Original Research Paper

Volume-9 | Issue-4 | April-2019 | PRINT ISSN No 2249-555X

Biochemistry

ASSOCIATION OF SUBCLINICAL HYPOTHYROIDISM AND HBA1C LEVELS IN TYPE II DIABETIC PATIENTS

Sunita D. Singh* Demonstrator, Department of Biochemistry, Government Doon Medical College, Dehradun *Corresponding Author

Nita Garg Professor & Head, Department of Biochemistry, SGRRIM&HS, Dehradun

ABSTRACT

Aim: The aim of our study was to establish a correlation between HbA1C and TSH levels in patients who had subclinical hypothyroidism and Type II Diabetes mellitus and to compare with nondiabetic controls.

Study Design: A hospital based cross sectional study was conducted on patients attending the Out Patient Department of Medicine of Govt. Doon Medical College, Dehradun(U.K), during a period of 06 months from January 2018 to June 2018. 200 patients (100 Diabetics & 100 Non-diabetics) in the age group 30-80 years were selected randomly for the study. Out of the 100 Diabetics (48 Males and 52 females) and of 100 Nondiabetics (56 male and 44 females) were included in the study. Exclusion criteria was age less than 30 and more than 80 years, pregnant women with Diabetes Mellitus, seriously ill patients, known cases of thyroid disease.

Methodology: All the 200 participants underwent a biochemical analysis for FPS, PPPS, HbA1C, Total T3, Total T4, TSH, Total Cholesterol, TG and HDL. VLDL and LDL were calculated by computational methods.

Results: In patients with subclinical hypothyroidism we found raised level of Total cholesterol, TG, LDL, HbA1C and decreased levels of HDL in both male & female cases as compare to their controls respectively.

Conclusion: The present study identifies the patients at risk with subclinical hypothyroidism in Type II Diabetes mellitus. Therefore, screening of thyroid dysfunction in Type II Diabetes mellitus patients is recommended to reduce the severity of disease & endocrinal abnormalities in Diabetic patients.

KEYWORDS : Type II Diabetes, Subclinical hypothyroidism, HbA1C.

Introduction:

Type II Diabetes and hypothyroidism are chronic disease which frequently require lifelong follow up and treatment Both the disease have long lasting effects on cardiovascular health and mortality[6,7].

Type 2 Diabetes mellitus is a growing problem in our country and we have observed that many patients are associated with thyroid dysfunction, later in their life[1].

Thyroid disorders are widely common with variable prevalence among the different populations[2].

Diabetes mellitus is characterized by chronic hyperglycaemia due to insulin by pancreatic beta cells or both[3]. According to WHO the worldwide prevalence of Diabetes in 2002 was 170 million, and the number is projected to grow up to 366 mellion or more by 2030[4].

SCH is an asymptomatic state in which reduction of thyroid activity is compensated by an elevated TSH to maintain euthyroid state. It is defiened as an elevated level of Serum TSH with normal levels of free Serum Thyroxine[5].

Little is known about correlation between SCH and glycaemic control status in diabetic patients, so we thought of pursuing this study.

Methodology:

A hospital based cross sectional study was conducted on patients attending the Out Patient Department of Medicine of Govt. Doon Medical College, Dehradun(U.K), during a period of 06 months from January 2018 to June 2018. 200 patients (100 Diabetics & 100 Non-diabetics) in the age group 30-80 years were selected randomly for the study. Out of the 100 Diabetics (48 Males and 52 females) and of 100 Nondiabetics (56 male and 44 females) were included in the study. Exclusion criteria was age less than 30 and more than 80 years, pregnant women with Diabetes Mellitus, seriously ill patients, known cases of thyroid disease.

