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Lipidemic Changes in Perimenopausal Middle Aged Women with Subclinical Hypothyroidism.

Gaurav Gupta[1]*, Rajan Gupta[2], and Seema Gupta[3].

Department of Biochemistry, Santosh Medical College, Ghaziabad, Uttar Pradesh, India.
Department of Microbiology, Venkateshwara Institute of Medical Sciences. Gajraula, Uttar Pradesh, India.
Department of Physiology, Venkateshwara Institute of Medical Sciences. Gajraula, Uttar Pradesh, India.

ABSTRACT

Subclinical hypothyroidism is characterized by dyslipidemia most common in females in elderly. The effect of TSH range is not very well defined in middle aged women. 74 women with 35-45 age group with SCH were enrolled compared on the basis of TSH level. TSH & FT4 were evaluated by enzyme linked immunosorbant assay. Total cholesterol, triglycerides, HDL-cholesterol and LDL- cholesterol were estimated by CHOD-POD method, GPO-PAP method, CHOD-POD/Phosphotungustate method and Friedewald formula respectively. significant results were observed in different parameters among the groups. Total cholesterol, LDL-cholesterol TC/HDL-Cholesterol ratio and LDL/HDL ratio was highly significant (<0.01) among the various groups. HDL-cholesterol and FT4 levels were not significant (>0.05) among the groups. Triglycerides, TC/HDL-cholesterol ratio and LDL/HDL ratio were positively correlated with TSH. Perimenopausal women with subclinical hypothyroidism were characterized by dyslipidemia. SCH groups having TSH (>10µIU/ml) have the higher risk of developing atherosclerosis while in the SCH-1(TSH<10µIU/ml) this risk was not greater. TC/HDL ratio and LDL/HDL ratio were higher in SCH-II and SCH-III suggesting the future development of cardiovascular disease.

Keywords: Subclinical hypothyroidism, Dyslipidemia, Perimenopausal, Thyroid stimulating hormone

Corresponding author

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INTRODUCTION

Subclinical hypothyroidism (SCH), an earliest form of hypothyroidism, is a common endocrine disorder. SCH patients generally asymptomatic or having few to more symptoms of Hypothyroidism [1]. Mildly elevated thyroid stimulating hormone (TSH) above the normal range along with free thyroxine (FT4) within reference range confirm the presence of SCH [2]. Subclinical hypothyroidism frequently occurs in females comparative to males, prominent in elderly [3]. Many of the perimenopausal symptoms e.g. weight gain, mood swings, insomnia, tiredness, hot flushes, anxiety etc. are quite similar to hypothyroidism, evaluation of thyroid profile in these patient might show the presence of subclinical hypothyroidism which may progress to overt hypothyroidism [4]. Thyroid hormone have a great influence on lipid metabolism as it deficiency might create alteration in lipid metabolism mostly degradation rather than synthesis [5]. Studies in the past have revealed that cardiovascular risk might be possible in subclinical hypothyroidism but the effect of TSH range is not clearly stated [6,7]. So the lipid metabolic changes affected by the severity of disease in terms of elevation in the TSH range is topic of debate. So the purpose of this study is to assessment of various lipid parameters in perimenopausal women with Subclinical hypothyroidism with elevation in the range of TSH.

MATERIALS AND METHODS

The study was conducted in Santosh Medical College & Hospital, Ghaziabad. Newly diagnosed 74 perimenopausal SCH women were enrolled for the study, which were divided in three groups on the basis of TSH range: SCH-I (6.16-10µIU/ml), SCH-II (10-15µIU/ml), & SCH-III (15-20µIU/ml). The age group criteria for study population were 35-45 years. The patients were excluded from the study having any previous history of thyroid disorder, family history of thyroid disease, diabetes, hypertension, menopause or any cardiovascular risk, etc.

