

Original Research Article

**The Association Between Serum Lipids Level And Colorectal Neoplasm:
a Cross-Sectional Study in a Tertiary Health Care**

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ABSTRACT

INTRODUCTION-

Colorectal Carcinoma is the fourth most common cause of cancer death all around the world. In different literature, some consider serum lipid profile is one of the etiological risk factor among other risk factor. So estimation of serum lipid in this disease can link the association of healthy diet and colorectal Carcinoma.

OBJECTIVE-

To study in detail the relationship between serum lipids level and the outcome in colorectal carcinoma and thereby to find any clue to prevent this malignant disease.

METHODS AND MATERIALS-

The study was done in patients who are admitted in the department of GeneralSurgery VIMSAR, Burla from December 2020 to October 2022 in two groups. 40 cases of diagnosed with carcinoma of different parts of the colon and rectum on different stages and of different age groups were selected randomly as case group and 40 cases of patient suffering from other diseases but not colorectal carcinoma were taken as controls group. The serum TC,HDL-C,VLDL-C,LDL-C,TG were estimated from both case and control group for compared and analysed.

RESULTS-

A decrease in serum levels of TC, TG and LDL-C was seen in tumour group as against the levels in the control group irrespective of sex, location and stage of the malignancy. But, significant difference was seen in the serum levels of above parameters in advanced cases only comprising Dukes' C1 and C2, and on site comparison right sided cases were significantly lower than the left sided carcinomas and the decrease in the level of serum TC was statistically significant.

CONCLUSION-

There is an inverse correlation between colorectal carcinoma and serum TC, TG and LDL- C levels. It may be utilized for follow-up of treating colorectal carcinoma cases and also a low level of these serum parameters preceding the disease or in early tumours, may be exploited on screening the cases, so that a more curative approach in treating this dreaded disease may be planned. As our study consists of a Small number of participants, it needs further through investigations and a population based cohort study for further clarification of this relationship.

KEY WORDS - Serum total cholesterol (TC), High density lipoprotein cholesterol (HDL-C), VLDL cholesterol (VLDL-C), LDL cholesterol (LDL-C), Tri-glycerides (TG)

Introduction

Colorectal cancer is the third most common cancer in men and the second most common in women worldwide. Colorectal cancer is a disease of the elderly, with 90% cases occurring beyond the age of 50. It is now believed that Colorectal carcinoma arises from an adenoma in a stepwise process in which increasing dysplasia in the adenoma is due to an accumulation of genetic abnormalities (the adenoma-carcinoma sequence).

Among various other factors mentioned in the literature as etiologic risk factors for this Colorectal Carcinoma, some consider serum lipid profile as one of the etiologic risk factors among them. Some studies have found a positive association with colorectal carcinoma, while others have found a negative association. Lipid is the key components of the cell membrane. Dyslipidemia has been associated with an increase risk factor for Colorectal Carcinoma [1,2] whether increases [3,4,5,6,12,13] or decreases [7,8,9,10] or has no effect [11] on mortality rate is still controversial . In particular, there are a number of reports in the literature on the association between abnormal lipid levels and colorectal carcinoma [14,15,16,17].

Considering the above facts regarding the causation of colorectal carcinoma, the present study may shed light on the relationship between the disease and serum lipid levels, so that it may help to reduce the incidence by appropriate dietary and other measures in the future.

Materials and Methods

The present work embodies the thesis "Estimation of relationship between serum lipids level and colorectal carcinoma: a cross-sectional study", was performed in the Department of General Surgery, VIMSAR, Burla, from December 2020 to November 2020. Institutional Ethical Committee approval (VIMSAR IECo No- 119-2022/IST/107.Dt. 17.05.2022) was obtained before conducting the study.

Selection of cases

Cases were selected among patients admitted with carcinoma of the colon and rectum in the Department of General Surgery and Department of Radiotherapy. Forty cases of carcinoma of different parts of the colon and rectum at different stages and different age groups were selected. Both male and female patients were included in the study after the diagnosis was confirmed. Forty patients from the Department of General Surgery who had other diseases but not colorectal carcinoma were selected as controls.

