- pitting odema	39%	
Cold intolerance	31%	
Constipation	22%	

Table II, graph I shows that common clinical features were hoarseness of voice in 65%, fatigue in 53%, weight gain in 70%, depression in 42%, puffy face in 35%, non- pitting edema in 39%, cold intolerance in 31% and constipation in 22%. The difference was significant ($P< 0.05$).

Graph I: Clinical features in group I patients

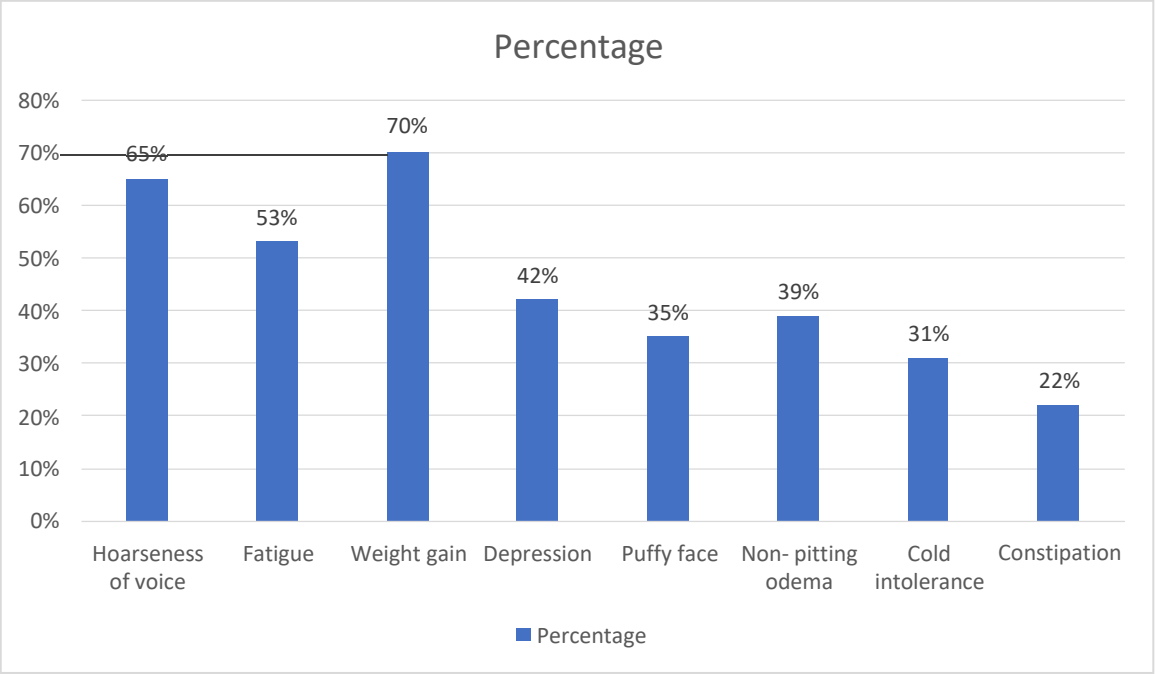

Table III: Laboratory findings

Findings	Group I	Group II	P value
TSH (mIU/l)	18.2	3.4	0.02
FT4 (pmol/l)	5.0	12.4	0.01
HbA1c (%)	5.9	5.2	0.05
FBS (mmol/l)	5.2	4.7	0.05

Table III shows that mean TSH level in group I was 18.2 mIU/l and in group II was 3.4 mIU/l, FT4 level was 5.0 pmol/l in group I and 12.4 pmol/l in group II, HbA1c level was 5.9% in group I and 5.2% in group II and FBS level was 5.2 mmol/l in group I and 4.7 mmol/l in group II. The difference was significant (P< 0.05).

Table IV Correlation between TSH and HbA1c levels

TSH	R	P value
Value	0.412	0.02

Table IV shows that there was correlation between TSH and HbA1c levels (r- 0.412, p< 0.05).