Thyroid profile and lipid profile were estimated in all the participants of study group. Thyroid stimulating hormone (TSH) and FT_4 were measured by using enzyme linked immunosorbant assay (ELISA) technique. The ELISA kits were used from *Avantor Performance, India*. The patients with TSH range (>6.16µIU/ml) and FT_4 within reference range (0.8-1.8 ng/dl) were said to having SCH [8].

Total cholesterol (<200 mg/dl), Triglycerides (<150 mg/dl), and High density lipoprotein cholesterol (40-60 mg/dl) were measured by using CHOD/POD method, GPO-PAP method, and CHOD-POD/Phosphotungustate method respectively. LDL cholesterol (<130 mg/dl) was estimated by Friedewald formula. Total cholesterol/HDL-C and LDL-C/HDL-C ratio were also calculated by dividing TC and LDL-C with HDL-C respectively. *Erba Mannhiem, Germany* kits were used for the estimation of lipid profile [9].

Statistical Analysis

A SPSS (statistical package of social sciences) version 20.0 of IBM for windows was used for statistical analysis. All the variables were expressed in Mean ± SD. The variables of divided groups of subclinical hypothyroidism were analyzed by using one way ANOVA. Pearson correlation coefficient was performed between TSH and other parameters (TG, TC/HDL-C ratio and LDL/HDL ratio). A p value <0.05 was considered statistically significant.

RESULTS

All the variables were significantly different among the groups of subclinical hypothyroidism except FT4 and HDL-Cholesterol. The concentration of thyroid stimulating hormone was significantly different in each group of subclinical hypothyroidism. The mean value of total cholesterol was below the reference range in SCH-I and significant higher in remaining groups from second to third. Triglycerides levels were significantly higher increasing with TSH concentration in each group but the level was below the reference range in each group. There was no variations were found among the groups of SCH in HDL-cholesterol and the difference was not significant. LDL-C level was significantly higher in each group above the reference range. TC/HDL and LDL/HDL ratios were significantly different in each group of SCH and consistently increasing along with the range of TSH. (Table-1)

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Observation

There was significant positive correlation (<0.05) was observed between thyroid stimulating hormone and triglycerides in subclinical hypothyroidism patients. (Fig-1) Thyroid stimulating hormone was highly significantly correlated (<0.01) with TC/HDL ratio (Fig-2) and LDL/HDL ratio (Fig-3). (Table-2)

Baseline characteristics among the various groups of SCH women

Parameters	*Subclinical Hypothyroidism¶*			F value	p value
	*SCH-1(25)	*SCH-II(25)	*SCH-III(24)		
Age(yrs)	38.68±2.52	37.80±2.38	38.33±2.53	0.798	.454
TSH(µIU/ml)	8.41±0.93	12.46±1.37	17.67±1.81	263.803	.000
FT4(ng/dl)	1.19±0.21	1.18±0.26	1.24±0.31	0.436	.649
TC(mg/dl)	197.8±15.86	217.42±22.64	219.40±22.13	8.475	.001
TG(mg/dl)	120.44±26.38	133.28±22.76	139.16±24.36	3.745	.028
HDL(mg/dl)	42.01±2.26	42.42±2.58	41.93±2.89	0.411	.664
LDL(mg/dl)	130.52±15.66	146.48±20.86	148.70±21.29	6.46	.003
TC/HDL ratio	4.71±0.46	5.13±0.55	5.25±0.52	7.40	.001
LDL/HDL ratio	3.1±0.41	3.45±0.51	3.56±0.52	5.96	.004

Table 1: *All the variables in Mean ± SD. ¶By analysis of variance. A p value <0.05 was considered statistically significant.

Correlation between TSH and other variables⅂

Parameters	r value
TSH-TG	0.29*
TSH- TC/HDL ratio	0.38**
TSH- LDL/HDL ratio	0.33**

Table 2: ⅂By person correlation coefficient.