Inclusion criteria

1. patients of both sexes from different age groups diagnosed with colon and rectal cancer by clinical methods and various examinations.
2. patients in the preoperative stage who have not received prior chemotherapy or radiation therapy

Exclusion criteria

1. Patients with other independent risk factors for serum lipid levels such as diabetes mellitus, hypertension, and obesity.
2. Cases whose histology was negative for malignancy but whose lipid profile was obtained earlier were excluded from this study.

Case selection method

Diagnosis of colon carcinoma is made by a series of clinical examinations as well as a number of investigative modalities, including preoperative proctoscopy, colonoscopy, ultrasonography, and FNAC.

After diagnosis of colorectal carcinoma, patients had fasting blood drawn overnight and sent for lipid profile testing to the Department of Biochemistry of the VSS Institute of Medical Science and Research, Burla.

The following serum parameters were estimated:

1. Serum total cholesterol (TC)
2. High density lipoprotein cholesterol (HDL-C)
3. VLDL cholesterol (VLDL-C)
4. LDL cholesterol (LDL-C)
5. Tri-glycerides (TG)

Serum cholesterol was determined by enzymatic methods in the Department of Biochemistry using the Logotech-168 semi-automated analyzer. The blood sample was collected overnight in a fasting state and sent to the Department of Biochemistry of the VSS Institute of Medical Science and Research, Burla, and the lipid profile was determined.

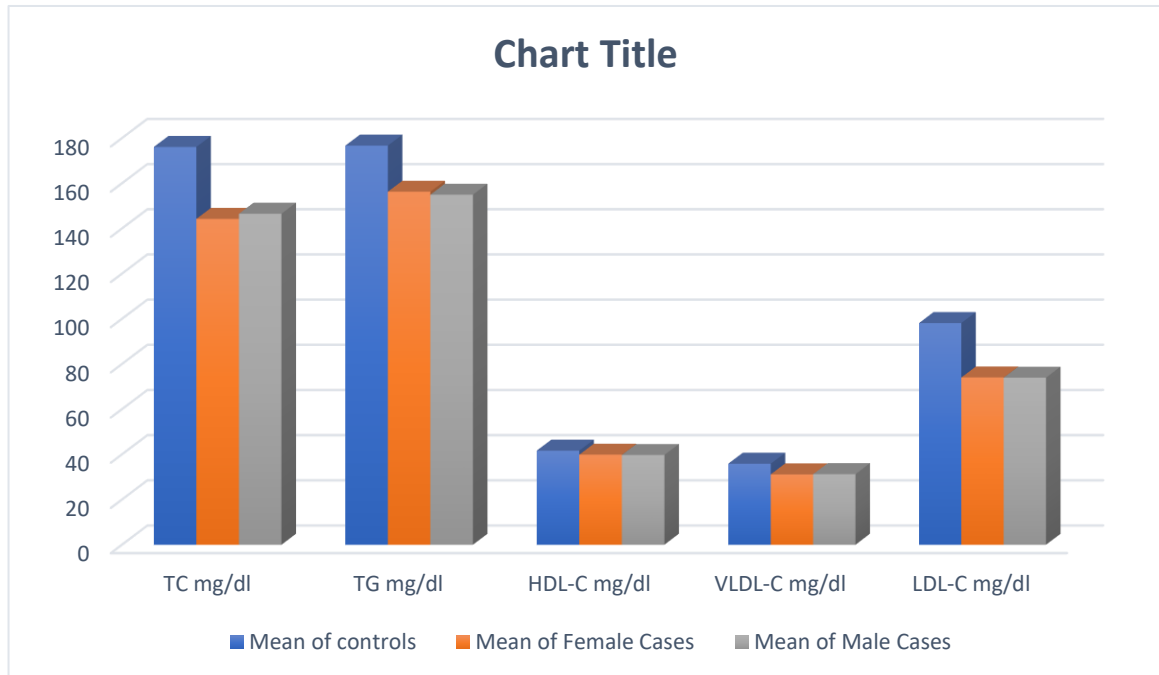
Statistical analysis

Recording, categorisation, and computing was done with the help of Microsoft Excel. All the data was analysed with SPSS. The outcome was analysed in terms of chart, bar diagram, mean, standard deviation. P-value < 0.05 was considered significant.

