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RESEARCH ARTICLE

A STUDY OF LIPID PROFILE IN ANAEMIA

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Abstract

Objectives: Both anemia and dyslipidemia are widely prevalent public health problems, especially in the Indian population. Association of anemia and dyslipidemias were reported in some individual experimental animals. The study was planned to find the changes in serum lipid profile in adult Indian patients with anemia.

Material and methods:100 cases of anemia (hemoglobin <13 gm% in men and <12 gm% in women), and 100 age and sex matched healthy controls, in the age group 18-40 years were investigated for any possible changes in serum lipid profile i.e., triglycerides, total cholesterol, high density lipoprotein cholesterol, very low density lipoprotein cholesterol.

Results: The mean cholesterol in patients with anemia was 122.47 ± 29.32 mg/dl, whereas in controls group was 160.43 ± 38.91 mg/dl. The mean serum triglyceride level in patients with anemia was 89.41 ± 33.1532 mg/dl and in control group was 111.45 ± 40.6632 mg/dl. Mean high-density lipoprotein levels were 36.13 ± 12.8132 mg/dl in anemic group and 45 ± 13.032 mg/dl in control group, whereas low-density lipoprotein (LDL) cholesterol level was 70.12 ± 21.64 mg/dl in the anemic group and 100.45 ± 30.8032 mg/dl in control group. VLDL levels were higher in control group (21.96 ± 8.132 mg/dl) compared to the anemic group (18.34 ± 7.6432 mg/dl).

Conclusion: Lipoproteins levels were significantly abnormal in anemic as compared to non-anemic subjects.

Introduction:-

Both anemia[1,2,3] and dyslipidemia[4] are widely prevalent problems across India, irrespective of the socio-economic status of the people[3,5]. Dyslipidemia is one of the important risk factors for development of CAD. Another equally important public health concern is the prevalence of anemia.

Nutritional deficiency, especially the iron deficiency, is the most common cause of anemia irrespective of age, gender, and socio-economic status in India. Iron is an essential metal required for many physiological functions of the body, such as oxygen transport and enzymatic reactions. However, excess iron is harmful because of generation of free radical leading to tissue damage[6,7,8,9].

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Several studies have been done to show the relationship between anemia and lipid profile. Verma et al.[10] and Antappanavar et al.[11] showed that triglycerides and VLDL levels are increased in iron deficiency anemia as compared to non-anemic patients, whereas low-density lipoprotein (LDL), cholesterol level were found lower in anemic patients. Sandeep et al.[12] found lower levels of total cholesterol, high-density lipoprotein (HDL), LDL, VLDL, and triglyceride levels in anemic patients as compared to healthy controls.

Choi J.W. et al.[13] found that girls with severe iron deficiency anemia have lower serum total cholesterol and triglyceride concentrations and returned to normal levels after iron replacement therapy.

The present study is an attempt to investigate the relationship between anemia and blood lipid levels in Indian adults.

Materials and Methods:-

The study was conducted in the Indira Gandhi Institute of Medical Sciences, Patna, Bihar with prior approval from Institutional Ethical committee.

The participants were enrolled into the study after obtaining their written informed consent. 100 proven cases of anemia, both male and female, of age 18-40 years were included in the study after obtaining their written informed consent.

100 healthy sex matched adults within the same age group were taken as the control group. Anemia was defined as hemoglobin <13 gm% in men and <12 gm% in women. Patients with diabetes mellitus, CAD, cerebrovascular disease, nephrotic syndrome, retroviral disease, obesity (BMI> 25 kg/m^2), and those who were receiving glucocorticoids, diuretics, beta blockers, and statins were excluded from the study. Hb level was estimated by automated hematology analyser, Sysmex XT 1800i. Analysis of serum lipid levels, which included Total cholesterol (TC), Triglycerides (TG), High Density Lipoprotein (HDL) cholesterol, Low Density Lipoprotein (LDL) cholesterol and Very Low Density Lipoprotein (VLDL) cholesterol were done in all subject, using the enzymatic method by fully auto biochemical analyzer, Beckmen Synchron Clinical System CX4, (Beckman Coulter, Inc, California, USA).

Statistical analysis:

All results were expressed in Mean±S.D. Data were analyzed using SPSS, version 24. An Independent student's t-test was used to compare the means of variables. Pearson's correlation was used to find out the correlation between the variables. p value < 0.05 was considered significant.

