



RESEARCH ARTICLE

“A COMPARATIVE STUDY OF HOMOCYSTEINE, CYANOCOBALAMINE, FOLATE, LIPID PROFILE AND SERUM CREATININE LEVEL IN HYPERTHYROID SUBJECTS BEFORE AND DURING TREATMENT”

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Key words:-

Homocysteine, Cyanocobalamine,
Folate, Thyroxine, Serum Creatinine,
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Abstract

Introduction: Hyperthyroidism disorder results from over production of hormones secreted by thyroid gland itself. The present study plan to delineate influence of thyroxine on homocysteine, folate, cyanocobalamine, lipid profile and serum creatinine in hyperthyroid patients before and during treatment with antithyroid drugs.

Material and Method: The present study was conducted on 75 patients of hyperthyroidism of either sex in department of biochemistry, J.L.N. medical college and hospitals, Ajmer. Serum homocysteine, cyanocobalamine, folate level was measured by ELISA while thyroid function test were evaluated by RIA method.

Result and discussion: There were significant change in homocysteine, folate, cyanocobalamine, total cholesterol, HDL-cholesterol and LDL-cholesterol in hyperthyroid subjects before and during treatment ($P < 0.0001$) and these emerging evidence suggest that these parameter are influenced by level of thyroxine hormone which were higher in hyperthyroid subjects before treatment with antithyroid drugs.

Conclusion: It is concluded that treatment with antithyroid drug reduces the level of thyroxine hormone in hyperthyroid subject increases level of homocysteine and causes dyslipidemia which increases risk of coronary artery disease, angina pectoris in subclinical hyperthyroidism.

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Introduction:-

Thyroid disorders are most common endocrine abnormalities encounter in clinical practices. Thyroid function affects the activity of MTHFR gene, its activity increased in person with hyperactive thyroid. Hyperthyroidism also increases conversion of riboflavin to FAD, which can equally increase activity of MTHFR gene, FAD also serve as a cofactor for enzyme involve in metabolism of B12 and folate. Which explain low homocysteine level, high folate and cyanocobalamine level in hyperthyroid patient. Following administration of antithyroid drug, thyroid hormone level decreases in hyperthyroid patients which decreases the activity of MTHFR gene, decreases conversion of riboflavin to FAD, it further decreases the metabolism of B12 and folate. Which explain the relative high level of homocysteine, low folate and cyanocobalamine during treatment of hyperthyroid patients. Furthermore, a change of kidney functions may have an effect; higher glomerular function rate (GFR) is found in patients of hyperthyroidism which decreases serum creatinine level and no significant change during treatment with antithyroid drugs.

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Dyslipidemia is common finding in hyperthyroid patients, explained by adverse effect of thyroid hormone in all aspect of lipid metabolism including synthesis, mobilization and degradation.

Aims And Objectives:-

To estimate plasma homocysteine, serum cyanocobalamine, folate, lipid profile and serum creatinine in control and hyperthyroid subjects before treatment and in hyperthyroid patients during treatment. To find out correlation between cyanocobalamine, folate with homocysteine, lipid profile and serum creatinine with thyroid hormone in hyperthyroid patients before and during treatment.

Material And Method:-

The present study will comprise of 75 diagnosed patients of thyroid dysfunction (hyperthyroidism) attending OPD of Medicine / Surgery of J.L.N. Medical College and Hospital, Ajmer. Diagnosis would be finalised after thyroid profile estimation.

Seventy five healthy subjects of either sex of similar age group will be included in the study, as the control group.

Exclusion Criteria:

Uncontrolled diabetes mellitus, Cardiovascular disease, Pregnancy, Patient on drug like methotrexate, fenofibrate, l-dopa, cholestyramine, Renal failure, Chronic alcoholism.

Blood samples will be collected by venipuncture by aseptic technique, Serum / plasma will be subjected to following estimations:

1. Plasma homocysteine – By ELISA method.
2. Serum cobalamine – By ELISA method.
3. Serum folate – By ELISA method.
4. Serum cholesterol – By enzymatic CHOD-POD, end point method (Allian CC; 1974).
5. Serum triglycerides – By enzymatic GPO-POD, endpoint method (Fossati P, 1982).
6. Serum HDL cholesterol – By phosphotungstic acid, endpoint method (Finley PR, 1978).
7. Serum LDL cholesterol – Calculated from the Friedewald's formula.
8. Serum VLDL cholesterol – Calculated from the Friedewald's formula.
9. Lipoprotein (a) (Lp-a) – Latex turbidimetry method (Gaubatz JW, 1983).

