Original Research Article

A study of biochemical profile of patients with hypothyroidism at tertiary health care center

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Abstract

Background: Hypothyroidism is a syndrome characterized by clinical and biochemical manifestations which results from decreased production of thyroid hormones, or very rarely, from their decreased actions at the tissue level **Aims and Objectives:** To Study Biochemical Profile of patients with hypothyroidism at Tertiary health care center. **Methodology:** This was a cross-sectional study carried out in Patients with hypothyroidism admitted to KIMS, Hospital Hubli during April 2004 to march 2005, Diagnosis based on thyroid function test. Total of 40 cases of hypothyroidism patients who were admitted. The lipid profile (total cholesterol, triglycerides, LDL, HDL) of hypothyroid patients was analyzed using student 't' test. **Result:** The maximum incidence was noted in the age group of 30-49 with 55%. (22/40) of the patients being the this age group. This was almost similar in both female and male patients. Female to male ratio was 4:1. The mean age of the study population was 42.9 years with female being 43 years and male 42.5 years. All the patients had serum TSH level of more than 10 µU/L with a mean of 37.32 µU/L. the value was statistically significant. The mean total cholesterol was sigh with value of 241.6 mg/dl. The mean value for female patients was 246 mg/dl which was also high. The mean value for serum HDL-C was 45.2mg/ld with mean value for female patients being 45.84 mg/dl and for male patients 42.62 mg/dl. The mean value for serum LDL-C was high with 144.27 mg/dl with the mean value for female patients being 149.96 mg/dl which was also high and for male patients 121.5 mg/dl which was near optimal. The mean value serum VLDL-C was 49.09 mg/dl and it was 48.66 mg/dl for female and 50.8 mg/dl for male patients. The mean values for serum triglyceride level was 245.5 mg/dl, it was 243 mg/ld for female patients and 254mg/ld for male patients. Serum cholesterol level was high in 45% (18) of the patients and 30% (12) had borderline and 25% (10) desirable level according to ATPIII guidelines by NCEP. S. triglycerides level was high in 62.5% (25 no) of the patients. It was borderline in 22.5% (9 no) of the patients and 12.5% (5 no) had normal values. Only 2.5% (1 no) patients had very high triglycerides levels. **Conclusion:** Patients with hypothyroidism had significant increased levels of serum cholesterol, serum triglycerides and serum LDL-C. So it can be concluded that hypothyroidism is associated with increased in total cholesterol, serum triglycerides and serum LDL-C level. Hyperlipidemia contribute to increased risk of atherogenesis. Prudent substitution therapy with L-thyroxine is indicated in patients with hypothyroidism, with or without angina, to counteract the cardiovascular risk resulting from dyslipidemia.

Key Words: Biochemical Profile, hypothyroidism, Dyslipidemia, Lipid profile.

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INTRODUCTION

Hypothyroidism is a syndrome characterized by clinical and biochemical manifestations which results from decreased production of thyroid hormones, or very rarely, from their decreased actions at the tissue level. It is reported that the hypothyroidism is present action 0.5 to 2.1 of all patients seeking medical care.[1] overall prevalence is about 2% in adult women and 0.1-0.02% in adult men. after age 60 yrs the prevalence rises several fold and may be as high as 6-7% in women. Thyroid

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hormone influences all major metabolic pathways. in lipid metabolism, the thyroid hormones affect synthesis, mobilization and degradation of lipids, hypothyroidism account for 2% of all cases of secondary dyslipidemia. Even subclinical hypothyroidism produces increase LDL-C levels. The changes in LDL-C, HDL-C correlate with changes in free T_4 levels.[2] While hypothyroidism is usually associated with increased serum concentration of total cholesterol and atherogenic lipoproteins, the occurrence of acute myocardial infarction in hypothyroid patient is not frequent. However hypothyroid patients appear to have an increase incidence of residual myocardial ischemia following acute MI. The correction of hypothyroidism by L-thyroxin replacement reverses the lipid abnormality[3,4].

