

## A Cross Sectional Study of Correlation between Thyroid Dysfunction with Blood Sugar levels and Serum Lipid levels in Post Menopausal Women

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### Abstract

**Background:** According to American Association of Clinical Endocrinologists, it has been found that millions of women with menopausal like symptom may in fact be suffering from thyroid disease. They predominantly have subclinical thyroid dysfunctions, Hypothyroidism being more than Hyperthyroidism.

**Objective:** To study the correlation between thyroid dysfunction with blood sugar levels and Serum lipid levels in postmenopausal women.

**Methods:** This cross-sectional study was conducted at Darbhanga Medical College and Hospital, Laheriasarai, Bihar. Total 100 Postmenopausal women who attending the outpatient and inpatient of Medicine department from June 2021 to May 2022.

**Results:** 100 postmenopausal women were screened for thyroid dysfunction in this cross sectional study. Prevalence of hypothyroidism was found to be 22% and of subclinical was 8% and of thyrotoxicosis was 2%. It is seen that thyroid dysfunction has a correlation with duration of menopause with maximum patients having more than 10 years of menopause.

**Conclusion:** Thyroid dysfunction is seen in a significant percentage of postmenopausal women. The predominant dysfunction seen is overt hypothyroidism, followed by subclinical hypothyroidism. The incidence of thyrotoxicosis was very less in these women. Hypothyroidism was seen more in women with increasing age and increasing duration of menopause and was associated with an increased BMI.

**Keywords:** overt hypothyroidism, Subclinical hypothyroidism, Postmenopausal women, Dyslipidemia, Diabetes mellitus, HDL, LDL, TG, TC.

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### Background

In a developing country like India, thyroid profile is not routinely done in postmenopausal women. Menopausal symptoms may be misinterpreted, and thyroid dysfunctions go undetected, which

in turn lead to health hazards like dyslipidemia, increased risk of hypertension and ischemic heart disease. Therefore, this study is necessary to stress the importance of regular screening for

timely detection and prevention of further complications, associated with thyroid dysfunctions in postmenopausal women [1,2]. The study intends to investigate the relationship between the menopausal status and related variation of thyroid hormones with plasma lipid concentrations.

### Menopause

Menopause is an unspoken, unattended, reality of life, the cause of which is still undeciphered completely by man. Menopause, also known as the climacteric, is the time in most women's lives when menstrual periods stop permanently, and they are no longer able to have children [3,4]. Menopause typically occurs between 45 and 55 years of age [5]. Medical professionals often define menopause as having occurred when a woman has not had any vaginal bleeding for a year [6]. It may also be defined by a decrease in hormone production by the ovaries [5].

### Material and Methods

In this cross sectional study total 100 post menopausal women were included a period of one year from June 2021 to May 2022 in the Medicine OPD and IPD, of DMCH, Laheriasarai, Bihar.

### Inclusion Criteria

- Postmenopausal women attending outpatient and inpatient of Medicine Department

### Exclusion Criteria

- Known cases of diabetes mellitus
- Known cases of Thyroid dysfunction
- Known cases of hypertension

- Known cases of chronic kidney disease.
- Patients on Hormone replacement therapy
- Diagnosed cases of Ovarian and uterine malignancy
- Patients on drugs like iodide, amiodarone, salicylates, propranolol, octreotide, phenytoin, lithium, glucocorticoid, amphetamine, aminoglutethemide, somatostatins.

### Statistical Analysis

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean  $\pm$  SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance. 2 $\times$ 4, 3 $\times$ 4 Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. 95% Confidence Interval has been computed to find the significant features. Confidence Interval with lower limit more than 50% is associated with statistical significance. Statistical calculation has been used SPSS software version 17.0 and Microsoft word and Excel.

### Results

100 postmenopausal women were screened for thyroid dysfunction in this cross sectional study. Prevalence of hypothyroidism was found to be 22% and of subclinical was 8% and of thyrotoxicosis was 2%. It is seen that thyroid dysfunction has a correlation with duration of menopause with maximum patients having more than 10 years of menopause.

**Table 1: Thyroid status**

Thyroid status	Number (n=100)	%	95%CI
Euthyroid	68	68.0	58.34-78.33
Hypothyroid	22	22.0	15.00-31.07
Known case of hypothyroidism	6	6.0	3.34-9.45
Subclinical hypothyroid	8	8.0	4.11-15.00
Thyrotoxicosis	2	2.0	0.5-7.80

**Table 2: Correlation of Thyroid dysfunction of patients and age in years**

Age in years	Total no. of patients	Thyroid dysfunction			
		Normal	Hypo	Subclinical	Thyrotoxicosis
45-49	7	7(100%)	0(0%)	0(0%)	0(0%)
50-54	31	27(87.1%)	3(9.7%)	1(3.2%)	0(0%)
55-59	33	20(60.6%)	9(27.3%)	3(9.1%)	1(3%)
60-64	29	14(48.3%)	10(34.5%)	4(13.8%)	1(3.4%)
Total	100	68(68%)	22(22%)	8(8%)	2(2%)
Inference	Age in years is significantly associated with thyroid dysfunction with P=0.052+ (4×4 Fisher Exact test)				

**Table 3: Correlation of Thyroid dysfunction of patients and Duration of menopause**

Duration of menopause	Total no. of patients	Thyroid dysfunction			
		Normal	Hypo	Sub clinical	Thyrotoxicosis
0-4 years	23	18(78.3%)	4(17.4%)	1(4.3%)	0(0%)
5-9 years	40	31(77.5%)	6(15.0%)	2(5%)	1(2.5%)
10-14 years	34	19(55.9%)	10(29.4%)	4(11.8%)	1(2.9%)
15-19 years	3	0(0%)	2(66.7%)	1(33.3%)	0(0%)
Total	100	68(68%)	22(22%)	8(8%)	2(2%)
Inference	Duration of menopause is statistically associated with thyroid dysfunction with P=0.079 (4×4 Fisher Exact test)				

There was a significant correlation between thyroid dysfunction and BMI. Maximum patients with thyroid dysfunction were overweight or had grade 1 obesity. 15.2 % of hypothyroid patients and 6.2% of subclinical hypothyroid patients were found to have type 2 diabetes mellitus. Dyslipidemia was found to be

statistically associated with thyroid dysfunction with a P value of 0.014. The pattern of dyslipidemia seen was that 36.3% of hypothyroid Patients had hypercholesterolemia and 27.2% of patients had a combination of hypercholesterolemia and hypertriglyceridemia.