Result:-

75 pateints suffering from hyperthyroidism (24 males and 51 females), and 75 healthy control subjects (24 males and 51 females) were studied for thyroid function test, serum homocysteine level, serum folate, serum cyanocobalamine, serum lipid profile and serum creatinine.

The mean value for serum homocysteine level was 8.15 ± 0.345 $\mu\text{mol/L}$, Folic acid (ng/ml) 6.494 ± 0.397 , cyanocobalamine 360.9 ± 10.18 pg/ml, serum creatinine 0.7604 ± 0.058 mg/ dl, Total cholesterol 162.46 ± 6.584 mg/dl, triglyceride 124.1 ± 13.084 mg/dl, HDL 37.0 ± 1.884 mg/dl, VLDL 25.72 ± 2.347 mg/dl and LDL 99.74 ± 5.439 mg/dl in control subjects. For hyperthyroid patients, the mean value of serum homocysteine level were 7.7160 ± 0.454 $\mu\text{mol/L}$ and 9.566 ± 0.379 $\mu\text{mol/L}$, folic acid 8.531 ± 0.296 and 6.282 ± 0.216 ng/ml, cyanocobalamine (pg/ml) 343.78 ± 2.516 and 335.71 ± 2.399 , serum creatinine (mg/dl) 1.134 ± 0.3378 and 0.931 ± 0.29 , serum cholesterol (mg/dl) 166.71 ± 4.581 and 209.78 ± 5.699 , triglyceride (mg/dl) 136.35 ± 30.768 and 164.28 ± 38.34 , HDL (mg/dl) 46.33 ± 2.449 and 55.27 ± 2.088 , VLDL (mg/dl) 26.764 ± 6.297 and 32.867 ± 7.678 , LDL (mg/dl) 92.671 ± 1.699 and 121.64 ± 2.238 before and during treatment respectively.

Table-1:- Comparison Of Homocysteine, Folate, Cyanocobalamin, Serum Creatinine And Lipid Profile Of Control And Hyperthyroid Subject Before Treatment.

Parameter	Control Subjects (mean \pm SD)	Hyperthyroid subjects before treatment (mean \pm SD)	P value (mean \pm SD)
Homocysteine ($\mu\text{mol/L}$)	8.15 ± 0.345	7.7160 ± 0.454	0.0016 (NS)
Folic acid (ng/ml)	6.494 ± 0.397	8.531 ± 0.296	0.0001
Cyano cobalamin (pg/ml)	360.9 ± 10.18	343.78 ± 2.516	0.0001

Serum creatinine (mg/dL)	0.7604±0.058	1.134±0.33	0.0302
Total cholesterol (mg/dL)	162.46±6.584	166.71±4.581	0.0273
Triglyceride (mg/dL)	124.1±13.084	136.35±30.768	0.0309 (NS)
HDL (mg/dL)	37±1.884	46.33±2.449	0.0001
VLDL (mg/dL)	25.72±2.347	26.764±6.297	0.3358 (NS)
LDL (mg/dL)	99.74±5.439	92.671±1.699	0.0001

*P – value < 0.0001 highly significant (HS)

P – value < 0.001 significant (S)

P – value >0.001 non significant (NS)

