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RESEARCH ARTICLE

Blood Group Characteristics in Rectal Cancer. A study Conducted in a Tertiary Care Center, Srinagar, Kashmir, India

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Abstract

Introduction: Rectal cancer is the third most common cancer in the world. Tumors are most commonly located in the rectosigmoid region. There are many factors in the etiology such as age, geographical features, family history, obesity, diet, and history of malignancy. Blood groups are one of the controversial etiologic factors in CRC. Blood group antigens, covered by Karl Landsteiner in 1901, have been the subject of numerous cancer studies since 1953, when Aird declared that blood group A was associated with stomach cancer. **Aim:** In the present study, we aimed to determine the effect of blood group characteristics, which play a role in the etiology of Rectal cancer. **Method:** We Prospectively reviewed the patients who were diagnosed with CRC and operated in our center or at other centers and were followed postoperatively at our centers. Age, gender, histologic TNM stage (tumor, lymph node involvement, and metastasis), tumor-bearing colonRectal segment, ABO blood group, and Rh antigen were examined from the patients' records. **Results:** Total of 60 patients with histopathologically confirmed as rectal cancers formed the study population. The male to female ratio in rectal cancers was 1.7:1. The age group varied from 16 to 80 years with most common age group in rectum cancer were between age is 45-64 years constituted (29) 48%. However, we observed relationship in the present study between Rh antigen and lymph node metastasis, liver metastasis, or TNM stage. O Blood group and rh positive was associated with lymph node involvement, higher TNM stage, and also found that risk of liver metastasis. **Conclusion:** As in Rectal cancer, our findings show that the O (+) blood group is a risk factor in rectal cancers, which have multifactorial etiology. Further genetic studies are needed.

Keywords: Rectal cancer- ABO blood group- Rh antigen

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Introduction

Colorectal cancer (CRC) is the third most common cancer and ranks third in males and fourth in females among causes of cancer-related mortality [1]. There are a number of etiological factors such as age, gender, obesity, diet, geography, and hereditary characteristics. It has been reported that CRC in the Asia-Pacific region and Africa occur a decade or more earlier compared to the USA [2]. Forms of CRC with proven genetic bases include the polyposis syndromes and hereditary nonpolyposis syndromes. However, the CRCs associated with these inherited and acquired etiologic factors account for a relatively small proportion of all CRC cases. In the majority of patients the responsible factors are still undetectable.

The risk of CRC increases with age; the median age at diagnosis for colon cancer is 68 in men and 72 in women; for rectal cancer it is 63 years of age in both men and women [3]. Tumors of the colorectal arise in the mucosa and virtually all (>90%) are adenocarcinomas [4]. Blood groups are one of the controversial etiologic factors in CRC. Blood group antigens, covered by Karl Landsteiner in 1901, have been the subject of numerous cancer studies since 1953, when Aird declared that blood group A was associated with stomach cancer [5]. Today, there are literature data suggesting that blood group A plays a role in the development of stomach, uterus, kidney, and neurological malignancies; blood group B in esophagus cancers; and blood group O in melanoma [5].

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Materials and Methods

This retrospective study was carried out in the Department of radiation oncology tertiary care Srinagar Kashmir India. Patients with rectal carcinoma from all ages and both sexes were included in the study. Clinically suspected rectal carcinoma subsequently proved to be non-malignant lesions after histological examination; non-Hodgkin lymphoma and other non epithelial tumors of the rectum were excluded from this study.

A prospective study was conducted to find the following data were recorded from the patients' records: age and gender, TNM (tumor, lymph node involvement, and tant metastasis) staging according to the pathology report, tumor location, and ABO blood groups and Rh antigens. The diagnosed of rectal performed by digital rectal examination colonoscopy and CECT scan and confirmed by biopsy of tumor. Records of patients who had complete colonoscopy examination till the ceacum, presence of tumor in the rectum, biopsy showing adenocarcinoma, were scrutinized. The tumor was classified according to the World Health Organization classification and the tumor staging was done using TNM classification. Baseline investigations were done to assess the patient's fitness for surgery. Treatment modalities included surgery, neoadjuvant or adjuvant chemotherapy and radiotherapy. Studies have suggested a link between inherited human blood group antigens and the risk of various cancers.

Statistical analysis

Descriptive analysis was used to report the study results. Categorical data were summarized as percentages. We analyzed the cancer characteristics according to age and sex. In the present study, we aimed to determine the effect of blood group characteristics, which play a role in the etiology of rectal cancer in kashmir valley.

Results

Total of 60 patients with histopathologically confirmed as rectal cancers formed the study population. The male to female ratio in rectal cancers was 1.7:1. The age group varied from 16 to 80 years with most common age group in rectum cancer were between age is 45-64 years constituted (29) 48%, followed by less than 45 years in our study. Less than 45 years age group constituted 35% of the cases (21 patients) shown in Table 1.

Clinical presentation, anatomical sites, histological patterns and tumor stage

The duration of symptoms at presentation ranged from one month to 1 year with mean duration of 6 months. In rectal cancers bleeding per rectum was the chief complaints in 63% of the patients, followed by constipation in 28% of the patients followed altered bowel habits in 9%.

There were 60 cases of carcinoma rectum, of these 25 (42%) cases are in middle third followed by 21 patients (35%) are in lower third and 14 patients (23%) had upper third rectum shown in Table 2. The distance measured is arbitrary measured by clinical digital examination and colonoscopy.

