

## Study of Lipid Profile in Patients of Chronic Anaemia and Correlation of Different Types of Anaemia with Lipid Profile

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### Abstract

**Purpose:** This study was carried out to assess the lipid profile in anaemia as compared with that in age and sex matched controls and to correlate the extent of changes, if any, in the various lipid sub fractions with the severity of anaemia.

**Methods:** A total of 100 anaemic cases and 100 normal subjects was undertaken to study the clinical presentation of anaemic cases and also to investigate the relationship between anaemia and lipid profile. Fasting venous blood sample(> 8 hours) was obtained for estimation of lipid profile. The clinical and laboratory profile, course in hospital, and outcome were documented.

**Result:** Following the study the maximum cases had dimorphic anaemia followed by microcytic hypochromic anaemia and others. The most common presenting symptom was easy fatigability followed by dyspnoea, palpitations, giddiness and others. The mean serum total cholesterol levels, HDL levels, VLDL levels, TG levels and total cholesterol/HDL ratio were significantly lower ( $P < 0.01$ ) in cases of anaemia as compared to controls the correlation of anaemia with lipid profile was very large.

**Conclusion:** We concluded that patient with anaemia have a beneficial effect on lipid profile. The type of anaemia did not have a significant effect on the mean lipid levels. Anaemia is associated with significant hypocholesterolemia, with lowering in all lipid subfractions irrespective of the type and cause of anaemia. The extent of hypocholesterolemia is proportional to the severity of anaemia.

**Keywords:** High Density Lipoprotein, Low Density Lipoprotein, Very Low-Density Lipoprotein.

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### Introduction

Anaemia is a common disorder in India. although it may be due to various causes,

iron deficiency is most commonly responsible. Anaemia has been reported to

have a beneficial effect on the lipid profile. [1] The exact mechanism by which anaemia causes a fall in serum lipids is not known. The simplest explanation is a dilutional effect (the increased volume of serum in anaemia carrying the same total load of cholesterol). [2] Other possibilities are increased utilization of cholesterol by proliferating cells, decreased endogenous synthesis of cholesterol by the liver due to decreased lower oxygenation, elevated level of granulocyte-macrophage colony stimulating factor and enhanced receptor mediated removal of LDL in the bone marrow. Correction of anaemia is associated with a rise in serum lipids. [3]

Patients with anaemia may also have relative hypocholesterolemia, which is present regardless of the cause of anaemia, [7] and correction of anaemia leads to a rise in serum cholesterol levels. Patients with anaemia may have a lower risk of developing ischemic heart disease compared with subjects with normal haemoglobin levels. [6] This may be due not only to the lower cholesterol levels seen in patient with anaemia, but also due to iron induced free radical damage to the heart in patient with adequate iron reserves. [4,5]

### Material and methods

This was a cross-sectional study carried out in the department of medicine, Maharana Bhupal Government hospital attached to RNT medical college Udaipur (Rajasthan). A total of 100 anaemic cases and 100 normal subjects were undertaken

to study the clinical presentation of anaemic cases and also to investigate the relationship between anaemia and lipid profile.

A detailed history was obtained from the subjects of the study, with special emphasis on age, sex and occupation. Past history of disorders associated with dyslipidaemia or anaemia were obtained, including diabetes mellitus, hypertension, ischemic heart disease, cerebrovascular accident, AIDS, recent blood loss and gall stones. Dietary habits and habits like alcoholism and tobacco chewing and smoking were ascertained. History of intake of drugs affecting lipid profile were also obtained.

A detailed clinical examination (including general and systemic examination) findings were recorded for each patient. Complete investigations like complete hemogram, RBS, KFT, LFT, TSH and urine sample were carried in each patient. Fasting venous blood sample was obtained for estimation of lipid profile. Bone marrow aspiration and cytology were done in selected cases based on clinical assessment.

### Results

A total of 100 cases were included in the study. The cases and controls were matched for age. Majority of the cases were middle aged (30-60). The cases and controls were matched for sex. Following the study the maximum cases had dimorphic anaemia followed by microcytic hypochromic anaemia and others.

