SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Surgery

Associated Risk Factors and Outcomes of Resection Surgery of Colorectal Cancer: A Single Center Study in Bangladesh

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DOI: 10.36347/sasjs.2023.v09i05.023 | **Received:** 05.04.2023 | **Accepted:** 08.05.2023 | **Published:** 24.05.2023

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Abstract **Original Research Article**

Background: One of the most common cancers in the world is c1olorectal cancer. Surgery is the sole curative option, and post-operative morbidity and mortality should be kept to a minimum to enhance results. Of course, the whole surgical and medical team is extremely frustrated when post-operative complications finally result in patient death. Because colon cancer patients tend to be older, it is to be expected that a growing percentage of patients have co-morbidity, making any procedure riskier. Patients may lose their lives even after successful surgery as a result of co-morbidity-related consequences. The main method of therapy for colorectal cancer is still surgery. However, the procedure entails a high risk of morbidity and death and uses a substantial amount of medical resources. Postoperative complications are common in patients who have had colorectal surgery, and they put them at increased risk for morbidity, mortality, poor oncologic outcomes, and a reduced quality of life. ***Objective:*** To find out associated risk factors of the patients related to colorectal cancer and the outcome of resection surgery of colorectal cancer. ***Materials and Methods:*** After receiving ethical permission, the department of surgery at Rangpur Medical College Hospital carried out this longitudinal form of descriptive study between July 2019 and June 2020. After explaining the nature and goal of the study to the participants, signed informed permission was acquired. A pre-made questionnaire was used to interview a total of 33 patients. Each patient had a complete physical examination, a careful history review, and any necessary investigations. Based on pre-existing co-morbidities, surgical technique, and associated complications, 30-day postoperative mortality and morbidity were assessed. The case questionnaire contained the collected data. ANOVA, Fisher exact, and the appropriate statistical tests (Chi-square) were run. Software called SPSS (version 22.0) was used to examine the data. Statistical significance was defined as P 0.05. By avoiding lost data, filling up code, regularly entering data, and carefully analyzing data, quality was increased. ***Results:*** More than one third (35.3%) patients belonged to age >50 years in group I and 25.0% in group II. More than half (58.8%) patients were female in group I and 5(31.2%) in group II. By ASA, 23.5% patients had normal healthy in group I and 68.8% in group II. 47.1% patients had mild systemic disease in group I and 31.2% in group II, 27.4% patients had severe systemic disease in group I. More than half (52.9%) patients had intra operative blood loss in group I and 6(37.5%) in group II. 47.1% patients developed wound infection in first follow up, 23.5% in second follow-up and 29.4% in third follow-up. Majority (78.6%) patients belonged to serum albumin ≤3.5 in patients with morbidity and 33.3% in mortality. ***Conclusion:*** It could be reasonably imparting an insight for convincing that hard data should supplant much of the foregoing speculation by colorectal cancer surveillance program.

Keywords: Colorectal cancer, Factors, Resection surgery, Intra-operative blood.

INTRODUCTION

Cancer is expected to become a more significant source of illness and mortality in Bangladesh in the next decades, just like it has in other parts of the world. In the industrialized world and several regions of Asia, colorectal cancer (CRC) is the second most prevalent malignancy. However, it is extremely widespread in South Asia, especially the Indian subcontinent [1]. Male to female ratio of 1.4:1 and age range of 19-84 years for colorectal cancer. Bangladesh has a lower peak incidence of colorectal cancer than Western and other nations, with the age range of 50 to 59 years [2]. Due to the lack of outcome data, the

prevalence of colorectal cancer in South Asian nations is still unclear [1]. Left sided colorectal cancer typically presents with blockage (8% to 29%) and is the most frequent reason for emergent surgery, which raises the risk of infection after surgery [1]. However, a cross-sectional research revealed that colorectal cancer surgery may be performed successfully without any intestinal preparation [3]. The detection of colon cancer at an early stage, which might be treated with aggressive surgery and adjuvant oncologic therapy [4]. The best course of treatment for a patient with non-metastatic colorectal cancer is surgical resection. 90% of patients with colorectal cancer need surgery, which is often performed with the goal of curing the disease. The technique entails a whole or sub-total colectomy, a transvevse colectomy, a sigmoid colectomy, an anterior or low anterior resection, an abdominoperineal resection, and a right hemicolectomy or extended right hemicolectomy [1]. Lower and mid rectal cancer is treated with total mesorectal excision (TME), which carries a higher risk of anastomotic leak [5]. Open or laparoscopic approaches, hand-sewn or stapled anastomosis, and stomas or no stomas are all components of the process [1]. Up to one-third of patients who have a colorectal operation experience postoperative problems. Infection or organ space infection/anastomotic leakage (AL) and gastrointestinal (GI) motility issues, such as ileus and bowel blockage, are the most frequent consequences. Following colorectal surgery, wound complications such infection, hematoma, and dehiscence are frequent, occurring in up to 13% of patients [6]. Surgical factors that have been observed to predict morbidity include the necessity for intraoperative transfusion, peritoneal contamination, and prolonged operative times (>120 minutes) [6]. The most terrifying consequence is anastomotic leak (AL), which can occur between three and nine days following surgery and has a reported incidence of 1.5% to 16% in the colon. Mortality rates vary from 10% to 20% [5]. It's interesting to note that anastomotic leakage (AL) was frequently discovered late in the postoperative period, more frequently after hospital release or 12 days postoperatively, in two recent investigations [7]. Numerous studies have examined factors that might predict overall morbidity after colorectal surgery. Older age, co-morbidities (particularly neurologic and cardiovascular co-morbidity), and low preoperative albumin are all variables affecting the patient. Independent risk factors for postoperative morbidity include an ASA Score >2 [8]. However, a number of co-morbidities that are thought to be important predictors of lower survival have an impact on the complications on survival [4]. This study aims to determine the associated risk factors and outcomes of resection surgery of colorectal cancer in Bangladesh.

