ORIGINAL RESEARCH PAPER

Pathology

CORRELATION BETWEEN LIPID PROFILE AND ANEMIA: A STUDY IN SOUTHERN RAJASTHAN

KEY WORDS: anemia, lipid profile, haemoglobin,cholesterol

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ABSTRACT

Objective- The present study was designed to study the relationship between social, demographic profile and clinical features of cases with anaemia and to find out the correlation between lipid profile and severity of anaemia. **Materials and methods-** This study was performed among the population of southern rajasthan in age >18 years. A total of 100 people were participated in the present study. Blood samples were collected for the estimation of anemia and lipid profile and were correlated. Results- Study shows maximum number of anaemia patients was 20-70yrs of age. Out of 100 cases 27 (27%) had severe anaemia (Hb<6gm/dl), 40 (40%) had moderate anaemia (Hb 6-9gm/dl) and 33 (33%) patient had mild anaemia (Hb>9gm/dl). Among them 48% were males and 52% were females. Most common type of anemia was dimorphic 40% followed by microcytic hypochromic anemia 27%. Mean serum cholesterol was 100mg/dl in cases with haemoglobin <6gm/dl, triglyceride was 88.4 in cases with haemoglobin <6gm/dl, mean LDL was 55.0gm/dl in cases with haemoglobin <6gm/dl, mean VLDL was 12.9mg/dl in cases with haemoglobin <6gm/dl, mean HDL was 20.3mg/dl in cases with haemoglobin <6gm/dl. **CONCLUSION-** The present study concludes that anaemia is associated with decreased lipid fractions and thus may retard atherosclerosis. However correction of anaemia will raise the lipid fraction and may enhance atherosclerosis and cardiovascular morbidity and mortality

INTRODUCTION

Anaemia is a common disorder worldwide and especially in underdeveloped and developing countries like India. Although anaemia may be due to various causes but iron deficiency is being the most common. Anaemia has been reported to have a favourable effect on lipid profile. The lowering of lipid levels is not related to the type of anaemia. The decrease in serum cholesterol is not due to a specific lowering of any of the serum lipoprotein families; hypocholesterolemia is caused by a proportional reduction in all the major lipoprotein families. This may have a beneficial effect on the risk of developing coronary artery disease, a disease to which we Indians are particularly susceptible.

The exact mechanism by which anaemia causes a fall in serum lipids is not known. The simplest explanation is a dilution effect (the increased volume of serum in anaemia carrying the same total load of cholesterol). Other possibilities are increased utilization of cholesterol by proliferating cells, decreased endogenous synthesis of cholesterol by the liver due to decreased liver oxygenation, elevated levels 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[1]

MATERIAL AND METHODS

The study was conducted on 100 consecutive anaemic patient of age > 18yrs in both sexes from Jan 2016 onwards at Geetanjali medical college Udaipur, Rajasthan. The data was collected from all the study subjects and analyzed. A detailed history was emphasis on age, sex, residence and occupation/ economic status; non specific symptoms of anaemia. Each patient was subjected to a detailed general physical examination, with special emphasis on pallor, koilonychias, icterus, pedal edema, lymphadenopathy, pulse, blood pressure, weight, height and body mass index was measured and thorough systemic examination was made. Venous blood was drawn for investigations like complete haemogram including CBF, blood urea, serum creatinine, liver function tests, and thyroid stimulating hormone levels. A urine sample was obtained for urine analysis, including albumin, sugar and microscopy. Fasting venous blood sample (> 8 hours) was obtained for estimation of lipid profile. T_3 and T_4 levels, blood sugar levels, and bone marrow aspiration cytology was done in selected cases based on clinical assessment. Complete haemogram was performed using the Sysmax automated analyzer. Haemoglobin levels were confirmed by the colorimetric method. Estimation of total cholesterol, HDL and triglycerides was done with the commercially available Autopak cholesterol kit on Technicon RA-XT system. VLDL was calculated using the formula, VLDL = Triglyceride/5. LDL cholesterol was calculated using the Friedewald's equation. LDL = Total cholesterol – [(Triglycerides/5) + HDL] mg/dl.

The classification of anemia was based upon criteria developed by the WHO Severity of anaemia was graded:

Mild -Hb>9gm% Moderate- Hb between 6-9gm Severe- Hb<6gm%

Kruskal Wallis test has been used to find significance of TC/HDL and LDL/HDL ratio when there are more than 2 groups. The statistical software used for the analysis of the data was SPSS 11.0 and Systat 8.0. Microsoft Word and Excel have been used to generate figures and tables.

RESULTS

Table 1 Age distribution with Haemoglobin levels

Age (years)	Haemoglobin(gm/dl)			
	< 6 (n= 27)	6 – 9 (n=40)	>9 (n=33)	Total (n=100)
18-20	4	3	1	8
21-30	5	10	4	19
31-40	7	8	7	22
41-50	3	6	4	13
51-60	4	2	12	18
61-70	3	10	3	16
>70	1	1	2	4
Total	27	40	33	100

Table no.1 shows maximum number of anaemia patients was 20-70yrs of age. 8 patients were between 18-20yrs of age, 19 patients were between age 21-30yrs , 22 patients were of age group 31-40, 13 patient were of 41-50, 19 patients were of 51-60 age, 16 patients were of 61-70 yrs of age and 4 patients were >70yrs of age .Out of 100 cases 27 cases had severe anaemia

(Hb<6gm/dl), 40 had moderate anaemia (Hb 6-9gm/dl) and 33 patient had mild anaemia (Hb>9gm/dl).