MATERIAL AND METHODS

This was a cross-sectional study carried out in Patients with hypothyroidism admitted to KIMS, Hospital Hubliduring April 2004 to march 2005, Diagnosis based on thyroid function test. The study group including all patients with serum TSH level more than 5µU/L and the patients condition liable to affect serum lipids like Patients with diabetes mellitus, Patients with renal disease, Alcoholics, Patients with H/O smoking, Patients receiving pharmacological agents liable of affect serum lipids and thyroxin were excluded from the study. Cases for study are taken from inpatients of medical wards, KIMS, Hubli from april 2004- March 2005. The subject studied were aged between 20 and 80 years all the patients with hypothyroidism were selected. The study cases selected taking into consideration inclusion in exclusion criteria. Detailed history was taken and clinical examination was done as per proforma. The investigations, which ever necessary was done for study cases. At the prevalence rate of 1% and permissible error of 20%, the size of the sample works out to be around 9990. But, the actual inpatients of hypothyroidism as per the hospital statistics is 28 during the year 2003. Total of 40 cases of hypothyroidism patients who were admitted between April 2004 to march 2005 were included for study. For every case selected, clinical data and results of routine investigations were prospectively recorded, blood for lipids was taken in fasting state by performing venipuncture and lipid estimation was done in clinical biochemistry laboratory, KIMS, Hubli. Each sample of serum will be analyzed for total cholesterol, triglycerides, HDL. The concentration of total cholesterol will be measured by modified roeshalu method using standard reagent kit provided by ERBA test co. The triglycerides will be measure by anzymatic hydrolysis based on the methods of Waco and the modification my McGowan *et al* and fossati *et al* using standard reagent kit provided by ERBA test Co. The LDL and VLDL were estimated by using freidwald formulae. It applies only of triglcride level is less than 400-500mg/dl because LDL and VLDL are not estimated in our laboratory. VLDL=triglycerides/5. LDL=total cholesterol – (HDL+VLDL). The lipid profile (total cholesterol, triglycerides, LDL, HDL) of hypothyroid patients was analyzed using student 't' test.

RESULTS

Table 1: Age and Sex wise distribution of the patients

Age group (yrs)	Female	%	Male	%	Total	%
20-29	4	10	1	2.5	5	12.5
30-39	9	22.5	2	5	11	27.5
40-49	8	20	3	7.5	11	27.5
50-59	5	12.5	1	2.5	6	15
60-69	3	7.5	0	0	3	7.5
70-79	3	7.5	1	2.5	4	10
Total	**32**	**80**	**8**	**20**	**40**	**100**

The maximum incidence was noted in the age group of 30-49 with 55% (22/40) of the patients being the this age group. This was almost similar in both female and male patients. Female to male ratio was 4:1.

Table 2: The mean age and SD of study group

	Female	Male	Total
Mean age	42.5	43	42.9
SD	13.4	14.5	13.8

The mean age of the study population was 42.9 years with female being 43 years and male 42.5 years.

Table 3: Mean and SD of lipid profile in study group and its statistical significance

Lipid profile	Mean	SD	't' value	'p' value
Total cholesterol	241.6	46.04		<0.0001
HDL-C	45.2	9.75		<0.0001
LDL-C	144.275	41.342		<0.0001
VLDL-C	49.0	17.100		<0.0001
Tgriglycerides	245.5	85.5	18.160	<0.0001
Total cholesterol/HDL-C	5.286	0.874	38.251	<0.0001
LDL-C/HDL-C	3.264	0.803	25.708	<0.0001

Value for various fraction of lipid profile were statistically significant.

Table 4: Mean and SD of serum TSH

Mean	37.32
SD	20.20
't' Value	11.686
'p' value	<0.0001

All the patients had serum TSH level of more than 10 µU/L with a mean of 37.32 µU/L. the value was statistically significant.

Table 5: Biochemical (lipid profile) data among male and female patients

Lipid Profile (Mg/Dl)	Female	Male	Total
Total cholesterol	246±48.01	223.3±40.24	241.6±46.04
HDL-C	45.84±10.02	42.63±11.01	45.2±9.75
LDL-C	149.96±39.99	121.5±42.10	144.27±41.34
VLDL-C	48.66±16.52	50.8±21.11	49.09±17.1
triglyceride	243±82.61	254.105.6	245.5±85.5

The mean total cholesterol was sigh with value of 241.6 mg/dl. The mean value for female patients was 246 mg/dl which was also high. The mean value for male patients was 223.3 mg/ld was in border line group according to ATPIII guideline by NCEP.

1. The mean value for serum HDL-C was 45.2mg/ld with mean value for female patients being 45.84 mg/dl and for male patients 42.62 mg/dl.
2. The mean value for serum LDL-C was high with 144.27 mg/dl with the mean value for female patients being 149.96 mg/dl which was also high and for male patients 121.5 mg/dl which was near optimal.
3. The mean value serum VLDL-C was 49.09 mg/dl and it was 48.66 mg/dl for female and 50.8 mg/dl for male patients.
4. The mean values for serum triglyceride level was 245.5 mg/dl, it was 243 mg/ld for female patients and 254mg/ld for male patients.