### Distribution of cases according to type and severity of Anaemia

Hb (in gm/dl)	Type of Anaemia					Total
	DM	MH	NH	NN	Others	
< 6	14	5	-	-	4	23
6-9	21	15	2	-	2	40
> 9	5	5	16	10	1	37
Total	40	25	18	10	7	100

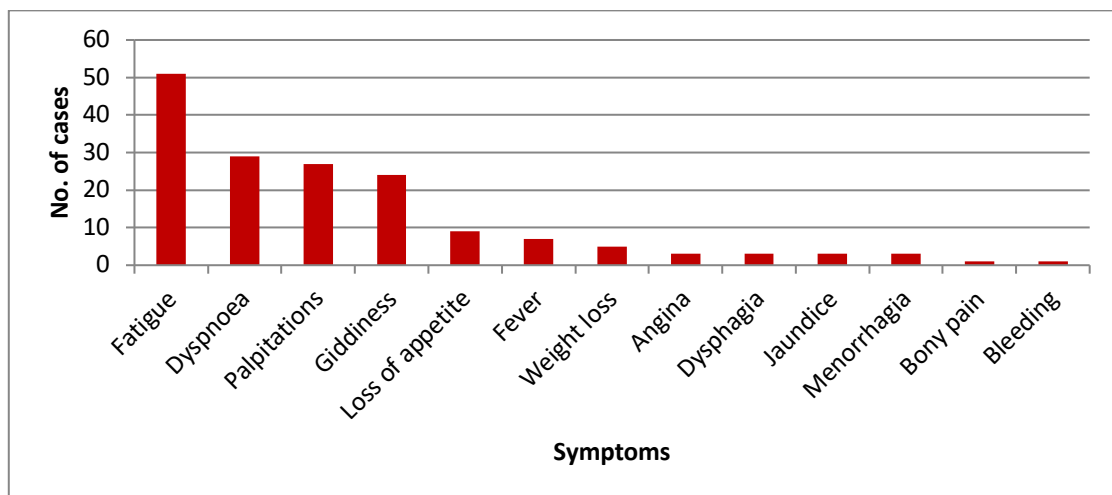
The most common presenting symptom was easy fatigability followed by dyspnoea, palpitations, giddiness and others. Not seen in the study group were pica, abdominal pain, melaena, haemoglobinuria and pregnancy.

Fever, bony pain and bleeding were the only symptoms which were found more frequently in cases with less severe anaemia and chronic myeloid leukemia. Symptoms like angina, dysphagia and menorrhagia were seen only in patients

with dimorphic anaemia and microcytic hypochromic anaemia.

The most common finding on general physical examination was pallor followed by glossitis, koilonychia, angular stomatitis and pedal edema.

Cardiovascular and respiratory findings such as elevated JVP, venous hum, cardiomegaly, flow murmurs and basal crepitations were found only in cases with haemoglobin less than 6 gm/dl. Hepatomegaly and splenomegaly were found in all groups of cases equally.



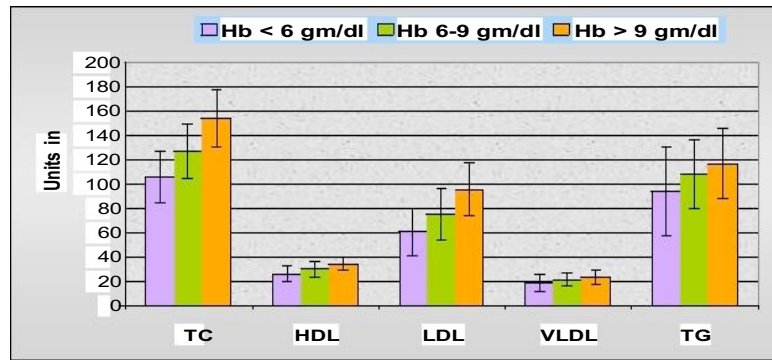
### Anaemia and lipid profile

The mean serum total cholesterol levels, HDL levels, VLDL levels, TG levels and total cholesterol/HDL ratio were significantly lower ( $P < 0.01$ ) in cases of anaemia as compared to controls the correlation of anaemia with lipid profile was very large.