***p value significant at 0.05 level**
****p value significant at 0.01 level**

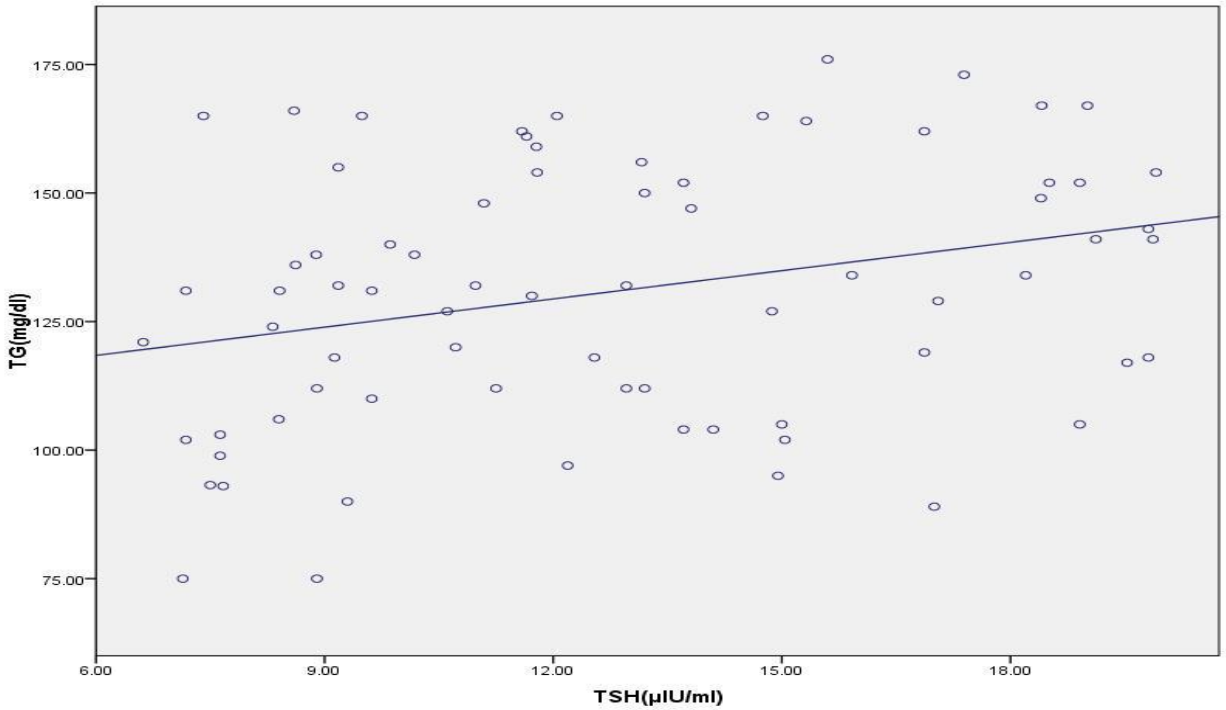

Figure 1: A positive correlation (r=0.29, p=<0.05) between triglycerides (TG) and thyroid stimulating hormone (TSH) in SCH patients. The concentration of triglycerides was expressed in mg/dl while TSH concentration was expressed in µIU/ml.