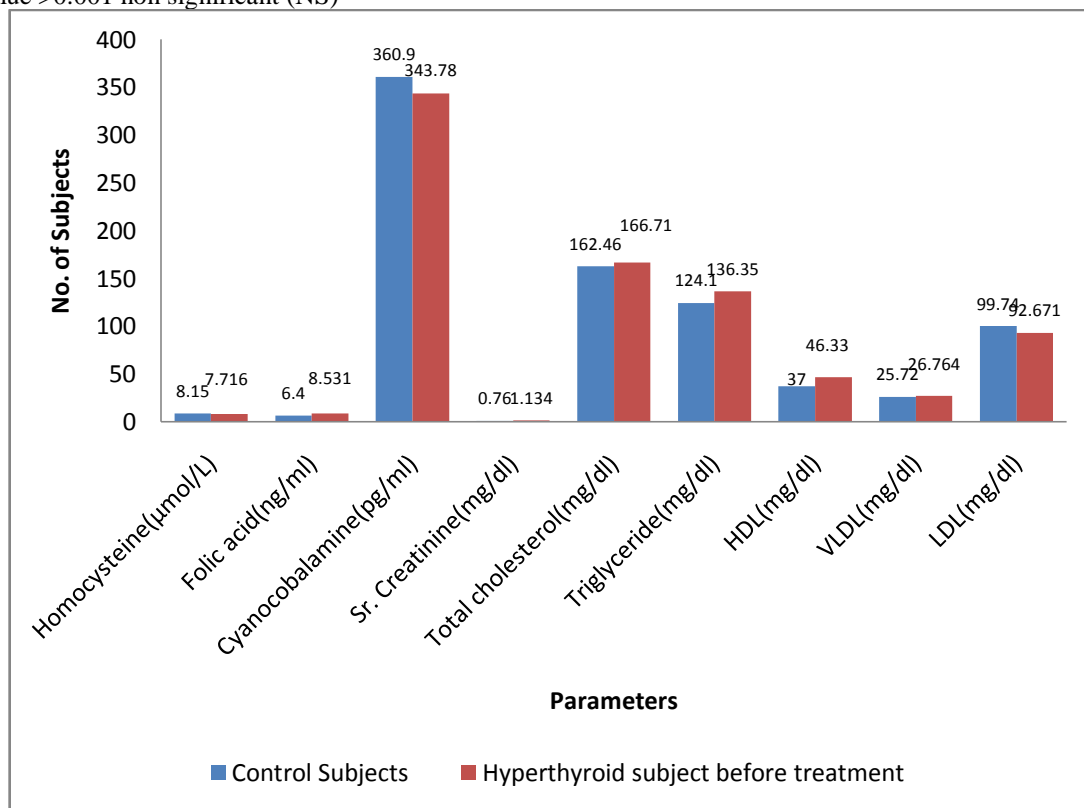
Table-2:- Comparison of Homocysteine, Folate, Cyanocobalamin, Serum Creatinine And Lipid Profile Of Hyperthyroid Subject Before And During Treatment.