Table 2: Haemoglobin level and Sex distribution

	Haemoglobin levels(in gm/dl)			Total (n =100)
	<6 (n=27)	6 - 9 (n = 40)	>9 (n = 33)	
Male	14	19	15	48
Female	13	21	18	52

Table no.2 shows haemoglobin level in either sex. Out of 100 cases studied 48 were males and 52 were females. Among the male 14 had severe anaemia (Hb<6gm/dl), 19 had moderate anaemia (Hb6-9gm/dl) and 15 had mild anaemia (Hb>9gm/dl).Among the female cases, 13 had severe anaemia (Hb<6gm/dl), 21 had moderate anaemia (Hb6-9gm/dl), 18 had mild anaemia (Hb>9gm/dl).

Table 3: Distribution of cases according to type and severity of Anaemia

Hb Level	Type of cases						
	Dimorphic (DM)	Microcytic Hypochromic (MH)	Normocyctic hypochromic (NH)	Normocytic normochromic (NN)	Megaloblastic (MA)	Others	Total
<6	14	9	-	-	3	1	27
6-9	21	15	2	-	-	2	40
>9	5	2	16	10	-	0	33
Total	40	26	18	10	3	3	100

Table no. 3 shows different type of anaemia, according to severity of anaemia.27 cases had severe anaemia (Hb<6gm/dl), out of these 14 had Dimorphic anaemia, 9 had microcytic anaemia and 3 had macrocytic anaemia and 1 had chronic myeloid leukemia.40 cases had moderate anaemia (Hb 6-9gm/dl), out of these 21 had dimorphic, 15 had microcytic anaemia, 2 had normocytic anaemia and 2 had pancytopenia.33 cases had mild anaemia (Hb>9gm/dl), out of these 5 had dimorphic, 2 had microcytic, 16 had normocytic hypochromic anaemia, 10 had normocytic normochromic anaemia

Table 4: Severity of Anaemia and Lipid Profile

Lipid Profile (mean ± SD)	Hb< 6 gm/dl (n=27)		Hb 6-9 gm/dl (n=40)		Hb> 9 gm/dl (n=33)		P value (ANOVA)
TC	100.0	± 21.3	127.5	± 22.5	147.7	±23.6	P<0.01**
TG	88.4	± 36.7	108.1	± 27.9	110.5	±28.8	P<0.01**
LDL	55.0	± 19.3	75.6	± 21.5	89.8	± 22.0	P<0.01**
VLDL	12.9	± 7.4	15.6	± 5.5	17.3	±5.9	P<0.01**
HDL	20.3	± 36.7	24.4	± 6.4	28.5	±5.2	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
	* Significant at 5%. ** Significant at 1%. K - KruskalWallies Test						

Table no. 13 shows the mean serum cholesterol was 100mg/dl in cases with haemoglobin <6gm/dl, 127.5 in haemoglobin between 6-9 gm/dl and 147.7 gm/dl in haemoglobin >9gm/dl Triglyceride was 88.4 in cases with haemoglobin <6gm/dl, 108.1 in haemoglobin between 6-9 gm/dl and 110.5 gm/dl in haemoglobin >9gm/dl. Mean LDL was 55.0gm/dl in cases with haemoglobin <6gm/dl, 75.6gm/dl in haemoglobin between 6-9 gm/dl and 89.8 gm/dl in haemoglobin >9gm/dl. Mean VLDL was 12.9mg/dl in cases with haemoglobin <6gm/dl, 15.6mg/dl in haemoglobin between 6-9 gm/dl and 17.3 gm/dl in haemoglobin >9gm/dl. Mean HDL was 20.3mg/dl in cases with haemoglobin <6gm/dl, 24.4mg/dl in haemoglobin between 6-9 gm/dl and 28.5 gm/dl in haemoglobin >9gm/dl.

