

PATTERN OF LIPID PROFILE IN ANEMIC PATIENTS

- A CROSS SECTIONAL STUDY

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ABSTRACT

Background: Anemia is common disorder in India, although there are plenty of reasons attributable to anemia. There are studies reporting the beneficial effect of anemia on lipid profile. This research was conducted to study the pattern of lipid profile in anaemic patients.

Material & Method: Present hospital based cross sectional study was conducted among the patient more than 18yrs of age attending the OPD or admitted in medicine department Aarupadai Veedu Medical college & Hospital with diagnosed anemia. Study was done over a period of two years on patients with proven cases of anemia. After informed & written consent from the patients, detailed history, clinical assessment & laboratory investigation was done.

Result: In present study total of 280 patients fulfilling inclusion criteria are included in the study. The mean age of the patients was found to be 39.44 ± 14.92 yrs, among them 60% were female and 40% were male patient with female preponderance. There was significant positive strength of association of hemoglobin with the lipid profile which included the total cholesterol, LDL, HDL, triglycerides and VLDL cholesterol ($p < 0.05$).

Conclusion: The present study showed a significant strength of association between the hemoglobin level and the lipid profile parameters. Also lower mean level of lipid parameters with severity of grade of anemia.

Keyword: Anemia, Severity, Lipid Profile, Cholesterol, Lipoprotein.

Introduction

Anemia is common disorder in India, although there are plenty of reasons attributable to anemia.¹⁻³ There are studies reporting the beneficial effect of anemia on lipid profile. Type of anemia does not influence the lowering of lipid levels. Decreased serum cholesterol levels is not due to specific lowering of any particular lipoprotein family, instead it is observed that there occurs a proportionate decrease in all major lipoprotein families.^{4,5} It's interesting that this fall in serum lipids in anemic patients may decrease the risk of coronary artery disease – a disease which kills number of Indians every year.^{6,7}

Anemia may be defined as a reduction below the normal values of a total red cell mass. Anemia has been defined by the World Health Organization as a reduction of hematocrit value below the normal limits or anemia is considered to exist in adults whose hemoglobin levels are lower than 13 g/dl (males) or 12 g/dl (females).⁸

The mechanism by which anemia causes a changes in serum lipid level is still a grey area. The simplest explanation is a dilution effect, increased cholesterol utilization by actively dividing cells, decreased liver oxygenation leading to reduced endogenous cholesterol synthesis, increased levels of granulocyte – macrophage colony stimulating factor & finally – in the bone marrow – enhanced receptor mediated uptake of LDL. Correction of anemia is associated with a rise in serum lipids.^{2,4,9,10}

Many research studies have collected considerable novel information about the effect of serum lipids on heart disease and vascular disease. Elevated serum lipids have a significant correlation with the risk of atherosclerosis which in turn causes coronary artery disease, cerebrovascular disease & peripheral vascular disease, thus increasing morbidity & mortality worldwide.¹¹⁻¹⁴

This research was conducted to study the pattern of lipid profile in anaemic patients. Previous study compared only with anaemic to non - anaemic patients but not with severity of anemia and the pattern of lipid profile is not clear. Hence our study is aimed to analyse the pattern of lipid profile in mild, moderate & severe anemia.

Materials & Method

The Present hospital based cross sectional study was conducted among the patient more than 18yrs of age attending the OPD or admitted in medicine department at AarupadaiVeedu Medical college & Hospital for a period of 2 years who had diagnosed cases of anemia. (According to WHO grading of anemia) FEMALE (mild- 11-11.9 gm%, moderate- 8-10.9 gm%, severe- <8gm%) MALE (MILD- 11-12.9 gm%, moderate- 8-10.9 gm%, severe- <8gm%). Patients with all secondary causes of Dyslipidemia and not willing to be part of study were excluded.