Aims and Objectives

To study in detail the relationship between serum lipids level and the outcome in colorectal carcinoma and thereby any clue to prevent this malignant disease.

Observation



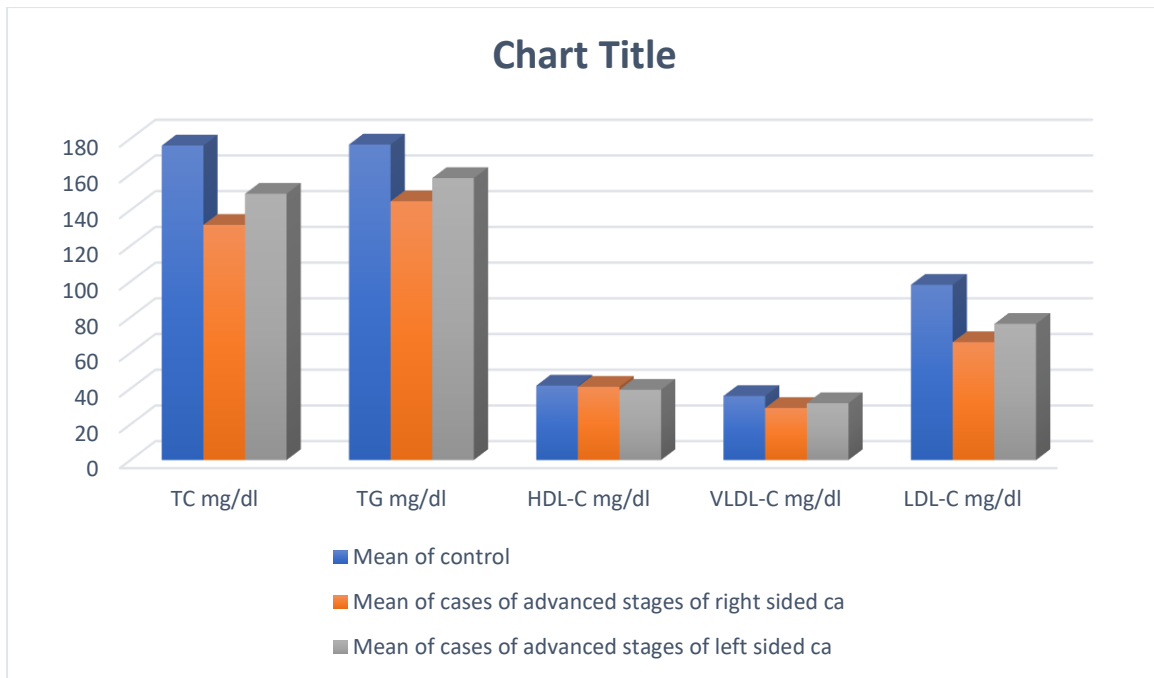
Comparison of lipid profile value of cases in both sex separately with those of the controls

TABLE-1

All the observations were recorded in both sexes of cases taking control group as standard for comparison

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

In the above table, serum levels TC, TG, HDL-C, VLDL-C, and LDL-C are shown separately for both sexes. Here, the serum levels TC, TG, and LDL-C were lower in both sexes than in the controls with a SD, but they were not significant in either sex because they were between two standard deviations of the control values and the P value was not significant. There was also almost no difference in these values between the two sexes.



