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Estimation of relationship between serum lipids level and colorectal carcinoma: a cross-sectional study in VIMSAR, Odisha

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ABSTRACT

Introduction: The fourth most prevalent cancer-related cause of death worldwide is colorectal cancer. Some authors have suggested that among other risk factors, the serum lipid profile is one of the etiological risk factors. Therefore, measurement of serum lipid in this illness can establish a relationship between a healthy diet and colorectal cancer.
Objective: To thoroughly research the connection between blood lipid levels and colon cancer outcomes in an effort to discover any tips for preventing this deadly condition.
Methods and Materials: Patients who were hospitalised to the General Surgery department at VIMSAR, Burla between December 2020 and October 2022 were divided into two groups for the research. 40 instances of patients with colorectal cancer were randomly chosen as the case group, and 40 cases of patients with other diseases—diseases other than colorectal cancer—were chosen as the controls group. The cases were all diagnosed with carcinoma of various regions of the colon and rectum at various stages and in various age groups. Both the case and control groups' blood concentrations of TC, HDL-C, VLDL-C, LDL-C, and TG were determined for comparison and analysis.
Results: Regardless of sex, location, or stage of the malignancy, the blood levels of TC, TG, and LDL-C were lower in the tumour group than they were in the control group. On site comparison, right sided cases were much less common than left sided carcinomas, and the drop in the level of serum TC was statistically significant. However, significant differences were detected in the serum levels of the aforementioned parameters in advanced cases, which only included Dukes' C1 and C2.
Conclusion: A negative relationship exists between serum TC, TG, and LDL-C levels and colorectal cancer. In order to design a more curative course of action for treating this dreadful illness, it may be used for follow-up treatment of colorectal carcinoma cases as well as a low level of these serum parameters preceding the disease or in early tumours. Our study only included a small number of people, thus more research and a cohort study based on the entire population are needed to fully understand this association.

1. Introduction

In the world, colorectal cancer is the second most frequent cancer in women and the third most common disease in men. 90% of instances of colorectal cancer occur in those over 50, making it a disease that mostly affects the elderly. It is currently thought that colorectal cancer develops from an adenoma in a stepwise process known as the adenoma-carcinoma sequence, wherein the adenoma's growing dysplasia is brought on by the accumulation of genetic mutations.

Some experts regard the serum lipid profile to be one of the many additional parameters indicated in the literature as etiologic risk factors for this colorectal cancer. While some

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studies have discovered a beneficial link with colorectal cancer, others have discovered a detrimental association. The essential elements of the cell membrane are lipids. It is still debatable whether dyslipidemia increases [1–6] or reduces [7–10] or has no impact [11] on mortality rates, despite the fact that it has been linked to an increased risk factor for colorectal cancer. [12,13] There are several studies in the literature, in particular, on the link between aberrant lipid levels and colorectal cancer. [14–17]

The current study may provide light on the connection between the illness and serum lipid levels in light of the aforementioned facts on the causes of colorectal cancer, which may assist to lower the occurrence by suitable dietary and other measures in the future.

2. Materials and Methods

The current work, which represents the thesis "Estimation of relationship between serum lipids level and colorectal carcinoma: a cross-sectional study", was completed between December 2020 and November 2020 in the General Surgery Department at VIMSAR, Burla. Before beginning the study, permission from the institutional ethical committee was acquired (VIMSAR IECo No- 119-2022/IST/107.Dt. 17.05.2022).

2.1. Selection of cases

Patients who had been hospitalised to the departments of general surgery and radiotherapy with cancer of the colon and rectum were used as the cases. We chose 40 instances of carcinoma from various locations in the colon and rectum, at various stages, and in various age groups. The trial was open to both male and female patients after the diagnosis was certain. As controls, 40 patients from the Department of General Surgery who did not have colorectal cancer but other conditions were chosen.

2.2. Inclusion criteria

1. The clinical procedures and numerous exams used to diagnose colon and rectal cancer in individuals of both sexes and across a range of age groups.
2. Those undergoing preoperative care who have not previously undergone chemotherapy or radiation treatment

2.3. Exclusion criteria

1. Patients who also have additional independent risk factors for high blood lipids, such as diabetes, hypertension, and obesity.
2. This investigation did not include cases whose histology revealed no evidence of cancer but whose lipid profile had already been determined.