The mean serum total cholesterol levels/HDL ratio was significantly lower ( $P < 0.05$ ) in cases with Hb less than 6 gm/dl as compared to cases with Hb more than 9 gm/dl.

The mean serum LDL/HDL ratio was significantly lower ( $P < 0.01$ ) in cases with Hb less than 6 gm/dl as compared to cases with Hb more than 9 gm/dl.

Severity of Anaemia and Lipid Profile



Severity of Anaemia and Lipid Profile

Lipid Profile (mean ± SD)	Hb < 6 gm/dl (n=23)	Hb 6-9 gm/dl (n=40)	Hb > 9 gm/dl (n=37)	P value (ANOVA)
TC	106.0± 21.3	127.5± 22.5	153.7 ±23.6	P<0.01 **
HDL	26.3± 6.2	30.4± 6.4	34.5 ±5.2	P<0.01 **
LDL	61.0± 19.3	75.6± 21.5	95.8± 22.0	P<0.01 **
VLDL	18.9± 7.4	21.6± 5.5	23.3 ±5.9	P<0.01 **
TG	94.4± 36.7	108.1± 27.9	116.5 ±28.8	P<0.01 **
TC/HDL	4.1± 0.7	4.4± 0.9	4.5± 0.7	P<0.05 *K
LDL/HDL	2.4± 0.7	2.6± 0.7	2.8± 0.7	P<0.01 **K

There was no significant difference (P>0.05) in the mean total cholesterol level, HDL, LDL, VLDL, TG and total cholesterol/HDL ratio in different types of anaemia with similar levels of haemoglobin.

**Discussion**

The study confirms that the mean serum total cholesterol, HDL, LDL, VLDL, TG levels are decreased in anaemia. The mean total cholesterol was found to be lower in anaemic cases when compared to controls. The decrease in mean serum cholesterol was not due to a specific lowering of any of the serum lipoprotein families; hypocholesterolemia was caused by a reduction in all the major lipoprotein families, including mean HDL, LDL, VLDL and triglycerides. There was a very large decrease in mean total cholesterol

and LDL levels, and a large decrease in mean HDL levels, resulting in a mild fall in mean TC/HDL and LDL/HDL ratios. There was a mild decrease in mean VLDL and TGs levels. The type of anaemia did not have a significant effect on the mean lipid levels. This suggests that it is anaemia per se, and not the type of anaemia that is responsible for the lowering of lipid levels in anaemia. Patients with more severe anaemia were found to have a low mean total cholesterol and all the lipid sub fractions. [8] This suggests that the severity of anaemia is associated with hypocholesterolemia. The mean pulse rate was higher in anaemic cases when compared to non anaemic controls. The mean pulse rate was higher in cases with more severe anaemia. The pulse rate has been described to be higher in case of anaemia, in standard textbooks

of medicine. [9] This is part of a compensatory mechanism to raise cardiac output and maintain tissue oxygenation.<sup>6</sup> The mean blood pressure was comparable in cases and controls. It was lower in cases with more severe anaemia. This is due to peripheral vasodilatation, another compensatory mechanism to raise cardiac output and maintain tissue oxygenation.

### Conclusion

We concluded that patient with anaemia have a beneficial effect on lipid profile. There was a larger reduction in mean total cholesterol, HDL, LDL, VLDL and triglyceride levels, along with TC/HDL and LDL/HDL ratios with increased severity of anaemia. The type of anaemia did not have a significant effect on the mean lipid levels. Anaemia is associated with significant hypocholesterolemia, with lowering in all lipid subfractions irrespective of the type and cause of anaemia. The extent of hypocholesterolemia is proportional to the severity of anaemia.

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