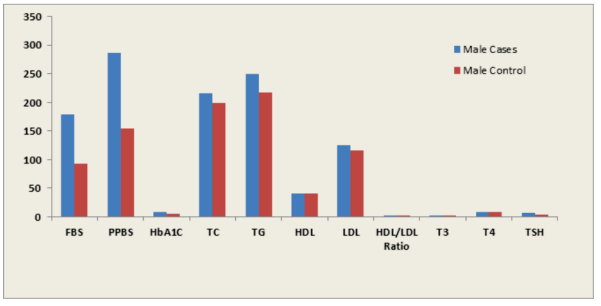
5ml of fasting venous blood was collected in sterile tubes from all the 200 subjects and analyzed for FPS, PPPS, HbA1C, Total T3, Total T4, TSH, Total Cholesterol, TG and HDL on a fully automated analyzer of SIEMENS. VLDL and LDL were calculated by computational methods. The data so obtained was analyzed using SPSS software.

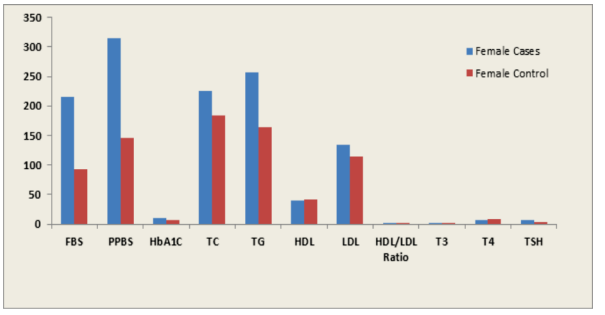
Results:

In patients with subclinical hypothyroidism we found raised level of Total cholesterol, TG, LDL, HbA1C and decreased levels of HDL in both male & female cases as compare to their controls respectively.

Parameter	Male Cases (48) Mean±SD±SE	Male Control (56) Mean±SD±SE	t-value	p-value	Significance
FBS	178.73±48.85±8.72	93±16.04±3.06	-12.3	<0.0001	ES
PPBS	286.88±70.86±12.65	154.32±35.43±6.76	-12.137	<0.0001	ES
HBA1C	9.22±2.35±0.42	5.49±1.23±0.24	-10.3	<0.0001	ES
TC	216.69±44.0±7.86	199.04±51.42±9.81	-12.2	<0.0001	ES
TG	250.62±107.69±19.23	218.71±109.17±20.83	-1.4	0.13	S
HDL	41.23±10.49±1.87	40.36±2.26±0.43	0.54	-0.6	NS
LDL	125.34±41.73±7.45	116.47±42.27±8.07	0.02	-2.2	S
HDL/LDL Ratio	0.38±0.21±0.04	0.403±0.13±0.03	0.49	0.68	NS
T3	1.73±0.68±0.12	1.39±0.42±0.08	-3.1	.0022	HS
T4	8.92±2.50±0.45	8.8±3.12±0.60	-0.2	0.83	NS
TSH	6.09±2.07±0.37	3.46±1.67±0.32	-7.1	<0.0001	ES

Parameter	Female Cases (52) Mean±SD±SE	Female Control (44) Mean±SD±SE	t-value	p-value	Significance
FBS	214.71±92.86±21.90	92.55±13.57±3.22	-8.64	<0.0001	ES
PPBS	315.33±89.90±21.20	146.14±32.80±7.77	-11.8	<0.0001	ES
HBA1C	10.45±2.72±0.64	5.58±1.20±0.28	-10.9	<0.0001	ES
TC	225.83±66.45±15.67	184.27±47.24±11.19	-3.4	<0.0008	HS
TG	256.50±175.18±41.32	164.27±124.67±29.54	-2.9	0.004	HS
HDL	40.42±4.75±1.12	42.23±5.30±1.26	1.76	0.08	S
LDL	134.08±52.52±12.39	113.77±31.58±7.48	-2.2	0.02	S
HDL/LDL Ratio	0.35±0.13±0.03	0.40±0.11±0.03	2.01	0.04	S
T3	1.21±0.37±0.09	1.26±0.37±0.09	0.66	0.5	NS
T4	6.97±2.24±0.53	8.10±1.84±0.44	2.68	0.008	HS
TSH	6.32±7.67±1.81	3.34±1.65±0.39	-2.5	0.01	HS





Discussion:

There is a deep underlying relation between Diabetes Mellitus and thyroid dysfunction. In the present study, among subclinical hypothyroid patients, the mean values of Serum Total Cholesterol, LDL and TG were relatively higher than the respective mean values in euthyroid subjects, whereas mean serum HDL values were relatively lower in SCH patients that Euthyroid subjects. These findings were in accordance to that observed in a study by kim et al[15]. We also found that patients suffering from Type 2 Diabetes Mellitus with poor glycaemic control were selected with a higher prevalence of SCH and it was more prominent in older women. Several reports have documented that thyroid dysfunction is commonly seen in the diabetic population[16,17].