2.4. Case selection method

Colonoscopy, preoperative proctoscopy, colonoscopy, ultrasonography, and FNAC are some of the investigative modalities used to make the diagnosis of colon cancer. The next morning, colon cancer patients who had been diagnosed had their fasting blood drawn and submitted to the VSS Institute of Medical Science and Research, Burla, for lipid profile testing.

The subsequent serum variables were calculated:

1. Total cholesterol (TC in serum
2. HDL-C, or high density lipoprotein cholesterol
3. VLDL-C (VLDL-cholesterol
4. Cholesterol
5. TG, or triglycerides

The semi-automated Logotech-168 analyzer was used at the Department of Biochemistry to measure serum cholesterol utilising enzymatic techniques. At the VSS Institute of Medical Science and Research, Burla, the Department of Biochemistry collected a blood sample from a person who had fasted overnight before measuring the lipid profile.

2.5. Statistical analysis

Microsoft Excel was used for data recording, categorization, and computation. SPSS was used to evaluate all the data. The results were examined using a chart, a bar diagram, the mean, and the standard deviation. P-values under 0.05 were regarded as significant.

3. Aims and Objectives

Should carefully examine the connection between the level of blood lipids and the result of colorectal cancer in order to discover any early warning signs of this deadly condition.

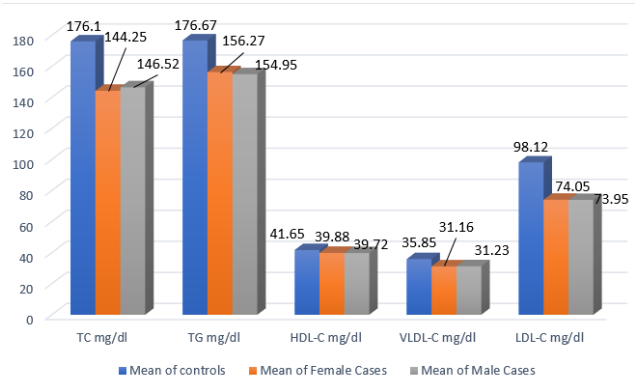

Figure 1: Comparison of lipid profile value of cases in both sex separately with those of the controls

Serum values for TC, TG, HDL, VLDL, and LDL are displayed separately for both sexes in the table above. In this

Table 1: In both sexes of the cases, all observations were documented using the control group as the reference point.

Serum Parameters	T-C (mg/dl)	TG (mg/dl)	HDL-C (mg/dl)	VLDL-C (mg/dl)	LDL-C (mg/dl)
Normal values	<200	<170	>30	<40	<150
Mean ±SD& 2SD Controls	176.10±20.69 41.650	176.67±27.19 54.736	41.65±8.04 16.190	35.85±5.75 11.581	98.12±21.51 43.281
Mean of Female Cases	144.25	156.27	39.88	31.16	74.05
Mean of Male cases	146.52	154.95	39.72	31.23	73.95

case, the serum levels of TC, TG, and LDL-C were lower in both sexes than in the controls with an SD, but because they were between two standard deviations of the control values and the P value was not significant, they were not significant in either sex. Additionally, there wasn't much of a difference in these values between the sexes.

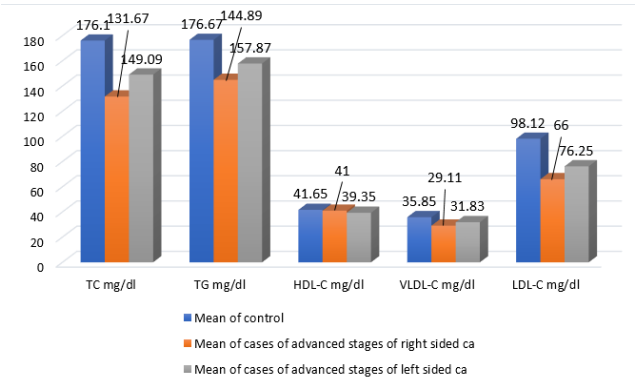

Figure 2: Lipid profile comparison of right and sided colorectal carcinoma in both sexes compared separately with those of the controls.

