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ASSOCIATION BETWEEN THYROID DYSFUNCTION AND DIABETIC NEPHROPATHY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

[1]Ajay soni, [2*]Dharam Prakash Bansal, [3]Puneet Rijhwani,[4]Paras Kumar soni, [5]Gunita Sharma,[6]Utkarsh Kimmatkar

[1,5]Resident, Department of General Medicine, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan,India
[2]Professor, Department of General Medicine, Mahatma Gandhi Medical College and Hospital,Jaipur, Rajasthan, India
[3]Professor And Head Of Department, Department of General Medicine, Mahatma Gandhi Medical College and Hospital,Jaipur, Rajasthan, India
[4]Junior specialist, Department of General Medicine
[6]Senior resident Department of General Medicine, Mahatma Gandhi Medical College and Hospital,Jaipur, Rajasthan, India

Corresponding Author: Dharam Prakash Banasal
(drdpbansal@yahoo.com)

Abstract
Introduction- Thyroid Dysfunction has been associated with type 2 diabetes mellitus (DM-2). However, it is not known whether common complications of DM-2 such as diabetic nephropathy, are also present with Thyroid Dysfunction.
Aim- To study the association of Thyroid Dysfunction and diabetic nephropathy in patients with type 2 diabetes mellitus.
Methodology-A Hospital based cross-sectional Observational study conducted in Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India from September 2022 to August 2023 on 100 Patients with DM-2.
Results- In present study the prevalence of thyroid dysfunction in DM-2 patients was 21%. In present study the prevalence of Subclinical Hypothyroidism (SCH) in DM-2 was 14%, the prevalence of Overt Hypothyroidism in DM-2 was 4%, the prevalence of Subclinical Hyperthyroidism in DM-2 was 1%, and the prevalence of Overt Hyperthyroidism in DM-2 was 2%. There were significant differences in term of Thyroid status in Diabetes patients with respect to Nephropathy i.e. prevalence of DN is higher in patients of DM with Thyroid dysfunction as compared to patients with euthyroid status (P = 0.027) .
Conclusion-Thyroid Dysfunction may be independently associated with Diabetic Nephropathy in Indian patients with type 2 diabetes mellitus. This imply that Thyroid Dysfunction may be a new therapeutic target to prevent the development and progression of Diabetic Nephropathy in DM-2 patients.

Keywords- Thyroid Dysfunction, Subclinical Hypothyroidism, Diabetic Nephropathy.

INTRODUCTION:

Diabetes mellitus (DM) is a collection of common metabolic illnesses characterized by hyperglycemia, which can be caused by deficiency of insulin. By International Diabetes Federation report 386 million individuals globally suffering from diabetes in 2014 [1].

India is second in world behind China having about 69 million diabetics (almost one in every ten adults). Although type II diabetes (T2D) is significantly underdiagnosed, it has been determined to account for more than 90% of the global diabetes burden [2].

Thyroid Dysfunction and DM are the two most prevalent endocrinology disorders seen in practice. DM and thyroid diseases have been demonstrated to influence each other, and a link between the two disorders has been described in studies [3].
It is estimated that 41 million people in India suffer from thyroid disease. Thyroid dysfunction can manifest clinically and biochemically in a variety of ways, including subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, and overt hyperthyroidism. Thyroid and insulin hormone are involved in cellular metabolism.[4]

Patients with type 2 Diabetes Mellitus (DM-2) have higher risk for thyroid disorders and prevalence of thyroid dysfunction increases with time inDM-2) [5]. The Insulin resistance has a central role in the development of hypothyroidism in patients with DM-2 type 2. Hypothyroidism in DM-2 may worsen dyslipidemia, hypertension and cardiovascular disease.[6] Therefore it is imperative to early detect and treat hypothyroidism

in DM-2 patients for retarding diabetic complications.[7] Hypothyroidism can be detected easilyby clinician treating diabetic patients. Early diagnosis and treatment of thyroid dysfunction in DM-2 patients leads to optimizing glycemic status and lipid profile.

Researches have found that DM-2 patients with sub-clinical hypothyroidism (SCH) have been associated with an increased risk of nephropathy and cardiovascular disease.[8,9]

An association between type 2 diabetes mellitus and SCH is common. Various researches have found prevalence of sub-clinical hypothyroidism (SCH) to be 2.2– 17% [10-12]. Various researches have also found a close interrelationship between chronic kidney disease and SCH [13,14]. The present study was done to estimate the prevalence of thyroid dysfunction in a North Indian population with DM-2 and examine its association with diabetic Diabetic Nephropathy.