**Table 4: Correlation of Thyroid dysfunction of patients and BMI**

BMI (kg/m <sup>2</sup> )	Total no. of patients	Thyroid dysfunction			
		Normal	Hypo	Subclinical	Thyrotoxicosis
Up to 22.9	39	34(87.8%)	2(6.1%)	1(2.0%)	2(4.1%)
23 – 24.9	10	9(58.8%)	1(4.4%)	0(0%)	0(0%)
25.0 – 29.9	34	20(29.4%)	10(29.4%)	4(11.8%)	0(0%)
> 30	17	5(14.2%)	9(52.9%)	3(17.6%)	0(0%)
Total	100	68(68.0%)	22(22.0%)	8(8.0%)	2(2.0%)
Inference	BMI (kg/m <sup>2</sup> ) is significantly associated with thyroid dysfunction with P<0.001** (3×4 Fisher Exact test)				

**Table 5: Correlation of Thyroid dysfunction of patients and Diabetics**

Diabetics	Total no. of patients	Thyroid dysfunction			
		Normal	Hypo	Sub clinical	Thyrotoxicosis
Absent	67	43(64.2%)	17(25.4%)	6(9%)	1(1.5%)
Present	33	25(75.8%)	5(15.2%)	2(6.1%)	1(3%)
Total	100	68(68%)	22(22%)	8(8%)	2(2%)
Inference	Presence of diabetics is not statistically associated with thyroid dysfunction with P=0.531 (2×4 fisher Exact test)				

**Table 6: Correlation of Thyroid dysfunction of patients and Dyslipidemia**

Dyslipidemia	Total no. of patients	Thyroid dysfunction			
		Normal	Hypo	Subclinical	Thyrotoxicosis
Absent	64	49(76.6%)	8(12.5%)	5(7.8%)	2(3.1%)
Present	36	19(52.8%)	14(38.9%)	3(8.3%)	0(0%)
Total	100	68(68%)	22(22%)	8(8%)	2(2%)
Inference	Dyslipidemia is significantly associated with thyroid dysfunction with P=0.014* (2x4fisher Exact test)				

## Discussion

The prevalence of subclinical hypothyroidism in the US population is about 4% to 8.5% in those without known thyroid disease [7]. The prevalence increases with age and in women older than 60 years of age subclinical hypothyroidism is present in upto 20%. There is a correlation seen between increasing age of the patients and incidence of hypothyroidism, this is consistent with the fact that incidence of hypothyroidism increases with increasing age and is probably related to aging of the thyroid gland and atrophic thyroiditis [8].

There is also a correlation seen between duration of menopause and thyroid dysfunction with maximum hypothyroid patients having more than 10 years of menopause.[9,10] The thyroid menopause connection is complex. It actually stems from close interactions between hormones the thyroid produces and the reproductive organs.

Because hormones produced by the thyroid regulate metabolism, they directly influence the activity of reproductive glands. In addition, estrogen and progesterone directly affect thyroid uptake receptor sites by blocking or allowing them to function. An association is seen with the thyroid dysfunction and BMI but weight gain is known to be an effect of hypothyroidism [11,12].

15.2% of hypothyroid patients and 6.2% of subclinical hypothyroid patients were found to have type 2 diabetes mellitus. In one study the overall prevalence of thyroid disease was found to be 13.4% in diabetic patients and was highest in Type 1 diabetic

females (31.4%) and lowest in Type 2 diabetic males.

Significant association is observed between thyroid dysfunction and dyslipidemia. It is known that hypothyroidism is one of the most common etiologies of secondary dyslipidemia. The pattern of dyslipidemia seen in this study is that 34 % of patients had hypercholesterolemia and 27.2% had a combination of hypercholesterolemia & hypertriglyceridemia. This is in accordance with the pattern seen in other studies.

## Conclusion

Thyroid dysfunction is seen in a significant percentage of postmenopausal women. The predominant dysfunction seen is overt hypothyroidism, followed by subclinical hypothyroidism. The incidence of thyrotoxicosis was very less in these women. Hypothyroidism was seen more in women with increasing age and increasing duration of menopause and was associated with an increased BMI.

Postmenopausal women are at an increased risk for arteriosclerosis and heart disease and the added presence of secondary dyslipidemia due to hypothyroidism in these women will add to the risk of arteriosclerosis and its vascular complications. The presence of increased BMI as a consequence of undiagnosed hypothyroidism will further add to the risk factors for vascular complications.

Even subclinical hypothyroidism was associated with dyslipidemia and increased

BMI. Hence screening can be recommended for hypothyroidism in postmenopausal women especially in those with increasing age, duration of menopause and overweight women to evaluate and correct dyslipidemia so as to prevent adverse atherosclerotic cardiovascular complications and to prevent morbidity and mortality.

A larger study is required to be conducted in postmenopausal women to evaluate these factors.

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