Table 1. Demographic Profile

Age	N	%
<45	21	35
45-64	29	48
>64	10	17
Gender		
Male	38	63
Female	22	37
Performance score		
0	6	10
I	29	48
II	18	30
III	7	12
Presenting Symptoms		
Altered bowel habits	5	9
Bleeding per rectum	38	63
Constipation	17	28
BMI (kg/m^2)		
<25	10	17
25-30	34	56
30+	16	27
TOTAL	60	100%

Analysis of blood group and Rh antigen subgroups revealed that 12 patients (20%) were blood group A, 15 patients (25%) were blood group B, 24 patients (40%) were blood group O, 9 patients (15 %) were blood group AB, and 49 patients (82%) were Rh positive and 11 patients were Rh negative (Table 3). The incidence of rectum cancer was significant among patients in the O(+) blood group. However O blood groups were associated with lymph node involvement or TNM grade, there was a significant relationship between blood group and risk of liver metastasis, particularly for blood group O, However it has been observed between Rh positive antigen and TNM stage, lymph node involvement, or liver metastasis. According to TNM staging in rectal cancers, majority of patients 40 (67%) are in stage III followed by 13 cases (22%) are stage ii and 07 cases (11%) are in stage iv.

Treatment modalities Treatment plan was made according to the stage of presentation assessed by clinical examination, radiological findings. Operability and type of surgery was assessed by the operating surgeon by clinical examination and examination under anesthesia. Neoadjuvant, adjuvant chemotherapy and radiotherapy was given according to protocols.

Discussion

For several decades, a role for ABO blood type antigens in the development of cancer has been suspected, and earlier investigations have noted a relationship between ABO blood type and the risk of malignances

Table 2. Distribution of Stage According to Sub Site in Rectal

Site	Total		Sex	Total	
	N	%		N	%
Lower third	21	35	Male	14	67
			Female	7	33
Middle third	25	42	Male	14	56
			Female	11	44
Upper third	14	23	Male	9	64
			Female	5	36
Total	60	100			

Table 3. Tnm Staging, and Blood Group Association

Stage			I	II	III	IVA	IVB
			X	13 (22%)	40 (67%)	07 (11%)	X
Blood group		A	B	AB	O	RH+	RH-
		12 (20%)	15 (25%)	9 (15%)	24 (40%)	49 (82%)	11 (18%)
Stage Asoosiated With Bood Groups	I	X	X	X	X	X	X
	II	X	4 (27%)	04 (44%)	05 (20%)	X	X
	III	7 (58%)	9 (60%)	05 (66%)	19 (80%)	X	X
	IV	5 (42%)	2 (13%)	X	X	X	X
Total	12		15	9	14	60 (100%)	

[6] This study investigated the relationship between ABO blood groups and Rh antigens and rates of rectum cancer, which involves numerous etiological factors. Our results show that the prevalence of blood groups O, as well as Rh antigen positivity were significantly higher among rectal patients. Despite being an archive study, it was of prospective design and less no of patents which is a drawback in terms of the strength of the evidence. ABO blood group antigens were covered by Karl Landsteiner in 1901 and Rh antigens by Huang et al in 1940. The ABO blood group antigens are encoded on chromosome 9q34. Although these antigens are biochemical components of the erythrocyte membrane, they have also been identified in epithelial cells of the gastrointestinal mucosa [7]. There is an intriguing hypothesis regarding the pathophysiological link between ABO blood groups and malignancy. Dysregulation of the enzymatic activities of glycosyltransferase A and glycosyltransferase B, which are responsible for cell membrane-mediated signaling and intercellullar adhesion during the immune response, may increase plasma levels of von Willebrand factor, thereby leading to angiogenesis, apoptosis, and tumorigenesis. In addition, the association shown between ABO antigens and tumor necrosis factor-α, E-selectin, P-selectin, and intercellular adhesion molecule-1 also supports the hypothesis that ABO alleles influence the formation and spread of malignancy [8].

Rectal cancer is the third most common cancer worldwide, and similar data have been reported in Turkey [9]. reported that blood group A was more frequent in patients with CRC, and in Turkey, Urun et al [1] also found that the incidence of rectal cancer was higher among patients with non-O blood groups, especially those carrying the blood group A allele. Our study was contradicted to Urun et al and Henderson etal, in our study 12 (20%) patients were blood group A, 15 (25%) patients were blood group B, 24 (40%) patients were blood group O, 9 (15%) patients in blood group AB, and 49 patients (82%) were Rh positive and 11 (18%) patients were Rh negative.

In 2001, Nakagoe et al [10] evaluated nonpolypoid syndromes, one of the hereditary syndromes involved in CRC development, and reported that blood group A was associated with nonpolypoid CRC. Despite improved early diagnosis, treatment modalities, and industrial advances, rectal cancer remains one of the main causes of cancer-related death. In addition to comorbid factors, causes of cancer-related mortality include tumor grade, Distant organ metastasis, and lymph node invasion. Nakagoe et al [10]. showed that CRC patients with blood group A had higher risk of lymph node metastasis. Our study found similar results that patients with blood group A had high grade However contradicted with above study that blood group O has associated with localy advanced and high probability to through distant metastasis.

However, we observed relationship in the present study between Rh antigen and lymph node metastasis, liver metastasis, or TNM stage. O Blood group and rh positive was associated with lymph node involvement, higher TNM stage, and also found that risk of liver metastasis.

In summary, rectum cancer is the most common malignancy of the gastrointestinal system and various acquired and inherited factors play a role in its etiology. Polyposis and non polyposis syndromes are the most common hereditary forms of rectum cancer. In the present study, we investigated blood group and subgroup distributions in gastrointestinal system malignancies. Although the patient population in this study was not

sufficient to reach a definitive conclusion, we found that blood group O has higher chances of rectal cancer, however A and Rh antigen positivity had a higher stage and aggressive behavior.

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