AIM AND OBJECTIVES:
To study the association of Thyroid Dysfunction and diabetic nephropathy in patients with type 2 diabetes mellitus.

MATERIAL AND METHODS:
A Hospital based cross-sectional Observational study conducted in Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India from September 2022 to August 2023 on 100 Patients with DM-2.

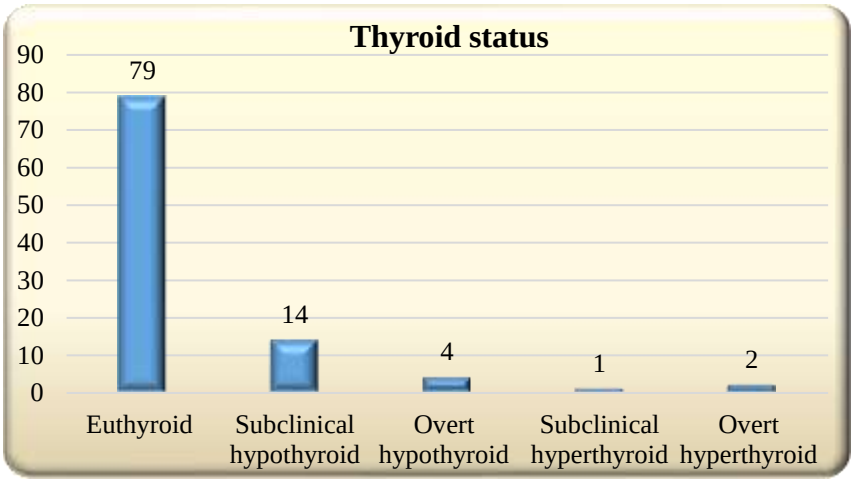
Inclusion Criteria
Patients with:
- Previously diagnosed type 2 diabetes mellitus
- Age >18 years

Exclusion Criteria
Patients with:
- A history of thyroid disease with or without treatment
- Cardiac disease
- Acute infection
- Stage 4 and 5 CKD
- Liver disease
- Pregnancy

RESULTS:

Table-1: Distribution of study subjects according to thyroid status

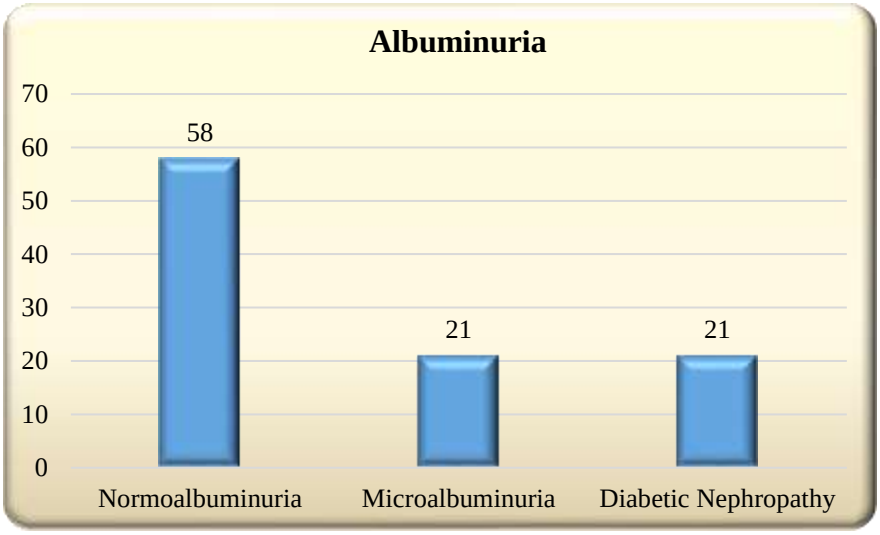
Thyroid status	N	Percentage
Euthyroid	79	79
Subclinical hypothyroid	14	14
Overt hypothyroid	4	4
Subclinical hyperthyroid	1	1
Overt hyperthyroid	2	2
Total	100	100