An important finding in our study is that the risk of SCH is increased with poor glycaemic control specially if HbA1C was more than 9%.

Secretion if insulin is influenced by thyroid hormones. Insulin resistance may be involved in the association of SCH with poor glycemic control. The oxidation of glucose & synthesis of glycogen are reduced when there is decreased thyroid function. The relationship between SCH and Type 2 Diabetes Mellitus seem to have a complex interdependent interaction and still more studies are required to explain the exact underlying mechanism.

Conclusion:

There is a higher incidence of hypothyroid state among diabetic patients. Besides SCH is hard to diagnose, infact it is often overlooked. Adequate diagnosis requires extensive laboratory tests of other than routine concommittant hypothyroidism in patients with Diabetes Mellitus helps us to achieve a better control of blood sugar values.

REFERENCES:

1. Alok Mawas et al. International Journal of Biomedical Research 2016; 7(01):026-029, 26 IJBR.
2. Faghilimuai S, Hashemijour M, Kelishadi, B. Lipid profile of childrens with type I diabetes compared to controls: ARYA J. 2006;2(1): 36-38.
3. WHO. (1985) Report of WHO study group WHO Technical Report series no. 127.
4. Weld S, Roglic G, et al. Gelobal prevalence of diabetes. Diabetes Care: 2004;27:1047-1053.
5. Helfand M; Redfern CC. Clinical guideline, part 2. Screening for thyroid disease: an update. American college of physicians. Ann. Intern. Med 1998;129;144-158.
6. A.G. Bertoni, J.S. Krop, G.F. Anderson, and F.L. Brancati, "Diabetes related morbidity and mortality in a national sample of V.S. elders". Diabetes care, Vol.25, no. 3, pp.471-475, 2002.
7. A.S. Laulund, M. Nybo, T.H. Brix, B. Abrahamsen, et. al. "Duration of thyroid dysfunction correlates with all cause mortality. The OPENTHYRO register cohort, "PLoS ONE, vol(9), no.10, 2014.
8. Huggett A.S., Nixon D.A. Use of glucose oxidase peroxidise & O-diamidine in determination of blood & urinary glucose, lancet 1957;273:368-70[pubmed].
9. Allain C.E, Poom L.S; E.Setal. enzymatic determination of total Sr cholesterol. Elin chrm. 1974;20:470-75[pubmed]
10. Burstein M. Sci-iolnick H.R; Morfen R. Rapid method for isolation of lipoproteins from human serum by precipitation with polyanion. J Lipid Res. 1970;11:583-95[pubmed]
11. Fossati P, Prencipe L. Serum triglycerides determined colorimetrically with an enzyme that produces hydrogen peroxide. clin chem 1982;28:2077-88[pubmed]
12. Friedewald WT; Levy RI; Fredrickson D.S; of the concentration of LDL cholesterol in plasma without use of preparation ultracentrifuge Clin Chem 1972;18: 499-502[pubmed]
13. Burtis CA; Bruns DE: saunders. Tietz fundamental of clinical chemistry & molecular diagnosis. 7th India (elsevier). 2015; 626-627.
14. Sterling L. Diagnosis and treatment of thyroid: Cleveland CRC Press; 1975 : 9-51.
15. Kim BY; Kim CH; Jung CH; Mok JO; Suh KI Kang SK. Association between subclinical hypothyroidism and severe diabetic ratinopathy in Korean patients with type 2 diabetes. Endocr J. 201.
16. Perros P; Mccrimmon RJ; Shaw G; Fries Frequency of thyroid dysfunction in diabetic patients : value of annual screening. diab 1995; 12: 622-627.
17. Palma CC; Povesi M; Nogueira. VG, et Prevalence of thyroid dysfunction in with diabetes mellitus. Diabetol metab 2013; 5: 58.