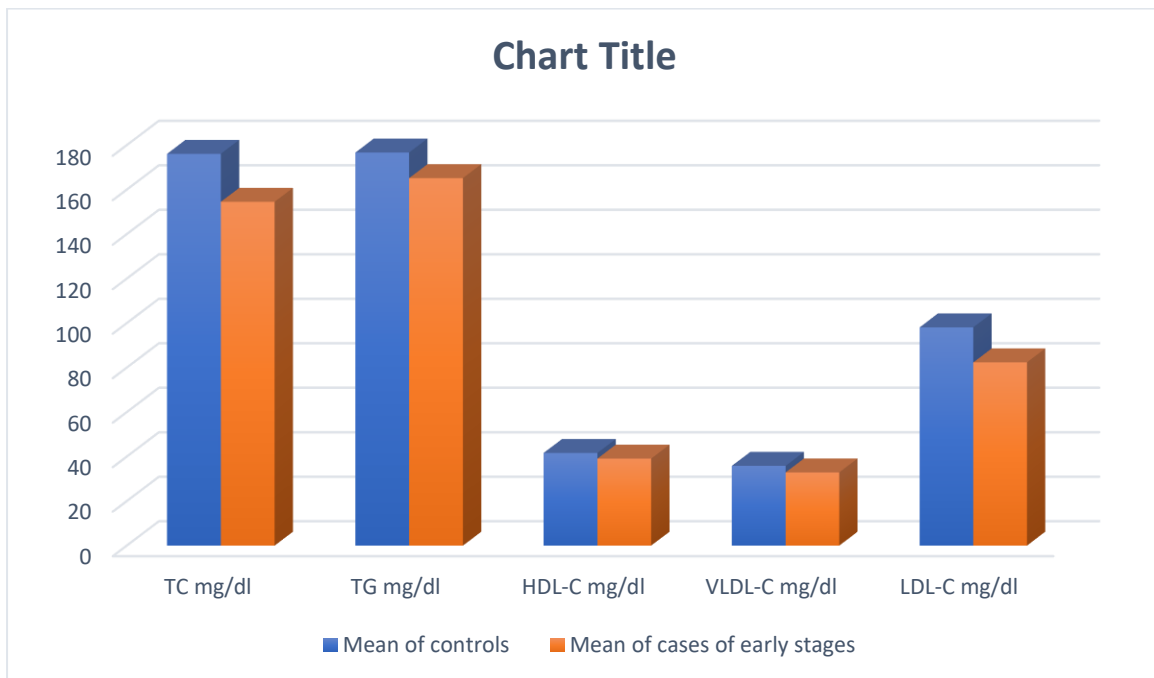
Lipid profile comparison of right and left sided colorectal carcinoma in Both sexes compared separately with those of the controls.

TABLE-2

Lipid profile comparison of right and left sided colorectal carcinoma in both sexes compared separately 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 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 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

This showed the mean values of serum TC, TG, HDL-C, VLDL C and LDL-C of advanced stage diseases (Dukes' C1 and C2) of the right side (caecum, ascending colon and hepatic flexure) and left side (transverse colon, descending colon, sigmoid colon and rectum) of both sexes. The levels of TC, TG, and LDL-C were decreased in both left-sided and right-sided advanced disease, with a more marked difference in right-sided cases. It was the TC, TG, VLDL-C, LDL-C level of right-sided carcinoma was lower than the level of controls with one standard deviation, but it was only the TC, where the mean level of right-sided carcinoma was lower than the level of controls with two standard deviations, and the P value of less than 0.05, and was significant, but this was not cases in left-sided carcinoma.