Table 5: Type of Anaemia and Lipid Fractions

Lipid Profile (Mean ± S.D.)	Hb (in gm/dl)	Type of Anaemia						P value (ANOVA)
		DM (n=40)	MH (n=26)	NH (n=18)	NN (n=10)	MA (n=3)	Others (n=3)	
TC (in mg/dl)	<6	109.4±19.3	107.0±23.6	-	-	108.5 ± 19.3	92.3 ±25.9	p>0.05
	6-9	126.8±20.9	131.6±26.2	112.0±18.3		-	119.4±02.1	p>0.05
	>9	159.4±22.5	144.6±31.2	150.8±23.6	164.6±13.0	-	106.0±0#	p>0.05
HDL (in mg/dl)	<6	22.6±6.6	24.6±3.6	-	-	23.1±5.3	23.8±7.4	p>0.05
	6-9	31.3±6.1	29.2±7.2	30.0±0	-	-	30.0±9.9	p>0.05
	>9	37.4±4.2	31.8±4.0	33.4±4.9	37.4±4.1	-	23.0±0#	p>0.05
LDL (in mg/dl)	<6	64.7±16.0	65.4±22.5	-	-	66.3±19.3	44.5±22.4	p>0.05
	6-9	75.3±17.7	79.4±27.2	57.0±14.1	-	-	18.5±12.0	p>0.05
	>9	19.2±18.7	42.6±32.3	92.0±23.0	105.4±12.4	-	60.0±0#	p>0.05
VLDL (in mg/dl)	<6	17.6±7.3	17.6±5.3	-	-	16.6±2.3	25.0±8.4	p>0.05
	6-9	20.2±5.5	23.1±5.8	25.0±4.2	-	-	21.0±0	p>0.05
	>9	23.0±5.0	20.2±4.4	25.4±6.7	21.8±5.2	-	23.0±0#	p>0.05
TG (in mg/dl)	<6	87.6±36.3	89.0±27.3	-	-	88.2±19.3	124.8±41.1	p>0.05
	6-9	101.5±27.8	115.7±29.3	125.0±21.2	-	-	103.5±0.7	p>0.05
	>9	114.2±26.4	101.4±23.4	126.6±32.4	109.5±25.7	-	114.0±0#	p>0.05
TC/HDL	<6	4.0±0.7	4.4±1.0	-	-	4.1±0.5	3.9±0.4	p>0.05k
	6-9	4.1±0.8	4.9±0.9	3.7±0.6	-	-	4.2±1.5	p>0.05k
	>9	4.3±0.7	4.6±1.1	4.6±0.8	4.4±0.5	-	4.6±0#	p>0.05k
LDL/HDL	<6	2.4±0.6	2.7±1.0	-	-	2.6±0.3	1.9±0.6	p>0.05k
	6-9	2.5±0.6	2.9±1.0	1.9±0.5	-	-	2.5±1.2	p>0.05k
	>9	2.7±0.6	2.9±1.0	2.8±0.7	2.9±0.5	-	2.0±0#	p>0.05k

Table 5 shows relationship between type of anaemia and lipid fractions. Since the severity of anaemia was found to have a significant effect on the lipid profile, analysis of the effect of type of anaemia on lipid profile was done by further subdividing the types of anaemia on the basis of severity and comparing the lipid profile in groups having varying types of anaemia with similar severity. There was no significant difference(P>0.05) found in all the lipid fractions, cholesterol, HDL, LDL, VLDL, TG, TC/HDL and LDL/HDL ratio in different type of anaemia with similar level of haemoglobin.

DISCUSSION

Anemia and dyslipidemia are a major public health problem throughout the world. The present study was undertaken in order to estimate the demographic characteristics, clinical presentation, physical findings and biochemical changes with special reference to lipid profile and its relation to severity and type of anaemia in the population of Southern rajasthan. Patients of either sex above the age of 18 yrs were taken for study out of which 52% were females and 48% were males. Anaemia was common from age of 21 to 70yrs, majority were between age 21-40yrs (41%) Dimorphic anaemia was the most common type of anaemia in our study (40%). Microcytic hypochromic anaemia was the second most common (26%), followed by normocytic hypochromic anaemia (18%), normocytic normochromic anaemia (10%) and megalobalstic anaemia (3%). 2 cases of pancytopenia, and one case of chronic myeloid leukemia mild anaemia were seen. In our study 27% had severe anaemia (Hb<6gm%), 40%had moderate anaemia(6-9gm%) and 33% had mild anaemia(>9gm%) in either sex.

In the present study 51 cases had fatigue as most common presenting symptom, followed by dyspnoea in 29 cases, and palpitation in 27 cases

In our study 46 cases were vegetarians. Vegetarians had more likely to have more severe anaemia (43.47%) and that to have dimorphic anaemia(50%). Probably due to low VIT B_{12} and less bioavailability of dietary iron of plant origin[6]. Pallor was the most common finding on general physical examination (67%) irrespective of severity of anaemia. Cases with more severe anaemia had more findings on general physical examination. Signs were not seen in cases with haemoglobin more than 9 gm/dl except pallor. Knuckle pigmentation and perioral pigmentation was seen in cases with megaloblastic anaemia and dimorphic anaemia.

All lipid fractions were lower in anaemic patients as compared to normal level and lower levels were seen as anaemia become more severe. Patients with more severe anaemia were found to have a larger fall in mean total cholesterol and all the lipid sub fractions. This suggests that the severity of anaemia is associated with hypocholesterolemia and all other lipid fractions. There is no significant difference in lipid fractions and different types of anaemia.

CONCLUSION

From the above study it can be concluded that anaemia is associated with decreased lipid fractions and thus may retard atherosclerosis. However correction of anaemia will raise the lipid fraction and may enhance atherosclerosis and cardiovascular morbidity and mortality. However long term and large scale studies on anaemia correction needed. Hence the study suggests that there is a need to arise educating the people on diet, physical activities and further surveillance as it is essential for verifying the impact of anemia and dyslipidemia.

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