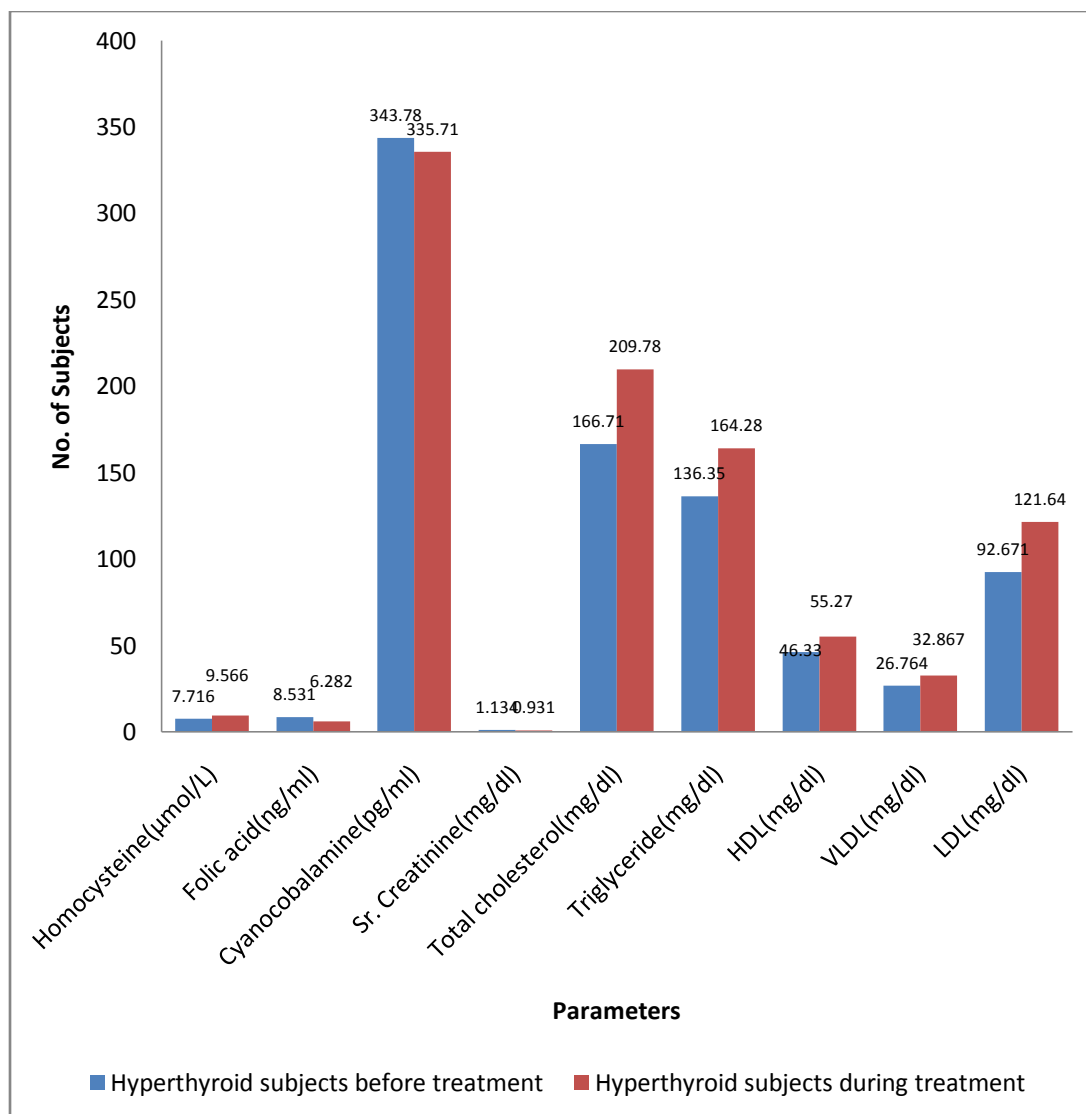
Parameter	Hyperthyroid subjects before treatment (mean±SD)	Hyperthyroid subjects during treatment (mean±SD)	P value (mean±SD)
Homocysteine (μmol/L)	7.7160±0.454	9.566±0.379	<0.0001 (HS)
Folic acid (ng/ml)	8.531±0.296	6.282±0.216	<0.0001 (HS)
Cyano cobalamin (pg/ml)	343.78±2.516	335.71±2.399	<0.0001 (HS)
Serum creatinine (mg/dL)	1.134±0.33	0.931±0.029	0.2687 (NS)
Total cholesterol (mg/dL)	166.71±4.581	209.78±5.699	<0.0001 (HS)
Triglyceride (mg/dL)	136.35±30.768	164.28±38.34	0.0432 (NS)
HDL (mg/dL)	46.33±2.449	55.27±2.088	<0.0001 (HS)
VLDL (mg/dL)	26.764±6.297	32.867±7.678	0.0297 (NS)
LDL (mg/dL)	92.671±1.699	121.64±2.238	< 0.0001

*P – value < 0.0001 highly significant (HS)

P – value < 0.001 significant (S)

P – value >0.001 non significant (NS)





Comparison of Homocysteine, Folate, Cyanocobalamine, Serum Creatinine and Lipid profile of Control and Hyperthyroid subject before and during Treatment

Discussion:-

Thyroid hormone status in hyperthyroid subjects before and during treatment with antithyroid drug has profound influence on variety of biochemical process, of which have secondary effect on homocysteine metabolism mainly by stimulating flavokinase and thereby synthesis of FMN and FAD which serve as cofactor for enzyme involve in metabolism of cobalamine and folate. Among these enzymes, the FAD dependent methyl tetra hydrofolate reductase is recognized as a possible mediator of change in level of homocysteine according to riboflavin status.

Dyslipidemia is common finding in hyperthyroid patients, explained by adverse effect of thyroid hormone in all aspect of lipid metabolism including synthesis, mobilization and degradation.

Conclusion:-

In hyperthyroid disease, during treatment with antithyroid drug to achieve euthyroid level there is considerable change in quantitative lipids and relative hyperhomocysteinemia occur. These changes explain relative risk of coronary artery disease, cerebral ischemia and angina pectoris in older and possibly ischemic stroke in younger patients.

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