Graph-1: Distribution of study subjects according to thyroid status

Table-2: Distribution of study subjects according to albuminuria

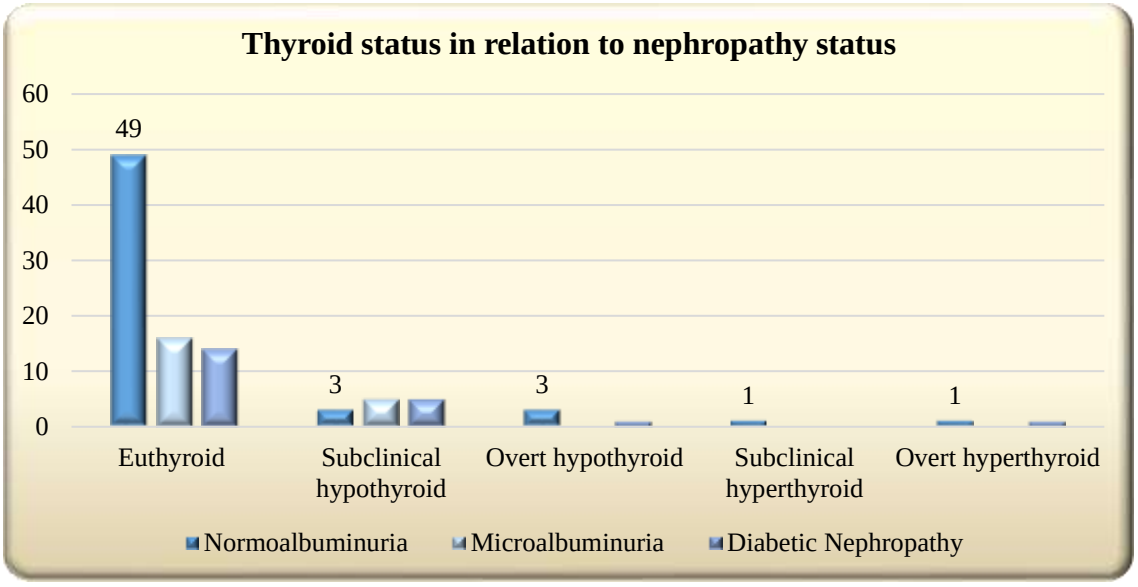
Albuminuria	N	Percentage
Normoalbuminuria	58	58
Microalbuminuria	21	21
Diabetic Nephropathy	21	21
Total	100	100



Graph-2: Distribution of study subjects according to albuminuria

Table-3: Thyroid status in relation to nephropathy status

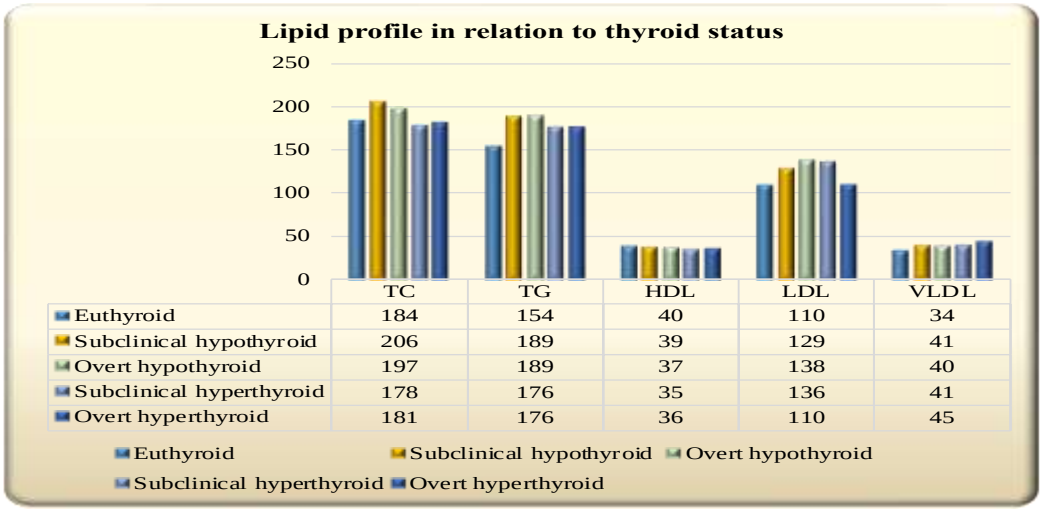
	Normoalbuminuria		Microalbuminuria		Diabetic Nephropathy	
	N	%	N	%	N	%
Euthyroid	49	84.5	16	76.2	14	66.7
Subclinical hypothyroid	4	6.9	5	23.8	5	23.8
Overt hypothyroid	3	5.2	0	0	1	4.8
Subclinical hyperthyroid	1	1.7	0	0	0	0
Overt hyperthyroid	1	1.7	0	0	1	4.8
Total	58	100	21	100	42	100
Chi-square = 17.320 with 8 degrees of freedom; P = 0.027 (S)						



