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STATUS OF SERUM FRUCTOSAMINE IN HYPERTHYROID SUBJECTS IN UDAIPUR, RAJASTHAN

Avdhesh Kumar Sharma *, Umesh Kumar Pareek, Milind N. Dudhane and G. S. Gupta

Biochemistry department, Annanta Institute of Medical Sciences and Research Center, Rajsamand, Rajasthan, India.

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Correspondence to Author:
Avdhesh Kumar Sharma

Biochemistry Department, Annanta Institute of Medical Sciences and Research Center, Rajsamand, Rajasthan, India**.**

E-mail: avdhesh16.sharma@gmail.com

ABSTRACT: Introduction: Measurement of glycated hemoglobin (HbA1c) and fructosamine has a growing role in the assessment of glycemic control but their use for screening purpose is questionable. **Material and methods**: The study was carried out on 50 controls and 50 patients suffering from hyperthyroidism from October 2014 to March 2015 at Geetanjali Medical College & Hospital, Udaipur (Rajasthan). **Results**: Fructosamine in hyperthyroid subjects (male & female) and control male & female (Mean ± SD) 141.87 ±41.14, 149.35 ± 49.82 and 223.54 ± 9.95, 224.15 ± 9.06 µmol/L respectively and the difference between them found statically significant. (P<0.001) **Conclusion**: The Fructosamine level was low in hyperthyroid patients as compared with control.

INTRODUCTION: All the physiological activities of the body are regulated by two major systems: 1) Endocrine System and 2) Nervous System. These two systems interact with one another and regulate the body functions. [1] Occasionally other endocrine disorders like abnormal thyroid hormone level are found in diabetes [2]. Measurement of glycated hemoglobin (HbA1c) and fructosamine has a growing role in the assessment of glycemic control but their use for screening purpose is questionable [3]. The physiological role of fructosamine 3-kinase has been investigated by incubating human erythrocytes in the presence of the high concentrations of glucose and of a specific inhibitor of this enzyme. [4]

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It converts glycated hemoglobin to a form of hemoglobin with alkali-labile phosphate, presumably corresponding to fructosamine 3-phosphate residues. This phosphorylation step triggers the spontaneous decomposition of fructosamine 3-phosphate residues to free amine, inorganic phosphate, and 3-deoxyglucosone, which can be oxidized to 2-keto-3-deoxygluconate in the red blood cells. [5] Fructosamine levels were found to be decreased in hyperthyroid and are significantly increased in hypothyroid patients. [6]

Southern part of Rajasthan, Udaipur is festooned with Aravali hills, presents a unique mixture of two subsets population with contrasting lifestyle. Due to increase in mining, it is on fast track of socio-economic resurgence with urbanization and brisk changes in lifestyles, on the other hand, people residing in rural subsets and in tribal areas suffers from silent hunger and poverty and both are not conducive to hyperthyroid & diabetic diseases. Till date there is no prevalence data of fructosamine in hyperthyroidism available for Udaipur region and

etiological reports are very scanty and meager. Therefore, the present study considers these points. The various aspects taken into considerations are gender, age, residential status (urban/rural), family history, dietary habits (smoking, alcohol, vegetarian/non-vegetarians).

Hence in the present study we have analyzed the FA, T3, T4, & TSH in the patients suffering from hyperthyroid attending the OPD & IPD of GMCH. The diagnosis of the hyperthyroid is based upon the T3, T4, & TSH was done for the confirmation of hyperthyroid.

MATERIAL AND METHODS: The study was carried out on 50 patients suffering from hyperthyroidism from October 2014 to March 2015 at Geetanjali Medical College & Hospital, Udaipur (Rajasthan) after obtaining permission of GMCH ethical committee. 50 healthy controls WHO came for medical executive check-up at our hospital were selected for this study.

Samples were centrifuged in Remi centrifuge at 3000 RPM for a period of 10 minutes at central laboratory of Geetanjali Hospital. Serum was separated after centrifugation and analyzed on ERBA CHEM- 5 plus V_2 semi automated analyzer, Roche/Hitachi cobas C- 311 & Roche/Hitachi cobas e- 411 immunoassay analyzer. All collected sample were analyzed for the following parameters: - Fructosamine, T_3, T_4 and TSH.