Procedure

Over a period of 2yrs hospitalized adults with proven cases of Anemia in department of general medicine AVMCH. After obtaining informed and written consent from the patients detailed history, clinical assessment, laboratory diagnosis to be done. All proven cases of anemia is selected for study. After that Lipid profile sample has to be collected empty stomach after overnight fasting to get accurate results and see the pattern of lipid profile in selected patients.

Statistics analysis was done by using SPSS version 22.0 (IBM SPSS, US) software with regression modules. Simple statistical methods such as pie diagram and bar charts were used for the descriptive purpose and summarised as frequency, percentage, mean and standard deviation. The mean difference between the continuous variable were analysed using student t-test and categorical variables using chi-square test. A p value less than 0.05 can be considered as significant.

Result

In present study total of 280 patients fulfilling inclusion criteria were included in the mean age of the patients was found to be 39.44 ± 14.92 yrs, among them 60% were female and 40% were male patient with female preponderance. There was no significant age difference between the genders in the present study. There was significant lower mean hemoglobin among the females compared to male patients ($p < 0.05$). There is no significant difference in the mean level of urea and creatinine ($p > 0.05$). There is significant mean difference in the lipid profile between the gender in the present study ($p < 0.05$). On assessment of type of anemia, 42.1% had the dimorphic anemia, 24.3% had the microcytic hypochromic anemia, 14.3% had Normocytic hypochromic anemia, 10.7% with Normocytic normochromic anemia. Over all 43.6% patients were with mild anemia, 35.7% with moderate and 20.7% with severe anemia. On assessment of the severity of anemia with the lipid profile, there was significant lower mean level of cholesterol, LDL, HDL, TG and VLDL among the patients with severe anemia compared to the moderate and mild grade of anemia ($p < 0.05$). There was significant positive strength of association of hemoglobin with the lipid profile which included the total cholesterol, LDL, HDL, triglycerides and VLDL cholesterol ($p < 0.05$).

Table 1: Comparison of mean level of lipid profile between the genders

	Male		Female		p-value
	Mean	SD	Mean	SD	
TC	143.3	27.3	127.8	27.4	0.001*
TGL	141.3	41.6	128.6	26.3	0.004*
HDL	28.9	6.4	24.5	5.2	0.001*
LDL	86.1	19.6	77.6	23.1	0.001*

VLDL	28.3	8.3	25.7	5.3	0.001*
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Table 2: Comparison of the mean level of lipid profile with the severity of anemia

	Severity of anemia						ANOVA p-value
	Mild		Moderate		Severe		
	Mean	SD	Mean	SD	Mean	SD	
TC	147.2	29.5	132.2	26.5	124.3	21.1	0.001**
TGL	145.5	46.1	132.0	26.4	124.0	22.9	0.001**
HDL	28.6	6.5	26.7	6.3	24.7	4.7	0.001**
LDL	89.5	20.6	79.1	21.8	74.8	18.2	0.001**
VLDL	29.1	9.2	26.4	5.3	24.8	4.5	0.001**

Table 3: Pearson's correlation of hemoglobin level with lipid profile parameters

Correlations						
		TC	TGL	HDL	LDL	VLDL
HB	r	.366**	.214**	.282**	.329**	.213**
	Sig	.000	.000	.000	.000	.000
**. Correlation is significant at the 0.01 level (2-tailed).						

Discussion:

The prevalence of coronary artery disease (CAD) is rising in India, and it is urgently necessary to treat the associated risk factors. As one of the major risk factors for coronary artery disease (CAD), dyslipidemia, effective preventive strategies, including lifestyle modification, should be undertaken to meet prescribed lipid targets.¹⁵

Anemia is common disorder in India, although there are plenty of reasons attributable to anemia. There are studies reporting the beneficial effect of anemia on lipid profile. Type of anemia does not influence the lowering of lipid levels. Decreased serum cholesterol levels is not due to specific lowering of any particular lipoprotein family, instead it is observed that there occurs a proportionate decrease in all major lipoprotein families.¹⁶

This research was conducted to study the pattern of lipid profile in anaemic patients. In present study total of 280 patients fulfilling inclusion criteria are included in the study. The mean age of the patients was found to be 39.44±14.92yrs, among them 60% were female and 40% were male patient with female preponderance.