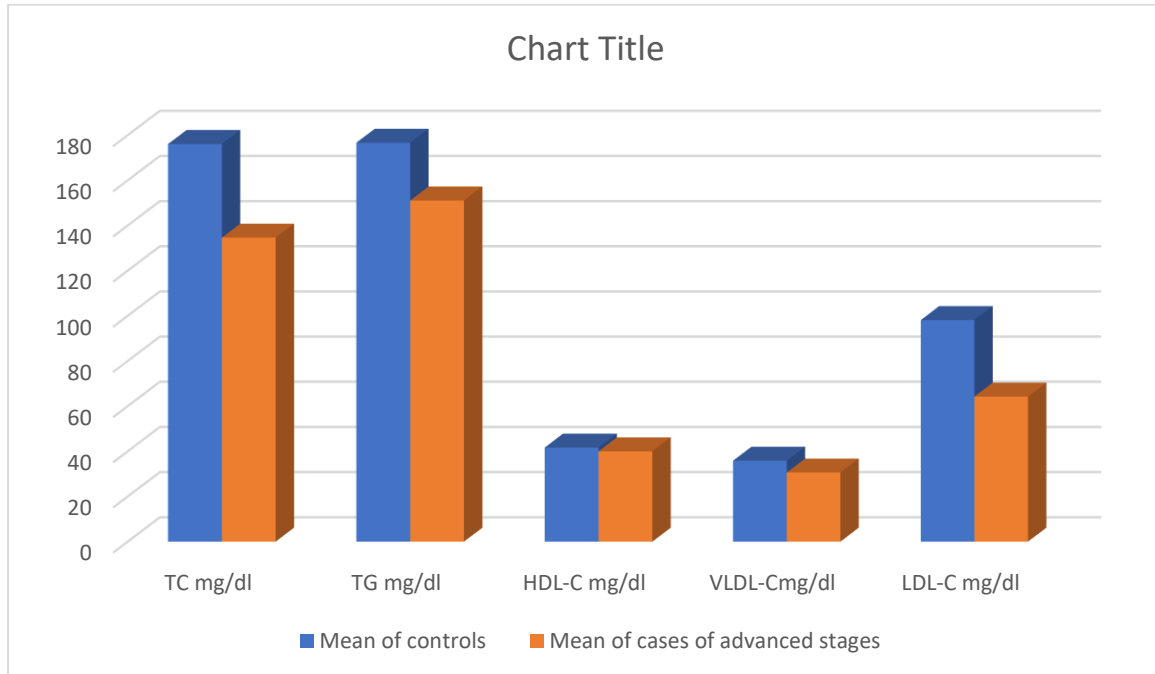


Comparison of lipid profile values of cases of early stage of diseases (Dukes A&B) of both sex taken together with those of controls

TABLE-3
Comparison of lipid profile values of cases of early stage diseases (Dukes, A and B), of both sexes, taken together 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 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 Cases of early Stages	154.54	165.19	39.09	32.90	82.36

Here, the mean serum levels TC, TG, HDL-C, VLDL-C, and LDL-C of Dukes' A and B stages of colorectal carcinoma of both sexes were presented together. Here, although there was a decrease in serum levels TC, TG, HDL-C, VLDL-C, and LDL-C, and only the value TC was one standard deviation higher than that of controls, it was not statistically significant and $P > 0.05$.