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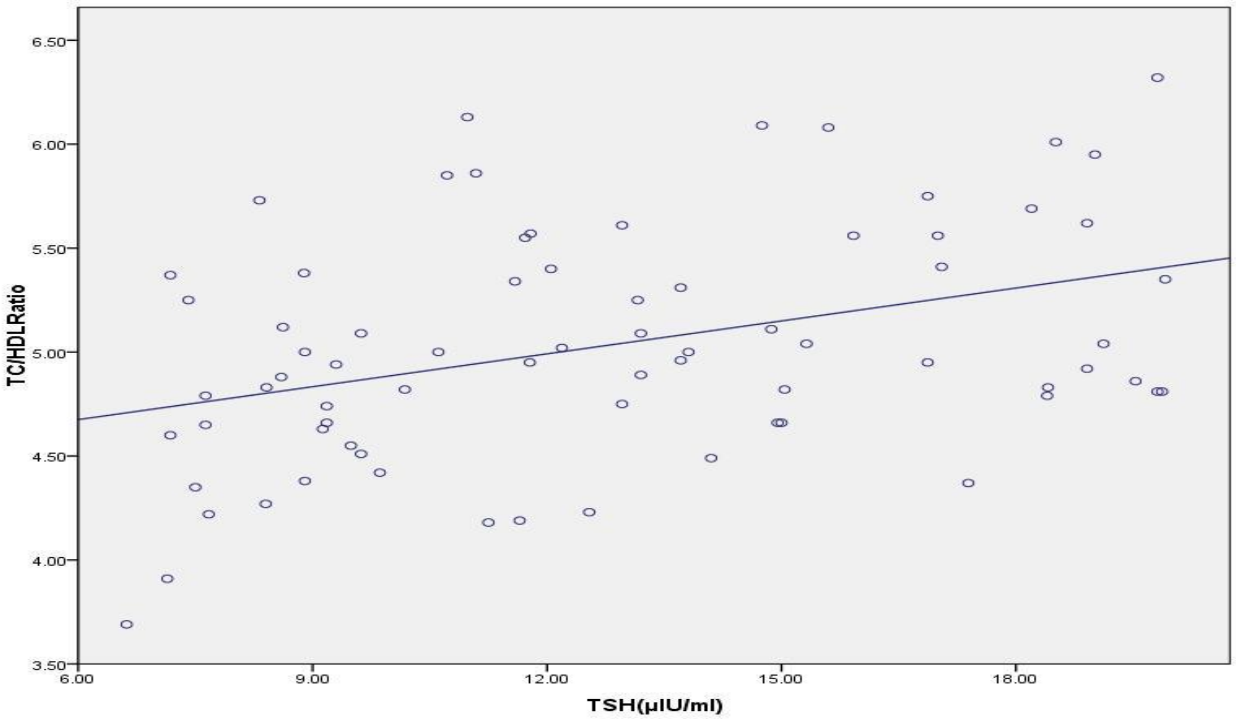

Figure 2: A positive correlation (r=0.38, p=<0.01) between total cholesterol/high density lipoprotein ratio (TC/HDL ratio) and thyroid stimulating hormone (TSH) in SCH patients. The concentration of TSH was expressed in µIU/ml.

