Original Article

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Pathology Section

Colorectal Cancer: A Study of Risk Factors in a Tertiary Care Hospital of North Bengal

SUMANTA BHATTACHARYA[1], SAIKAT BHATTACHARYA[2], RIVU BASU[3], PRANATI BERA[4], ANIKET HALDER[5]

ABSTRACT

Aim: Age, sex, living place (urban or rural), smoking, alcohol consumption, dietary pattern, obesity are considered as risk factors for Colorectal cancer. Our study was done to evaluate the association between these risk factors and colorectal cancer in the population of North Bengal.

Materials and Methods: The present study was done over a period of one year as a hospital-based analytical observational type of study with cross-sectional type of study design. All the patients undergoing colorectal endoscopic biopsy at the Department of Surgery, NBMC&H during the study period for various clinical indications comprised the study population. History and clinical examination were done of the patients whose colorectal biopsy were taken and filled-up in a pre-designed pre-tested proforma. Significance was tested at 95% confidence interval.

Results: There is an increased risk of colorectal carcinoma (CRC) with increasing age in our study population. Odd's ratio for last 2 age groups are statistically significant with 2.83 for 41-50 years age group (95% CI is0.3-24), 13.6 for 51-60 years age group (95% CI is 2.1-85.9), 42.5 for more than 60 y age group patients (95% CI is 3.1-571). There is increased risk of colorectal carcinoma in males with an Odd's ratio of 1.6 (95% CI is 0.5-5.5), but it is not statistically significant. There was an increased urban incidence of colorectal carcinoma compared to rural population with an Odd's ratio of 1.8 (with a 95% CI of 0.6-5.9). In our study smoking also proved to be a risk factor and it is significant with an Odd's ratio of 5.4 with a 95% CI of 1.6-8.7. Odd's ratio for cases of alcohol consumption was 3.5 with a 95% CI of 1-11.6. Carcinoma cases were more common among patients with history of non-vegetarian dietary intake with Odds ratio of 1.5 (with a 95% CI of 0.3-8.7), but it was not statistically significant. Obesity has got a significant association with CRC in our study with an Odd's ratio of 7.2 (with 95% CI of 1.3-40.2).

Conclusion: More than 50 years of age, smoking, obesity were significant risk factors in our study. Other risk factors were though not significant, but much more common in colorectal cancer patients compared to non-malignant population.

Keywords: Colorectal carcinoma, Endoscopic biopsy, Obesity, Smoking

INTRODUCTION

Colorectal cancer (CRC) is the third most common cancer in men in 2008(663,000 cases, 10.0% of the total cancers) and the second in women (570,000 cases, 9.4% of the total cases) worldwide [1]. Incidence rates of CRC vary 10-fold in both sexes worldwide, the highest rates being estimated in Australia/New Zealand and Western Europe, the lowest in Africa (except Southern Africa) and South-Central Asia [1]. The age adjusted incidence rates of CRC in all the Indian cancer registries are very close to the lowest rates in the world [2]. The intra country variation of the incidence rates of CRC across India is limited [3]. Population based time trend studies show a rising trend in the incidence of CRC in India [4]. The causes for CRC range from germline mutations of high penetrance genes such as the adenomatous polyposis coli genes to a completely life-style risk factor such as excess body mass index at the other end. About 6% of all CRC are caused by the inheritance of muted genes with high penetrance. Life style and dietary factors are responsible for over two thirds of all CRC [5].

According to Surveillance, Epidemiology and End Results (SEER) Program database the incidence rate of colorectal cancer is more than 14 times higher among people of 50 y of age and older than in those younger than 50 [6]. In different international and Indian studies it was found that higher age group, male population, male sex, smoking and alcohol abuse are associated with risk of CRC [7-11]. Higher consumption of red meat and processed meat had been implicated in the causation of colorectal cancer for several decades. Economic transition does make Indians susceptible to colorectal cancer with changing dietary habits leading to more consumption of protein-rich diet. In a exploratory meta-analysis, it was found that there is a positive association between all meat and red meat consumption and risk of colorectal cancer [12]. Some studies suggest that people with very low fruit and vegetable intakes are at higher risk of developing colorectal cancer [13]. Different studies suggest that being overweight or obese is associated with higher risk of colorectal cancer in men and women, with stronger associations more consistently observed in men than in women [14,15].

Most colorectal carcinomas can be diagnosed by endoscopic biopsy. The usual malignant tumor of the large bowel is a well-to-moderately differentiated adenocarcinoma secreting variable amounts of mucin.

