

LIPID PROFILE IN LEUKEMIA AND HODGKIN'S DISEASE

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ABSTRACT

A number of epidemiologic studies has been published in recent years showing an increase risk of death from cancer in subjects with low plasma cholesterol levels. Although several authors proposed that hypocholesterolemia is predisposing factor for cancer development, no causative relation has been established so far and that it may be that low plasma cholesterol is secondary to malignant disease. Hence, the present study was undertaken to examine the lipid profile in children patients with leukemia and Hodgkin's disease in comparison with age matched controls. The study included 52 normal healthy controls and 105 patients with leukemia and Hodgkin's disease. Lipid profile included serum cholesterol, HDL & LDL cholesterol and triglycerides. Serum cholesterol, HDL & LDL cholesterol were found to be inversely associated with incidence of cancer, whereas triglycerides were significantly elevated in cancer patients. The inverse association between cancer and serum cholesterol may reflect a physiological response to early undiagnosed stages of cancer.

KEY WORDS

Blood lipids, Leukemia, Hodgkin's disease.

INTRODUCTION

Several studies have reported clear relationship between low cholesterol levels and cancer (1,2). Alterations of cholesterol metabolism, including increased cholesterol synthesis and accumulation of cholesterol esters in tumor tissues associated with a decrease of high density lipoprotein cholesterol in serum, were previously observed in different models of neoplastic cell proliferation including haematological malignancies (3-7), similar association has been described in other types of malignancies as well (8-10). The exact mechanism of hypocholesterolemia is unclear. However, low density lipoprotein receptor activity of leukemic cells was found to be inversely correlated with the plasma cholesterol concentration (11). Hypocholesterolemia as a possible prognostic factor in malignancies is also suggested in some studies (9,12).

The present study was undertaken to examine the lipid profile in children with leukemia and Hodgkin's disease in cancer in India and to detect correlation between hypocholesterolemia and the disease activity.

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MATERIALS AND METHODS

The material for the present study comprised of 52 healthy children with an age group of 1 to 17 years and 105 total children (55 with leukemia and 50 with Hodgkin's disease) also of the same age group. Lipid profile included estimations of serum cholesterol, triglycerides, high density lipoprotein (HDL) cholesterol and low density lipoprotein (LDL) cholesterol.

Cholesterol was estimated using kits from Boehringer Mannheim's based on CHOD-PAP method, triglyceride was assayed using kit from Human's which is based on enzymatic colorimetric method with lipid clearing factor. HDL cholesterol was determined by using Menagent HDL cholesterol reagent which allows the determination of HDL cholesterol fraction after precipitation of LDL and very low density lipoprotein fractions with phosphotungstic acid and magnesium chloride (3).

The estimation was carried out on a fully automated analyzer Hitachi 717. LDL cholesterol levels were estimated by calculation using Friedwald et al formula (13):
Cholesterol - ($\frac{\text{Triglycerides}}{5}$ + HDL)

The results were evaluated statistically using Students 't' test.

Table 1
Lipid profile in normal healthy children, total patients with leukemia and Hodgkin's disease and patients with leukemia and patients with Hodgkin's disease.

| | | Cholesterol mg% | Triglycerides mg% | HDL cholesterol mg% | LDL cholesterol mg% |
|--|-------------|--------------------|----------------------|------------------------|------------------------|
| Normal (n=52) | Range | 106-191 | 36-134 | 20-48 | 64-147 |
| | Mean ± S.D. | 153.86 ± 18.98 | 73.9 ± 22.47 | 35.76 ± 6.68 | 104.54 ± 18.79 |
| Total cases (n=105) | Range | 67-241 | 48-405 | 6-53 | 21-163 |
| | Mean ± S.D. | 136.0 ± 35.04 * | 155.89 ± 68.2* | 25.15 ± 9.88 * | 81.7 ± 32.78 * |
| Patients with leukemia (n=55) | Range | 79-197 | 68-405 | 7-41 | 24-146 |
| | Mean ± S.D. | 131.36 ± 31.28* | 167.12 ± 68.33* | 22.76 ± 7.89* | 77.35 ± 28.12* |
| Patients with Hodgkin's disease (n=50) | Range | 67-241 | 48-314 | 6-53 | 21-163 |
| | Mean ± S.D. | 139.4 ± 37.17 * | 143.9 ± 65.88 * | 27.78 ± 11.1* | 86.5 ± 36.64* |

*p<0.001

RESULTS AND DISCUSSION

Table 1 shows the levels of cholesterol, triglycerides, HDL cholesterol and LDL cholesterol in normal and total cases comprising of leukemia and Hodgkins disease and also in patients with leukemia and Hodgkins disease individually.

The serum cholesterol, HDL cholesterol and LDL cholesterol showed significantly decreased levels ($p<0.001$), whereas the serum triglycerides values were significantly elevated as compared to the normal ($p<0.001$) which is in agreement with the findings of Musolino et.al.(14) & Fiorenza (15).Zyada demonstrated the relation between hypocholesterolemia & the degree of maturation of leukemic blast cells in acute myeloid leukemia(16). However, Peterson demonstrated that hypocholesterolemia in cancer patients may be caused by elevated LDL receptor activities in malignant cells(17).

Malignancy seems to influence the levels of total cholesterol. The possibility of decrease in cholesterol levels includes decreased synthesis or increased catabolism. A likely mechanism for the reduced LDL cholesterol concentration in patients with leukemia would be the presence of derepressed neoplastic cells with increased utilization of cholesterol for membrane synthesis. The in-vitro findings in various studies of mononuclear cells from patients and animals with leukemia support such a mechanism (18). Studies have shown hypocholesterolemia to be related to tumor burden in patients

with hairy cell leukemia (19). However, understanding the nature and the relationship of serum cholesterol to cancer requires long term sequential measurements at several points in time to cancer diagnosis.

The results of the present study confirms that in paediatric neoplastic patients alterations of lipid metabolism are already detectable at the time of diagnosis. In particular, low cholesterol and low HDL cholesterol levels together with hypertriglyceridemia were the most prominent features being consistently present in all paediatric cancer patients with leukemia and also in Hodgkin's disease. The inverse association between cancer and serum cholesterol may reflect a physiological response to the early stages of cancer.

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