The caecum, ascending colon, hepatic flexure, transverse colon, descending colon, and rectum on the right side (Dukes' C1 and C2) and the transverse colon, descending colon, sigmoid colon, and rectum on the left side (in both sexes) of patients with advanced stage illnesses were shown on this graph. Lower TC, TG, and LDL-C levels were seen in both cases with left- and right-sided advanced illness, with the right-sided patients exhibiting a more noticeable difference. Right-sided cancer had TC, TG, VLDL-C, and LDL-C levels that were one standard deviation lower than those of controls; However, only in the TC did the mean level of right-sided carcinoma differ by two standard deviations from the level of controls, and this difference was significant (P 0.05). This was not the case with left-sided carcinoma patients.

The mean blood values of TC, TG, HDL, VLDL, and LDL were presented here. The Dukes' colorectal cancer A and B stages in both sexes were evaluated. P > 0.05 was used to indicate that the change was not statistically significant even though the blood levels of TC, TG, HDL, VLDL, and LDL all reduced in this case and only the value of TC was one standard deviation greater than that of controls.

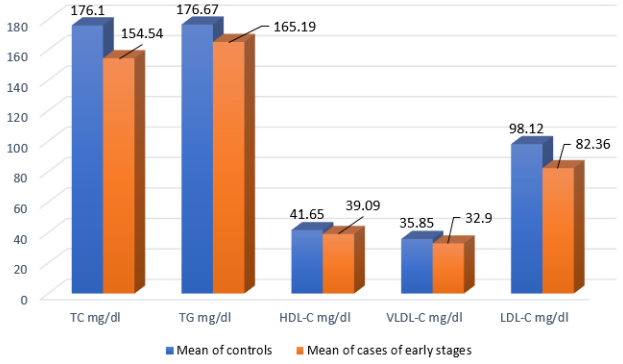

Figure 3: Comparison of the lipid profile values between early-stage illness patients (Dukes A&B) in both sexes and controls

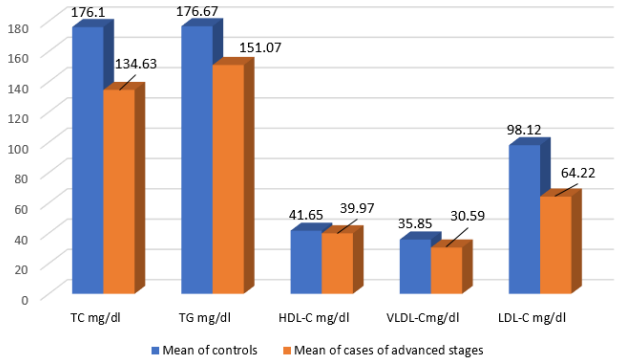

Figure 4: Lipid profile comparison of cases of both sex of colorectal ca with advanced stages (Dukes C) with those of controls

It has been demonstrated that mean blood concentrations of TC, TG, and LDL-C are linked with advanced stages of colorectal cancer. Even though the p value was larger than 0.05 and the patients' blood levels of TC and LDL-C were approximately two standard deviations lower than the mean values of the controls, HDL and VLDL-C did not change in a way that was statistically significant.

The mean serum TC, TG, and LDL-C levels of the cases were lower than those of the controls beyond one standard deviation of the controls but within two standard deviations of the controls when taken as a whole and with a P value > 0.05, but this was not statistically significant. No discernible

Table 2: Comparison of the lipid profiles of right and left sided colorectal cancer in each sex with those of the controls.

Serum Parameters	T-C (mg/dl)	TG (mg/dl)	HDL-C (mg/dl)	VLDL-C (mg/dl)	LDL-C (mg/dl)
Normal Values	<200	<170	>30	<40	<150
Mean ±SD &2SD	176.10±20.69	176.67±27.19	41.65±8.04	35.85±5.75	98.12±21.51 43.281
Controls	41.650	54.736	16.190	11.581	
Mean of cases of Advanced stages of Right sided Ca	131.67	144.89	41	29.11	66
Mean of cases of Advanced stage cases Of Left sided Ca	149.09	157.87	39.35	31.83	76.25

Table 3: Comparison of the lipid profile values between early stage illness patients (Dukes, A and B), including both sexes, and the controls.