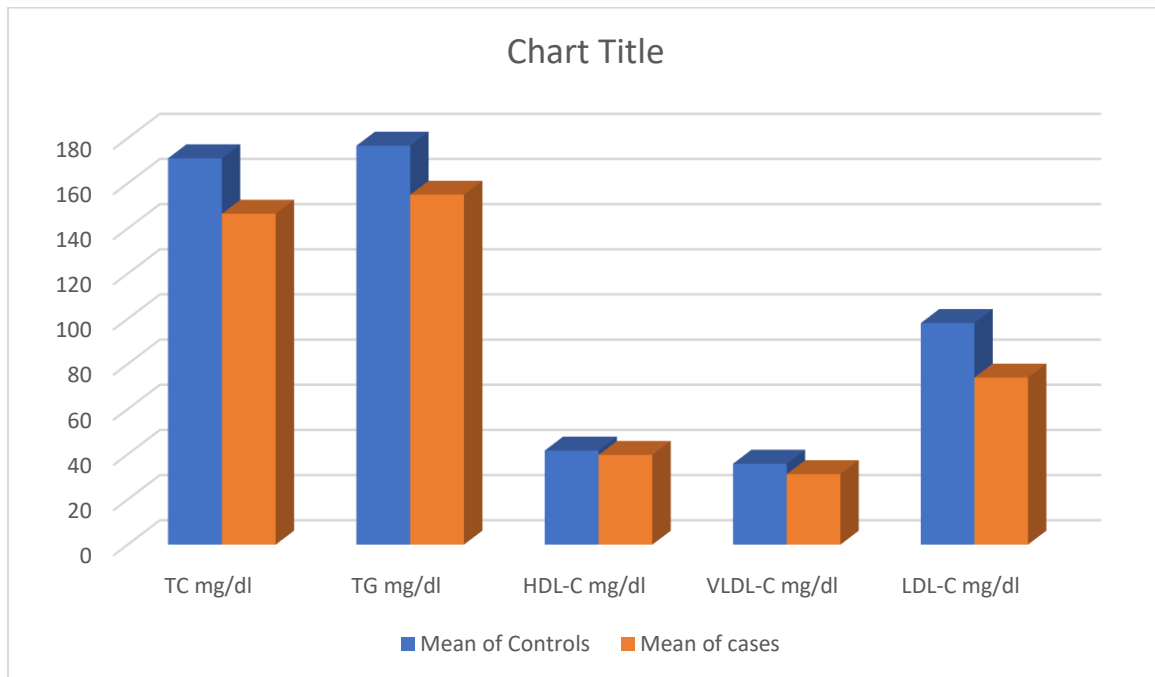
Lipid profile comparison of cases of both sex of colorectal ca with advanced stages (Dukes C) with those of controls

TABLE-4

Lipid profile comparison of cases in both sexes of colorectal Carcinoma, with advanced stages (Dukes C1 and C2), with thoseOf 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 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 cases Of advanced	134.63	151.07	39.97	30.59	64.22

Mean serum levels of TC, TG, and LDL-C have been shown to be consistent with advanced stages of colorectal cancer. The serum levels of TC and LDL-C in the cases were almost two standard deviations lower than the mean levels of the controls and the p value > 0.05 , but the difference in other serum levels such as HDL and VLDL-C was also not so significant.



Lipid profile comparison of all stages of colorectal ca of both sex together with those of the controls

**TABLE-5
Lipid profile comparison of all stages of cases of colorectal Carcinoma, of both sexes together, with those of 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 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 ± 2SD Of cases	146.52± 45.38	154.95± 50.36	39.72± 11.68	31.22± 9.07	73.95± 41.32

It was found that the mean values of serum TC, TG, and LDL-C of the cases were lower than those of the controls beyond one standard deviation of the controls when considered as a whole and the P value > 0.05 but within two standard deviations of the controls, and this was not so significant. The levels of HDL-C and LDL-C of the cases compared with those of the controls did not show significant differences.

Discussion

Comparative analysis of various serum parameters such as TC, TG, HDL-C, VLDL-C, and LDL-C was used as test cases in all 40 cases of colorectal carcinoma at various stages and locations in both men and women. A similar group of 40 other cases that did not have colorectal malignancy were used as controls. It was found that the mean value of total serum cholesterol level in the control group was 176.10, in contrast to a value of 146.52 in the cases

with colorectal malignancies. This shows a lower value of total serum cholesterol in our colorectal cancer group, which correlates positively with the findings of Seth R et al (1981), who found that cases with colorectal carcinoma had lower serum cholesterol levels, while cases with advanced tumours had significantly lower cholesterol levels than those in the control group [18].

Similarly, serum levels of TG and LDL-C were lower in the tumour group than in the control group. Here, the mean values of TG and LDL-C in the controls were 176.67 and 98.12, respectively, while the values in the tumour group were 154.95 and 73.95, respectively. This finding is consistent with the observations of Abraham M. Y. et al. (1991), who found that there was an inverse association between serum cholesterol levels and the risk of colon malignancy when all the subsites of the different parts of the colon were considered [19]. The present result may also be consistent with the findings of MC Michel AJ and Potter JD (1981), who found that low cholesterol levels in humans are associated with increased faecal bile acid concentrations, bile acids specifically being the deoxycholic acid type, which can cause carcinogenesis of the colon in experimental animals [20].