Fructosamine by Kinetic Fixed Time Nitroblue Tetrezolium Method [7]. Glucose by Enzymatic method with hexokinase (D'Orazio, 2005). Thyroid profile was by the electrochemiluminescence immunoassay "ECLIA" method. [8]

Statistics: Data obtained were analyzed statistically by using online student t-test calculator. Results of study group is compared with control group results by calculating p-value.

**p-value < 0.001 Highly Significant (HS)
*p-value<0.05 Significant (S)
P-value >0.05 Non Significant (NS)

RESULTS: In this study found a significant differences between male and female subjects and control in serum fructosamine level showed in **Table 1** and **Table 2.**

TABLE 1: MEAN ± SD & P-VALUES OF THYROID HORMONES IN HYPERTHYROID SUBJECTS AND CONTROL (MALE & FEMALE)

Subjects	Mean ±SD T_3	Mean± SD T_4	Mean ±SD TSH
Male	2.84±1.77	16.00±6.43	0.09±0.10
Female	2.16±1.28	15.86±4.09	0.13±0.10
p- value	0.1211 NS	0.9255 NS	0.1691 NS
Hyperthyroid Male	2.84±1.77	16.00±6.43	0.09±0.10
Control Male	1.36±0.29	8.65±1.65	2.73±1.22
P- Value	0.0001 HS	0.0001 HS	0.0001 HS
Hyperthyroid Female	2.16±1.28	15.86±4.09	0.13±0.10
Control Female	1.17±0.29	8.32±1.59	3.17±0.99
P - Value	**0.0024 S**	**0.0001 HS**	**0.0001 HS**

TABLE 2: MEAN ± SD & P-VALUES OF FRUCTOSAMINE IN HYPERTHYROID MALE & FEMALE SUBJECT AND CONTROL

Subjects	Sex	Mean ±SD FA
Hyperthyroid	Male	141.87±41.14
	Female	149.35±49.82
p-value		0.5763 NS
Hyperthyroid	Male	141.87±41.14
Control	Male	223.54±9.95
p-vallue		0.0001 HS
Hyperthyroid	Female	149.35±49.82
Control	Female	224.15±9.06
p-value		0.0001 HS

DISCUSSION: The present study was conducted on 100 subjects. Among them 50 are normal healthy controls and 50 are of hyperthyroid.

In Rajasthan, the prevalence of disease is moving on fast track. Udaipur especially our area of interest, which is beset with unique geographical location surrounded with festoon of Aravali Hills and distinct subsets of population with differing dietary idiosyncrasies and exposure to urbanization. As such no record is available for the prevalence of hyperthyroid & diabetes mellitus in Udaipur.

Larsen et al (2002) reported that compared to normal subjects the fructosamine levels higher in primary hypothyroidism cases and lower in Grave's disease. As thyroid hormone promotes albumin metabolism the mean concentration of albumin and total protein in serum were lower in hyperthyroid patients than the hypothyroid patients [9]. In our study, We have found that fructosamine level is low in hyperthyroid subjects compared to control (Mean ± SD) 146.21 ± 46.08 & 223.76 ± 9.55 µmol/L respectively.

Fructosamine in hyperthyroid subjects (male & female) and control male & female (Mean ± SD) 141.87 ±41.14, 149.35 ± 49.82 and 223.54 ± 9.95, 224.15 ± 9.06 µmol/L respectively And the difference between them found statically significant.($P<0.001$)

Our results are corroborating with the study of Cirillo et al who also reported marked decrease in serum fructosamine concentrations in severe hyperthyroid patients.[6] This study was also supported by Ford ; and Kim according to them fructosamine concentrations were found to be significantly lower in the subjects with hyperthyroidism as against those in the control group.[10, 11] Similarly our study correlate with Meller, Fagila and Rangaswamy fructosamine values significantly increased in hypothyroidism, subclinical hypothyroidism and lowered in hyperthyroidism group compared to normal group.[12, 13, 14] Significant correlation was found between T3, T4, TSH and fructosamine levels. It was concluded that serum fructosamine as useful the diagnostic indicator in patients with thyroid diseases. According to Meller when intercomparison was done among the different groups, we could see that fructosamine was found to be significantly correlated among the different groups ($p = 0.001$). [12] Fructosamine levels significantly increased in hypothyroidism, subclinical hypothyroidism and lowered in hyperthyroidism group as compared to normal group. A Significant correlation was found between T3, T4, TSH and fructosamine levels in hyperthyroid patient.

CONCLUSION: In our study we have found that there is significant difference in level of Fructosemine in hyperthyroid and diabetic subjects as compared to control.

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