Serum Parameters	T-C (mg/dl)	TG (mg/dl)	HDL-C (mg/dl)	VLDL-C (mg/dl)	LDL-C (mg/dl)
Normal Values	<200	<170	>30	<40	<150
Mean ±SD & 2SD	176.10±20.69	176.67±27.19	41.65±8.04	35.85±5.75	98.12±21.51 43.281
Controls	41.650	54.736	16.190	11.581	
Mean of Cases of early Stages	154.54	165.19	39.09	32.90	82.36

Table 4: Comparing the lipid profiles of colorectal cancer patients in both sexes with advanced stages (Dukes C1 and C2) to those of the controls as a whole.

Serum Parameters	T-C (mg/dl)	TG (mg/dl)	HDL-C (mg/dl)	VLDL-C (mg/dl)	LDL-C (mg/dl)
Normal Values	<200	<170	>30	<40	<150
Mean ±SD& 2SD	176.10±20.69	176.67±27.19	41.65±8.04	35.85±5.75	98.12±21.51 43.281
Controls	41.650	54.736	16.190	11.581	
Mean of cases of advanced	134.63	151.07	39.97	30.59	64.22

Table 5: Comparison of the lipid profiles of controls and patients of colorectal cancer in all stages in both sexes.

Serum Parameters	T-C (mg/dl)	TG (mg/dl)	HDL-C (mg/dl)	VLDL-C (mg/dl)	LDL-C (mg/dl)
Normal values	<200	<170	>30	<40	<150
Mean ±SD& 2SD	176.10±20.69	176.67±27.19	41.65±8.04	35.85±5.75	98.12±21.51 43.281
Controls	41.650	54.736	16.190	11.581	
Mean ± 2SD of cases	146.52± 45.38	154.95± 50.36	39.72± 11.68	31.22± 9.07	73.95± 41.32

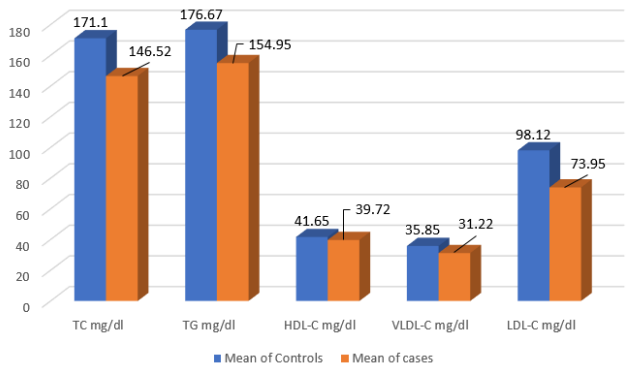

Figure 5: Comparison of the lipid profiles of controls and all stages of colorectal cancer in both sexes

changes were seen when the HDL and LDL cholesterol levels of the patients and controls were compared.

4. Discussion

The blood markers TC, TG, HDL-C, VLDL-C, and LDL-C were all compared in all 40 cases of colorectal cancer in both men and women. A comparable group of 40 additional patients that did not have colorectal cancer were chosen as controls. In contrast to 146.52 in instances of colorectal cancer, the average total blood cholesterol level was found to be 176.10 in the control group. This is consistent with Seth R et al's findings from 1981, which found that colorectal cancer cases had lower serum cholesterol levels and cases with advanced tumours had significantly lower cholesterol levels than those in the control group. Our colorectal cancer

group also had lower total serum cholesterol levels, which is also consistent with those findings.[18]

Serum levels were lower in the tumour group than in the control group, just as TG and LDL-C levels were. In this study, the mean TG and LDL-C levels were 176.67 and 98.12 for controls, and 154.95 and 73.95, respectively, for the tumour group. This outcome is consistent with those of Abraham M. Y. et al. (1991), who found that there was an inverse association between blood cholesterol levels and the risk of colon cancer when all the subsites of the various parts of the colon were taken into consideration.[19] The current finding may also be consistent with MC Michel AJ and Potter JD's (1981) discovery that low cholesterol levels in people are linked to higher faecal bile acid concentrations, specifically the deoxycholic acid type of bile acids, which can result in colon cancer in test animals.[20]