In present study, it was observed that late-stage colorectal carcinoma cases (Dukes C1 and C2) had lower levels of TC and LDL-C. Serum levels of TC and LDL-C in the control groups were 176.10 and 98.12, respectively, in contrast to values of 134.63 and 64.22 in the tumour groups. This finding is in agreement with the results of Seth R. et al (1981). However, Seth R. et al. did not include the estimation of LDL-C levels in their study [18].

In the present study, the levels of TG and VLDL-C had decreased but not significantly, whereas the mean HDL-C level remained unchanged throughout. Data from a study of WHO, conducted by the Committee of Principal Investigators (1978), indicate that lowering serum cholesterol levels by taking clofibrate was associated with a significant increase in the incidence of gastrointestinal malignancies. In contrast, Ederer F. et al (1980) demonstrated that lowering serum cholesterol levels by a diet containing polyunsaturated fatty acids did not result in an increase in the incidence of malignancies or mortality from colorectal carcinomas [21].

In the present study, conducted at this institution with tumour cases involving the right and left colon and rectum, a peculiar finding was observed and compared with the control group taken. The mean values of total cholesterol, triglyceride, and LDL-C in right-sided tumours (caecum, ascending colon, and hepatic flexure) were 131.67, 144.89, and 66, respectively, which were significantly lower than those in the control group. Of course, these parameters were also decreased in left-sided colon and rectal malignancies, but not statistically significant. Thus, the parameters of the three groups mentioned above, i.e., right-sided malignancies, left-sided malignancies, and the control group, were completely different. However, a standard deviation of more than 2 was highly significant when comparing the mean TC values between the right-sided case and the control group. This observation is

consistent with the findings of Abraham M. Y. et al (1991), who found a strong inverse association between serum cholesterol levels and colorectal cancer risk when the incidence shifted from the sigmoid colon to the caecum. They postulated that the metabolic effect of undiagnosed colon cancer contributed to this inverse association [19]. However, it was unclear why the association was stronger for caecum and ascending colon cancer than for rectal cancer.

In the present series, no significant difference was found in the values of various serum parameters in the early stage of malignancy (Dukes A and B) compared with the corresponding control group. This finding is similar to the results of Seth R. et al (1981). In the series of Seth R. et al. this inverse correlation of these serum parameters in the early tumour group with those of the control group was not statistically significant [18].

Gender had no effect on the change in serum parameters we assessed in either tumour or control groups. However, Abraham M. et al. had low serum cholesterol preceding the diagnosis of colorectal cancer in men, supporting his view that it may be a preclinical manifestation of colorectal carcinoma, but in their study they did not include female cases and also found a negative correlation between colorectal carcinoma in men and serum levels TC, TG and LDL-C, which was shown in **Table 1**.

Conclusion

It was found that the serum levels of TC, TG and LDL-C decreased in the tumour group compared with the control group regardless of sex, site of infestation and stage of malignant disease. However, a significant difference in serum levels of the above parameters was found only in advanced cases with Dukes C1 and C2.

When the serum parameters of cases with right-sided carcinomas and left-sided carcinomas were compared with those of the control group, it was found that the mean levels of TC, TG, and LDL-C were significantly lower in right-sided carcinomas than in left-sided carcinomas, and the decrease in the serum level of TC was statistically significant. Although this inverse correlation also existed in left-sided malignancies, the association was not as strong as in right-sided tumours.

Also, no significant difference was found in these serum parameters when the cases of both sexes were analysed separately. We conclude that there is an inverse correlation between colorectal cancer and serum levels TC, TG and LDL-C . A low value of these serum parameters in the precancerous or early stage of tumours can be used to screen cases, so that a more curative approach to the treatment of this dreaded disease can be planned. Because our study includes only a small number of participants, further investigation and a population-based cohort study are needed to further clarify this association.

It is almost documented that there is a negative correlation between total blood cholesterol levels and advanced malignancy affecting only the right-sided colon.

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Conflict of interest

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

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