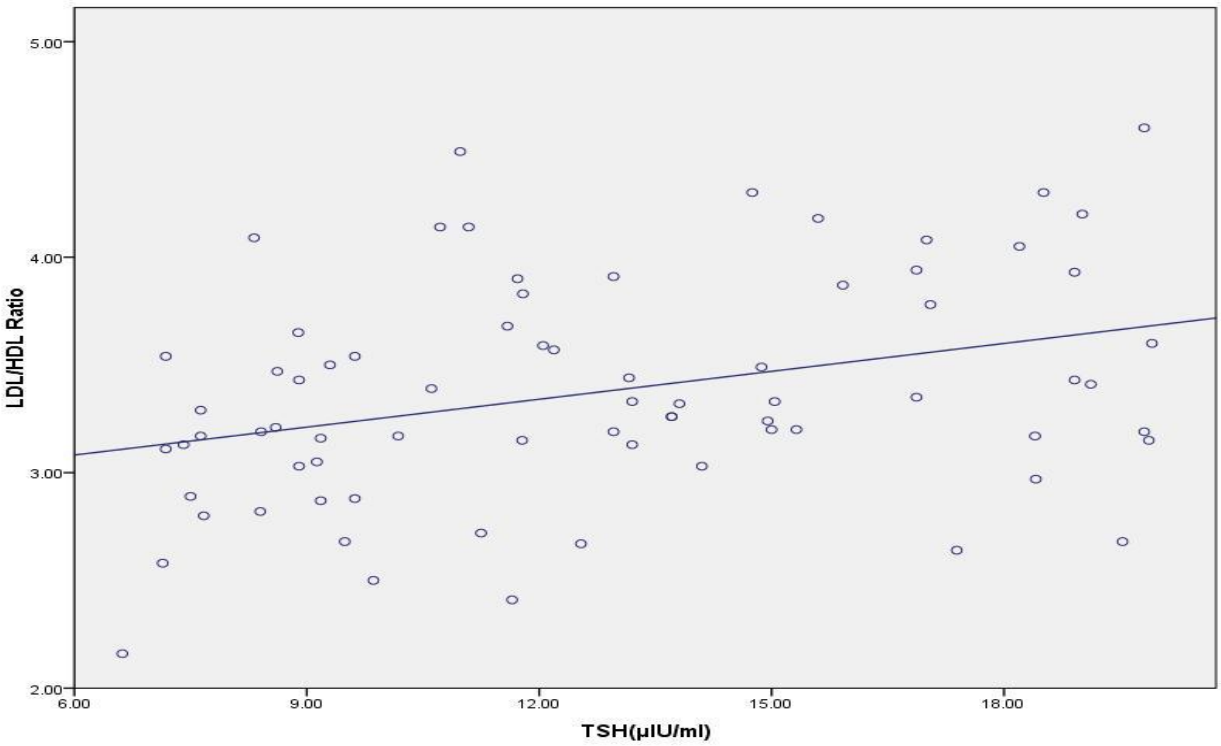

Figure 3: A positive correlation (r=0.33, p=<0.01) between low density lipoprotein /high density lipoprotein ratio (LDL/HDL ratio) and thyroid stimulating hormone (TSH) in SCH patients. The concentration of TSH was expressed in µIU/ml.

DISCUSSION

Subclinical hypothyroidism has a great influence on lipid profile in perimenopausal women. Senthilkumaran S et al found that SCH is more common in female compared to frank hypothyroidism. [10]

Total cholesterol and LDL cholesterol are increased with severity of disease as the elevation of TSH range. Celik C et al observed to support this study that SCH women are characterised by dyslipidemia [11]. Luboshitzky R concluded that dyslipidemia and hypertension was associated with SCH in middle aged women [12]. The Rotterdam study has concluded that subclinical hypothyroidism was strong risk factor of myocardial infarction and atherosclerosis in postmenopausal women [13]. Karthik N et al observed a significant dyslipidemic changes in SCH women compared to control group [14]. On contrary to it Legrys et al did not find any evidence that SCH was associated with increased risk of myocardial infarction in postmenopausal women [15]. It was also reported that SCH in middle aged women was associated with elevated level of triglycerides and TC/HDL-C ratio, which might increase the risk of accelerated atherosclerosis [16]. It was observed in this study that SCH women with TSH >10µIU/ml have the higher dyslipidemic changes in comparison to those having TSH<10µIU/ml. Marwaha et al supported this study by observing that atherogenic lipid abnormalities was found in adult subjects of SCH with TSH>10mIU/L not in subjects with TSH<10mIU/L [17].

CONCLUSION

In this study we observed that perimenopausal middle aged women with subclinical hypothyroidism are characterized by dyslipidemia which might create cardiac abnormalities in coming future. Elevated level of Total cholesterol and LDL-cholesterol might suggest a future development of cardiovascular diseases. Increased concentration of thyroid stimulating hormone is associated with consistently increasing lipid abnormalities. This study specify that SCH women with TSH>10µIU/ml have higher risk of developing cardiovascular risk in comparison to women having TSH<10µIU/ml. Increased concentration of TC/HDL ratio and LDL/HDL ratio are lead towards atherogenic risk in SCH women. However, it is a gender specific and small sample size study, more studies with large study population should be conducted to establish this fact.

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