Result:-

A total of 200 participants were included in the study, which includes 100 cases and 100 controls. Among the cases, 63 were females and 37 were males. In the control group, 58 were females and 42 were males. There was no difference in the age-wise distribution of patients between two groups. Of 100 cases, 36 had hemoglobin less than 7 gm%, 46 had hemoglobin between 7 and 10 gm%, and 18 had hemoglobin more than 10 gm%.

Table No. 1:- Base line characteristics of Group I and Group II.

Variable	Group I (Control) (n=100)	Group II (Anemic) (n=100)
Age (Years) mean±SD	28.07 ±6.03	28.64 ± 6.37
Gender Males, n Females, n	 42 58	 37 63

Table 2 shows the comparison of lipid profile among the anemic group and controls. The levels of serum TG and serum VLDL were significantly higher in the anemic group, whereas the levels of LDL were significantly lower.

Table No. 2:- Comparison of lipid profile among Group I and Group II.

Lipid Profile	Group I (Control) (n=100)	Group II (Anemic) (n=100)	P value
Total cholesterol (mg/dl)	160.45 ± 37.53	152.66 ± 42.63	P>0.05
LDL cholesterol (mg/dl)	97.32 ± 62.37	84.31 ± 36.56	P<0.001
VLDLcholesterol (mg/dl)	21.87 ± 6.75	28.39 ± 8.62	P<0.001
TG cholesterol (mg/dl)	107.39 ± 23.84147	147.76 ± 43.62	P<0.001
HDL cholesterol (mg/dl)	40.08 ± 6.56	37.21 ± 8.63	P>0.05

P<0.001 - Highly significant.P>0.05 - Not significant.

Disscusion:-

Both iron and cholesterol are important metabolites in the human body, and excess or deficiency of either of them could affect seriously. Iron deficiency is the world's most widespread nutritional disorder and also the commonest cause of anemia occurring regardless of age, gender and socio-economic status of the people, affecting both industrialized and developing countries. It is an important public health problem because of its complications[14].

According to WHO, prevalence of iron deficiency is 42.3% in women (15-59 years) and 30% in men (15-59 years) in the developing world. The report also estimated that 88% of pregnant females and 74% of non-pregnant females are anemic[15].

Dyslipidemia refers to elevated or reduced levels and/or functional impairment of lipoproteins. Primary dyslipidemias occur due to hereditary defects in lipoprotein metabolism. Secondary dyslipidemia is due to obesity, hypothyroidism, sedentary lifestyle, type 2 diabetes mellitus, chronic kidney disease, excessive alcohol consumption, primary biliary cirrhosis, cholestatic liver diseases, rheumatic diseases, nephrotic syndrome, HIV infection and some medications.

It is one of the major risk factor in the development of CAD. Various studies[16,17] have shown the elevated plasma levels of lipid as risk factors in emergence of CAD.

The present study found significantly raised levels of both TG and VLDL cholesterol levels in the anemic subjects, as compared to healthy controls. Similar results were observed by Tanzer et al. in Turkish children.

Shirvani et al., in their study conducted on elderly patients, showed that serum triglyceride, cholesterol and LDL levels were lower in the iron deficiency group than in the control group[18].

Yang et al. showed that women with iron deficiency anemia had higher serum triglyceride levels than healthy controls, while theyhad lower HDL cholesterol levels than healthy controls[19].

A study on Korean girls (14-19 years) showed reduced levels of TG in severe anemia[13] while another study[20] on Turkish children with anemia reported no effect on either TG or VLDL levels.

Various studies have been performed to define the related mechanisms underlying dyslipidemias in anemia. High TG levels have been explained on the basis of impaired carnitine biosynthesis together with increased TG synthesis and decreased TG degradation[6,21,22] in anemia. Lower serum cholesterol can be due to decreased hepatic synthesis[23] or dilutional effects of serum[22,23,24].

Long-term follow-up studies are required to know whether the hypocholesterolemia caused by anemia has a beneficial effect on atherosclerosis and its complications. The effect of treatment of anemia on lipid profile also needs to be further evaluated.

Conclusion:-

These findings indicate that there is abnormal serum lipid profile in anemia in Indian adults, which is consistent with the findings of several other studies. Nonetheless, to identify the possible mechanisms, further studies are recommended to be carried out.

Conflict of Interest:
None.

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Self.

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