Though there many studies on risk factors of CRC internationally and in India, but there are no such study found in the population of North Bengal despite extensive search. The present study was undertaken to assess the risk factors of colorectal carcinoma cases in the patients undergoing colorectal endoscopic biopsy in the surgery department of a tertiary care hospital in North Bengal.

MATERIALS AND METHODS

The present study was done over a period of one year between Apil, 2011 and March, 2012. It is a hospital-based analytical observational type of study with cross-sectional type of study design. The present study was performed in the Department of Pathology and Department of General Surgery, North Bengal Medical College and Hospital (NBMC&H), Sushrutanagar, Darjeeling, West Bengal. All the patients undergoing colorectal endoscopic biopsy at the Department of Surgery, NBMC & H during the study period for various clinical indications comprised the study population. These

Parameter	Total	Malignant (%)	Non Malignant (%)	Odd's Ratio (95% CI)
Age (years)				
<30	19	2 (10.5)	17(89.5)	1
31-40	6	2 (33.3)	4 (66.7)	4.25 (0.4-40)
41-50	8	2 (12.5)	6 (87.5)	2.83 (0.3-24)
51-60	13	8 (61.5)	5 (38.5)	13.6 (2.1-85.9)
>60	6	5 (83.3)	1 (16.7)	42.5 (3.1-571)
Sex				
Female	17	5 (29.1)	12 (70.9)	1
Male	35	14 (66.7)	21 (33.3)	1.6 (0.5-5.5)
Place of Residence				
Rural	21	6 (28.6)	15 (71.4)	1
Urban	31	13 (41.9)	18 (58.1)	1.8 (0.6-5.9)
Smoking				
No	32	7 (21.9)	25 (78.1)	1
Yes	20	12 (60)	8 (40)	5.4 (1.6-18.7)
Alcohol				
No	34	9 (26.5)	25 (73.5)	1
Yes	18	10 (55.6)	8 (44.4)	3.5 (1-11.6)
Dietary Pattern				
Pure Vegetarian	7	2 (28.6)	5 (71.4)	1
Non vegetarian	45	17 (37.8)	28 (62.2)	1.5 (0.3-8.7)
Obesity				
No	44	13 (29.5)	31 (70.5)	1
Yes	8	6 (75)	2 (25)	7.2 (1.3-40.2)
Total	**52**	**19 (36.5)**	**33 (63.5)**	

[Table/Fig-1]: Table showing comparison of different studies with current study *(figures in parentheses denote percentage)*

patients belong to different ethnic groups of North Bengal. In the present study 58 patients were selected after taking proper consent and detail history & endoscopic findings were taken.

In six cases the biopsy sample was inadequate. So, altogether six cases were excluded from the study. Therefore, 52 cases formed the final study sample.

History and clinical examination were done of the patients whose colorectal biopsy were taken and filled-up in a pre-designed pre-tested proforma. Age, sex, place of residence, addiction to alcohol and smoking were recorded. Those from panchayat areas were considered as rural areas, and municipality areas were taken as urban. Ever smokers and drinkers were considered as smokers and drinkers. Height and weight were measured by standard techniques by standard techniques. Body Mass Index (BMI) was then calculated. Obesity was defined when the BMI is ≥ 30.00 [16]. Dietary assessment was done by'24h recall method' using "Nutritive value of Indian foods" published from National Institute of Nutrition (NIN). Persons who took any form of animal protein except milk and milk proteins were considered as non vegeteranians. Statistical analyses for different continuous and discrete data were done using different statistical softwares. Significance was tested at 95% confidence interval.

As for outcome measurement, those that were classified as colorectal carcinoma by experts after endoscopic biopsy were classified as Diseases and the other lesions were classified as non diseases.

RESULTS

The [Table/Fig-1] shows the various risk factors of colorectal carcinoma. There is an increased risk of colorectal carcinoma (CRC) with increasing age in our study population, as, with respect to younger age groups, Odd's ratio increases with age as 4.25 for 31-40 y age group (95% confidence interval is 0.40-40), 2.83 for 41-50