Table 6: Total serum cholesterol among study group

Cholesterol Mg/Dl	Female	%	Male	%	Total	%
Desirable<200	7	17.5	3	7.5	10	25
Borderline200-239	9	22.5	3	7.5	12	30
High>240	16	40	2	5	18	45

Serum cholesterol level was high in 45% (18) of the patients and 30% (12) had borderline and 25% (10) desirable level according to ATPIII guidelines by NCEP.

Table 7: Biochemical values of serum triglycerides among study group

S. Triglycerides (mg/dl)	female	%	Male	%	Total	%
<150	4	10	10	25	05	12.5
150-199 (borderline)	8	20	1	2.5	9	22.5
200-499 (high)	20	50	5	12.5	25	62.5
>500(very high)	0	0	1	2.5	1	2.5
Total	**32**	**80**	**8**	**20**	**40**	**100**

S. triglycerides level was high in 62.5% (25 no) of the patients. It was borderline in 22.5% (9 no) of the patients and 12.5% (5 no) had normal values. Only 2.5% (1 no) patients had very high triglycerides levels.

DISCUSSION

H ypothyroidism in adults has an insidious onset with a range of non-specific symptoms resulting in delayed diagnosis. Many of the common signs and symptoms of hypothyroidism occur frequently in euthyroid patients. Common symptoms such as fatigue, lethargy and constipation have limited diagnostic value, while weakness, insomnia and loss of memory are usually attributed to old age [7]. This downgrading of clinical aspects of hypothyroidism has paralleled the increase in demand for thyroid function tests over the past 20 years. Few authors believe that a diagnosis of clinical hypothyroidism can be made on the basis of biochemical measurements alone and that signs and symptoms are not important [8]. Others challenge this statement and maintain that biochemical tests can be misleading and that diagnosis can be made on clinical grounds alone [9].Hypothyroidism associated with increased risk of coronary artery disease, peripheral vascular disease and various biochemical abnormalities including increased total cholesterol [10,] increased serum triglycerides and LDL-c level [11] In our study we have found that The maximum incidence was noted in the age group of 30-49 with 55%. (22/40) of the patients being the this age group. This was almost similar in both female and male patients. Female to male ratio was 4:1.The mean age of the study population was 42.9 years with female being 43 years and male 42.5 years. Value for various fraction of lipid profile were statistically significant. All the patients had serum TSH level of more than 10 µU/L with a mean of 37.32 µU/L. the value was statistically significant. The mean total cholesterol was sigh with value of 241.6 mg/dl. The mean value for female patients was 246 mg/dl which was also high. The mean value for serum HDL-C was 45.2mg/ld with mean value for female patients being 45.84 mg/dl and for male patients 42.62 mg/dl. The mean value for serum LDL-C was high with 144.27 mg/dl with the mean value for female patients being 149.96 mg/dl which was also high and for male patients 121.5 mg/dl which was near optimal. The mean value serum VLDL-C was 49.09 mg/dl and it was 48.66 mg/dl for female and 50.8 mg/dl for male patients. The mean values for serum triglyceride level was 245.5 mg/dl, it was 243 mg/ld for female patients and 254mg/ld for male patients. Serum cholesterol level was high in 45% (18) of the patients and 30% (12) had borderline and 25% (10) desirable level according to ATPIII guidelines by NCEP.S. triglycerides level was high in 62.5% (25 no) of the patients. It was borderline in 22.5% (9 no) of the patients and 12.5% (5 no) had normal values. Only 2.5% (1 no) patients had very high triglycerides levels. These findings are similar to Om Prakash[12] they found Serum total cholesterol of hypothyroids and diabetic patients showed a highly

significant relationship (p=0.024). Also similar to Venkata Ramana[13] *et al* they found It was found that Hypothroidism is associated with Obesity and hence weight reduction and regular physical exercise are to be advised for Hypothyroid Patients. It was also observed that Hypercholesterolemia with increased LDL-C and decreased HDL-C were noticed in Hypothyroid subjects and hence early detection of Hypothyroidism will help in prevention of progression of the disease to severity

CONCLUSION

Patients with hypothyroidism had significant increased levels of serum cholesterol, serum triglycerides and serum LDL-C. So it can be concluded that hypothyroidism is associated with increased in total cholesterol, serum triglycerides and serum LDL-C level. Hyperlipidemia contribute to increased risk of atherogenesis. Prudent substitution therapy with L-thyroxine is indicated in patients with hypothyroidism, with or without angina, to counteract the cardiovascular risk resulting from dyslipidemia.

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