Graph-3: Thyroid status in relation to nephropathy status

Table -4: Lipid profile in relation to thyroid status

	TC	TG	HDL	LDL	VLDL
Euthyroid	184.44 ± 11.16	154.63 ± 15.13	40.51 ± 3.28	110.81 ± 16.46	34.61 ± 5.7
Subclinical hypothyroid	206.29 ± 11.43	189 ± 7.93	39 ± 2.83	129.64 ± 4.43	41.5 ± 2.77
Overt hypothyroid	197.25 ± 11.35	189.75 ± 4.56	37.75 ± 2.05	138 ± 4.47	40.75 ± 3.33
Subclinical hyperthyroid	178 ± 0	176 ± 0	35 ± 0	136 ± 0	41 ± 0
Overt hyperthyroid	181 ± 1.15	176 ± 4.62	36.5 ± 0.58	110 ± 2.31	45 ± 1.15
p value	<0.001 (S)	<0.001 (S)	0.001 (S)	<0.001 (S)	<0.001 (S)



Graph-4: Lipid profile in relation to thyroid status

DISCUSSION:

In present study the prevalence of thyroid dysfunction in DM-2 patients was 21%. In present study the prevalence of Subclinical Hypothyroidism (SCH) in DM-2 was 14%, the prevalence of Overt Hypothyroidism

in DM-2 was 4%, the prevalence of Subclinical Hyperthyroidism in DM-2 was 1%, and the prevalence of Overt Hyperthyroidism in DM-2 was 2%.

Asuti et al. (2023) in their study to analyzed the pattern of thyroid dysfunction in T2DM (Type 2 Diabetes mellitus) patients found that the prevalence of thyroid dysfunction in DM-2 patients was 23.6%, prevalence of Subclinical Hypothyroidism (SCH) in DM-2 was 16%, prevalence of overt Hypothyroidism is 6.4%, and prevalence of Subclinical Hyperthyroidism is 0% and prevalence of overt Hyperthyroidism is 1.2%.[15] Khassawneh A H et al. in their study to analyzed the pattern of thyroid dysfunction in T2DM (Type 2 Diabetes mellitus) patients found that the prevalence of thyroid dysfunction in DM-2 patients was 26.7%.[16]Demitrost L et al. in their study to analyzed the pattern of thyroid dysfunction in T2DM (Type 2 Diabetes mellitus) patients found that the prevalence of thyroid dysfunction in DM-2 patients was 31.2 %, the prevalence of Subclinical Hypothyroidism (SCH) in DM-2 was 16.3%, the prevalence of Overt Hypothyroidism in DM-2 was 11.4%, the prevalence of Subclinical Hyperthyroidism in DM-2 was 2%, and the prevalence of Overt Hyperthyroidism in DM-2 was 1.5%% which is consistent with results of present study .[5]

There were significant differences in lipid profile in DM patients with respect to Thyroid status. The TC, TG, LDL, VLDL were significantly higher in subclinical and overt hypothyroidism than Euthyroid patients and HDL is significantly lower in subclinical and overt hypothyroidism than Euthyroid patients i.e. Lipid profile is deranged in Thyroid dysfunction.

In present study Thyroid status in DM is significantly correlated with development of Nephropathy i.e. there were significant differences in term of Thyroid status in Diabetes patients with respect to Nephropathy i.e. prevalence of Nephropathy is higher in patients of DM with Thyroid dysfunction as compared to patients with euthyroid status (P = 0.027). Shinya Furukawa et al. in their study found that SCH group had a higher prevalence of dyslipidemia and diabetic nephropathy than the euthyroid group.Yasuda et al. reported an association between serum TSH levels and logarithmically transformed UACR values and demonstrated that serum TSH levels were independently associated with albuminuria among Japanese patients with diabetes mellitus [17]Researches have found a negative correlation between eGFR and TSH concentration [18-20], strong interrelationship between CKD and SCH [21, 22] and a high prevalence of CKD among patients with SCH [18] in the general population, and the efficacy of thyroid replacement therapy in decreasing the rate of eGFR decline among patients with CKD with diabetes mellitus.[23].

CONCLUSION:

Thyroid Dysfunction may be independently associated with diabetic nephropathy in Indian patients with type 2 diabetes mellitus. This imply that Thyroid Dysfunction may be a new therapeutic target to prevent the development and progression of Diabetic Nephropathy in DM-2 patients. Thyroid function screening should be done in diabetes patients with diabetic nephropathy. Further multi-center larger longitudinal research is required to determine the causal relationship between Thyroid Dysfuction and Diabetic Nephropathy.

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