DISCUSSION

Studies	Age group	sex	Rural-urban	smoking	alcohol	diet	obesity
Current study	much more common in patients >50 years of age(2.1:1) [significa-nt]	CRC was more prevalent in male population (2.8:1)	CRC cases show a urban-rural ratio of 2.1:1	Smoking is a significant risk factor (odd's ratio of 5.4 with a 95% CI of 1.6-18.7)	it is much more common in CRC cases in our study(10:9)	CRC cases are much more common in non-vegetarian group (8.5:1).	Among 8 obese patients 6 had CRC with an Odd'sratio of 7.2 (with 95% Clof 1.3-40.2). [significant]
SEER 2008 Database	14:1	35% higher in men than in women					
Javid G et al.,	Highest incidence rate among age group of >50 years	Male to female ratio was 1.2:1.	Higher rate in urban area (6.19: 1.59)				
Mohondas KM et al.,	-	Higher among male population	Rural incidence rates are approximately half of urban rates				
Chao A et al.,				Relative Risk of 1.32 (with 95% CI 1.16–1.49) among male and 1.41 (1.26–1.58) among women.			
Mizoue T et al.,					A moderate or strong positive association was observed between alcohol drinking and colon cancer risk and a weak association with rectal cancer.		
Sandhu MS et al.,						significant 12–17% increased risk of colorectal cancer	
Dai Z et al.,							RR was 1.37 (95% CI: 1.21-1.56) for overweight and obese men and 1.07 (0.97-1.18) for women

[Table/Fig-2]: Showing comparision of different studies with current study

y age group (95% CI is0.3-24), 13.6 for 51-60 y age group(95% CI is 2.1-85.9), 42.5 for more than 60 y age group patients (95% CI is 3.1-571). Odd's ratio for last 2 age groups are statistically significant. There is increased risk of colorectal carcinoma in males with an Odd's ratio of 1.6 (95% Clis 0.5-5.5), but it is not statistically significant. In our study there was an increased urban incidence of colorectal carcinoma compared to rural population with an Odd's ratio of 1.8 (with a 95%CI of 0.6-5.9). In our study smoking also proved to be a risk factor and it is significant. Among 19 CRC cases 12 had history of smoking with an Odd's ratio of 5.4 with a 95% CI of 1.6-8.7. History of alcohol consumption was also slightly higher in those cases diagnosed with colorectal cancer with a Odd's ratio of 3.5 with a 95% CI of 1-11.6. Carcinoma cases were more common among patients with history of non-vegetarian dietary intake with Odd's ratio of 1.5 (with a 95% CI of 0.3-8.7), but it was not statistically significant. Among all the 8 cases of obese patients, 6 had CRC with an Odd's ratio of 7.2 (with 95% CI of 1.3-40.2). So obesity has got a significant association with CRC in our study. The [Table/Fig-2] shows comparison of different studies with current study.

CONCLUSION

This study, the first of its kind in North Bengal population, can be considered as a novel study. It has got its limitations, as it is an institution based study. Also no sampling has been done. But doing a community based study in a population for a disease like colorectal carcinoma, which is not so prevalent, requires a lot of logistic support that was unavailable. Quality in testing was maintained in the most important aspect of the study, endoscopy and biopsy of lesions, and testing by expert pathologists. This is the only Government tertiary care centre of North Bengal for such diseases, catering to the entire region. So, the results can actually be considered as representative of this region. Also, proper dose response relationship with quantum of smoking, alcohol consumption and diet could not be done, that requires more sophisticated longitudinal studies. However, results do reflect these factors along with urban residence, increasing age, obesity and male sex as risk factors for CRC. Also there is an urgent need of studies to classify the lesions and their stages, for planning sustainable treatment programmes in this area.

Also, inclusion of lesions other than CRC as controls may have caused Berkensonian Bias, as these lesions may share some common risk factors with CRC. Ideally endoscopy of patients, with no history of any colorectal disease should have been done.

Thus this study is an insight, the first and rather detailed one, into the risk factors of CRC in this area of North Bengal, a vital area of India. Future studies, community based, longitudinal and more elaborate shall definitely mine out more interesting facts regarding this deadly disease, which is on the rise in India's cancer scenario. Fortunately for us, many of the risk factors, described here, can be addressed through proper Health Promotional activities in mass or high risk mode, making this disease essentially preventable, thus reducing the burden to a lot.

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PARTICULARS OF CONTRIBUTORS:

1. Senior Resident, Department of Pathology, Ramkrishna Mission Seva Pratisthan Hospital, Kolkata, West Bengal, India.
2. Demonstrator, Department of Community Medicine, Burdawan Medical College, West Bengal, India.
3. Assistant Professor, Department of Community Medicine, R G Kar Medical College Hosptal, Kolkata, India.
4. Associate Professor, Department of Pathology, North Bengal Medical Colleege Hospital, Siliguri, West Bengal, India.
5. Consultant, Department of Pathology, Kalpataru Hospital, Barasat, West Bengal, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sumanta Bhattacharya,
Manorama Apt No.2, Near New Garia Telephone Exchange, Kolkata-700152, India.
Phone : 9831297234, E-mail : kolkata.doc27@gmail.com

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