Lower levels of TC and LDL-C were discovered in the present investigation's Dukes C1 and C2 patients of late-stage colorectal cancer. The blood concentrations of TC and LDL-C in the control groups were 176.10 and 98.12, respectively, as opposed to findings of 134.63 and 64.22 in the tumour groups. This finding is in line with Seth R. et al.'s (1981) conclusion. Seth R. et al. did not estimate LDL-C levels for their investigation, nevertheless.[18]

While TG and VLDL-C levels decreased, albeit not significantly, during the course of the study, the mean HDL-C level remained steady. Data from a WHO research by the Committee of Principal Investigators (1978) showed a substantial increase in the risk of gastrointestinal malignancies while using clofibrate to decrease blood cholesterol levels. Ederer F. et al. (1980) demonstrated that lowering blood cholesterol levels with a diet high in polyunsaturated fatty acids did not result in a rise in the incidence of malignancies or a higher death rate from colon cancer.[21]

In the current examination, which was conducted at this institution with cancer cases involving the right and left colon and rectum, and it was compared with the selected control group, a novel discovery was noted. The mean values of total cholesterol, triglycerides, and LDL-C in right-sided tumours (caecum, ascending colon, and hepatic flexure) were 131.67, 144.89, and 66, respectively. Comparing these numbers to those in the control group, they were noticeably lower. Naturally, these traits were also weakened in colon and rectal tumours on the left, but not statistically significantly. The characteristics of the three groups—right-sided malignancies, left-sided malignancies, and the control group—mentioned above were, as a result, completely different. However, a standard deviation was used to compare the mean TC values between the control group and the right-sided instance. This discovery is[10] According to Abraham M. Y. et al.'s (1991) research, as colorectal cancer incidence switched from the sigmoid colon to the caecum, there was a significant negative relationship between blood cholesterol levels and risk. They proposed that this inverse correlation was caused in part by the metabolic impact of undetected colon cancer.[19] The connection was stronger for caecum and ascending colon cancer than for rectal cancer, but the reason for this was unclear.

The levels of several blood parameters in the early stages of malignancy (Dukes A and B) in the current series did not significantly differ from the equivalent control group. This conclusion is consistent with those of Seth R. et al (1981). The inverse correlation between these serum parameters in the early tumour group and those in the control group in the Seth R. et al. series was not statistically significant.[18]

Gender had no impact on the change in blood parameters we assessed in the cancer and control groups. Abraham M. et al. discovered a negative association between male colorectal cancer and blood levels of TC, TG, and LDL-C, which is shown in Table 1, despite the fact that they did not include female patients in their investigation. This finding supports his theory that low serum cholesterol may be a preclinical manifestation of colorectal carcinoma.

5. Conclusion

The tumour group's blood levels of TC, TG, and LDL-C decreased in comparison to the control group, regardless of sex, site of the infestation, or stage of the malignancy. However, significant variations in blood levels of the aforementioned parameters were only seen in severe cases with Dukes C1 and C2.

Right-sided carcinomas had significantly lower mean levels of TC, TG, and LDL-C than left-sided carcinomas, and the difference in TC serum levels was statistically significant when the serum parameters of cases with right-sided and left-sided carcinomas were compared to those of the control group. Even while left-sided malignancies also showed this inverse link, the association was not as high as it was in right-sided tumours.

Additionally, no discernible variation in these serum values was discovered when the cases of the two sexes were examined independently. We come to the conclusion that there is an inverse relationship between blood levels of TC, TG, and LDL-C and colorectal cancer. In order to screen cases and create a more curative course of treatment for this dreadful illness, serum parameters with low values in the precancerous or early stages of tumours might be employed. Our study only has a limited sample size, thus more research and a population-based cohort study are required to fully understand this link.

Nearly all studies have found a link between elevated total cholesterol levels and advanced colon cancer that only affects the right side of the colon.

6. Source of Funding

No grants from funding organisations in the public, private, or nonprofit sectors were given to this work.

7. Conflict of Interest

There are no conflicts of interest to declare by any of the authors of this study.

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