Discussion

The glycosylated hemoglobin represents the fraction of hemoglobin that undergoes non-enzymatic glycosylation over the circulatory life span of the erythrocytes (usually 120 days). A positive association between thyroid disorder and diabetes mellitus is well recognized but to study the effect of thyroid disorders on glucose metabolism in non- diabetic patients (i.e. patients diagnosed with only thyroid dysfunction and not diabetes) is an area for extensive research.[6] Theory cites different causes for increased HbA1c levels in patients of Hypothyroidism. Decreasedmetabolism leading to decreased turnover of proteins and thus prolonging their half - life. Increased oxidative stress causing increased glycation of

proteins.[7]The present study was conducted to assess glycated haemoglobin (HbA1c) level in non-diabetic overt hypothyroid patient.

In present study, group I had 40 males and 30 females and group II had 40 males and 20 females. VidyaSagaret al[8] conducted a case-control study which was conducted on total 209 subjects. 109 patients were allotted in case group of non- diabetic sub clinical hypothyroidism and 100 in control group, HbA1c levels increased in subclinical hypothyroid patients.

We found that common clinical features were hoarseness of voice in 65%, fatigue in 53%, weight gain in 70%, depression in 42%, puffy face in 35%, non- pitting odema in 39%, cold intolerance in 31% and constipation in 22%. Meekyoungkimet al[9] conducted cross sectional study of 45 patients ofnon diabetic overt hyporthyroidism. The study compared with euthyroid as controls HBA1C levels were higher in patients with hypothyroidism compared with control subjects.

In present study, mean TSH level in group I was 18.2 mIU/l and in group II was 3.4 mIU/l, FT4 level was 5.0 pmol/l in group I and 12.4 pmol/l in group II, HbA1c level was 5.9% in group I and 5.2% in group II and FBS level was 5.2 mmol/l in group I and 4.7 mmol/l in group II. There was correlation between TSH and HbA1c levels (r- 0.412, $p< 0.05$).Makadiaet al[10]studied the HbA1c level in the non-diabetic SH patients and to compared the HbA1c level with the controls.Subjects with the non-diabetic SH had a significant higher level (5.70±0.35 %) of the HbA1c than the controls (5.26±0.17 %) ($p<0.0001$). There was no significant difference between the cases and the controls for the age, sex, FBS, vitamin D3, Haemoglobin (Hb), serum T3 and serum T4 levels.

Kumar et al[11]studied the glycosylated haemoglobin (HbA1c) levels in Non diabetic patients with hypothyroidism. 130 patients were studied, 65 were cases who were non diabetic patients with hypothyroidism, 65 controls who were non diabetic euthyroid patients. Among 65 cases 5 patients had normal HbA1C levels (7.7%) and 60 patients had increased HbA1C levels (Pre-diabetes) (92.3%), among 65 controls 56 patients had normal HbA1C levels (86.2%) and 9 patients had increased HbA1C levels (13.8%).

Yasminet al[12] in their study a total 170 patients were included for the study. Among them 85 patients were in case group having overt hypothyroidism and 85 patients were in control group with no thyroid dysfunction. The mean age of the overt hypothyroid cases was 45.79±11.26 years. In case group 12.94%,22.35%, 31.76%, 25.88%, and 7.05% were in 18-30 years, 31-40 years, 41-50 years, 51-60 years and >60 years age group respectively. Among the hypothyroid cases 34.11% were male and 65.88% were female. In case group mean BMI was 26.46±2.84 Kg/m2 and in control group mean BMI was 23.15± 2.72 Kg/m2. In case group mean HbA1c level was 5.80±0.28% and in control group mean HbA1c level was 5.26±0.39%. HbA1c level was statistically significantly more in case group than control group ($p<0.05$).

Conclusion

Authors found that hypothyroid patients had high level of glycatedhemoglobin level as compared to control subjects.

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