In present study on assessment of type of anemia, 42.1% had the dirmorphic anemia, 24.3% had the microcytic hypochromic anemia, 14.3% had Normocytic hypochromic anemia, 10.7% with Normocytic normochromic anemia. There was significant positive strength of association of hemoglobin with the lipid profile which included the total cholesterol, LDL, HDL, triglycerides and VLDL cholesterol(p<0.05).

In similar study by Seip et al., consisted of 17 children, 9 with hemolytic anemia, 3 with congenital hypoplastic anemia, 2 with congenital sideroblastic anemia, 2 with iron – deficiency anemia. All patients have low levels of cholesterol irrespective of hemolytic anemia with very active erythropoiesis or anemia with low erythropoietic activity. But there is no association between triglyceride and Hemoglobin levels. There is increase in cholesterol levels after treatment irrespective of type of anemia.¹⁷

However in study by Zaribaf F et al., found that there was no significant association between haemoglobin and hematocrit and concentrations of lipid profile components, glucose, and insulin before and after controlling for confounding variables.³

In a study by El-Hazmi et al., documented Cholesterol level is lower in patients with sickle cell anemia than in control but there is no significant change in triglyceride level. This hypocholesterolemia may be due to idiopathic decrease in endogenous production of cholesterol, utilization of cholesterol, decreased liver function, functional defects of liver or plasma volume expansion.¹⁸

Over all 43.6% patients were with mild anemia, 35.7% with moderate and 20.7% with severe anemia. On assessment of the severity of anemia with the lipid profile, there was significant lower mean level of cholesterol, LDL, HDL, TG and VLDL among the patients with severe anemia compared to the moderate and mild grade of anemia(p<0.05).

In a study by Bataju M et al., documented The mean triglyceride levels in the case and control groups were 92.96 mg/dl and 99.87 mg/dl, respectively. There was a statistically significant difference between these two groups (p=0.001). Furthermore, the case's serum

total cholesterol level (138.82 mg/dl) was substantially lower than the control's (146.67 mg/dl). The mean high-density lipoprotein level was nearly same in the anaemic and non-anaemic groups, $p=0.001$. While the iron-deficiency anaemia group's mean low-density lipoprotein was considerably lower than the control group ($p=0.001$). The lipid profile indices triglyceride, low-density lipoprotein, high-density lipoprotein, and total cholesterol were shown to be lower in cases than in controls in this investigation.¹⁹

Cholesterol level is lower in patients with sickle cell anemia than in control but there is no significant change in triglyceride level. This hypocholesterolemia may be due to idiopathic decrease in endogenous production of cholesterol, utilization of cholesterol, decreased liver function, functional defects of liver or plasma volume expansion.

In a study by Shirvani M et al., documented Anemia and IDA were shown to be prevalent 31% and 9%, respectively. The anaemia and IDA groups had lower mean blood triglyceride, cholesterol, and LDL concentrations than the control groups. The quantity of HDL in different groups was nearly same, while the difference was statistically significant when age and obesity were included ($P=0.001$). The study found that the elderly with anaemia and IDA had a lower lipid profile (triglyceride and cholesterol) than the general population. This conclusion was obtained in other research investigations as well, although further study is needed to identify probable explanations.⁵

Conclusion: The present study showed a significant strength of association between the hemoglobin level and the lipid profile parameters. With the severity of anemia with lower hemoglobin levels, the serum cholesterol, LDL, HDL, triglyceride levels were lower significantly. There was significant lower mean level of cholesterol, LDL, HDL, TG and VLDL among the patients with severe anemia compared to the moderate and mild grade of anemia. Thus study suggests that interpretation of lipid profile level should be done after correction of anemia only.

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