OBJECTIVES

- To find out associated risk factors of the patients related to colorectal cancer.
- To evaluate the outcome of resection surgery of colorectal cancer.
- To find out the socio-demographic characteristics of the patients.

MATERIALS AND METHODS

This is a longitudinal type of descriptive study. The study included 33 patients who had been admitted to the surgery department of Rangpur Medical College Hospital and who met the inclusion and exclusion criteria. After a thorough evaluation and treatment, individuals with colorectal cancer who were between the ages of 18 and 59 were enrolled in this study and split into two groups. Patients in group 1 were those with morbidity and death, whereas those in group 2 were those without morbidity. Each participant was given the opportunity to provide written informed consent after being told of the study's purpose, objectives, and methods. At the time of admission, a standardized questionnaire was used to conduct face-to-face interviews with each patient. Collecting the patient's history, concentrating on the disease's clinical aspects, its duration, and sociodemographic details. The study's design called for gathering information on comorbidities, cancer stage, ASA score, kind of surgery, tumor location, length of operation, and problems in the immediate postoperative period. To assess the questionnaire's validity, clarity, and reliability as well as its usability as a tool for gathering data, it was pretested and validated at the Rangpur Medical College Hospital in Rangpur. Early postoperative evaluations of morbidity and mortality were conducted. Three follow-ups in total were made throughout this time. The initial follow-up was conducted with in 7 POD, the second and third follow-ups were conducted within the PODs of 7 to 14 and 14 to 30 respectively. All information gathered was kept in record form as data. Once the data had been verified, they were entered into a Microsoft Excel sheet (version 2010) and entered into statistical software. Finally, data analysis using SPSS version 22 was completed following data modification and compilation. Data was collected by standard pre-designed data collection form. SPSS was used to enter data into the computer (Statistical Package for Social Science, version 22.0). Prior to analysis, the level of significance was established as "P" value less than 0.05 and the percentage resistance calculation was set within a 95% confidence interval (CI). ANOVA, Fisher exact, and the appropriate statistical tests (Chi-square) were run. Tables and graphs were used to present the findings.

RESULTS

Table 1: Group wise Patients age distribution (N=33)

Age (In years)	Group I (n=17)		Group II (n=16)		P value
	n	%	n	%	
≤20 yrs.	1	5.9	4	25.0	0.359
21-30 yrs.	1	5.9	3	18.8	
31-40 yrs.	3	17.6	2	12.4	
41-50 yrs.	6	35.3	3	18.8	
>50 yrs.	6	35.3	4	25.0	

Table 1 showed the distribution of age group among the patients. It was observed that more than one third (35.3%) patients belonged to age >50 years in group I and 4(25.0%) in group II.

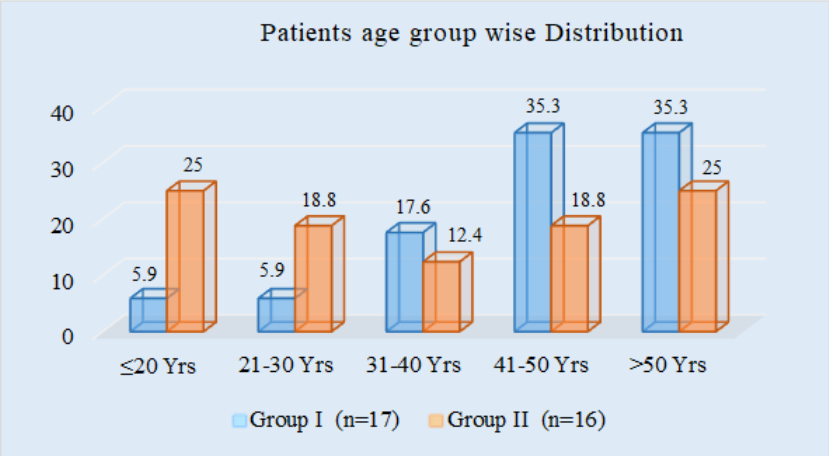

Figure I: Bar chart showed group wise age distribution of patients (N=33)

Table 2: Distribution of the study population by comorbid conditions (N=33)

Comorbid conditions	Group I (n=17)		Group II (n=16)		P value
	n	%	n	%	
Diabetes mellitus					
Yes	7	41.2	0	0.0	0.005
No	10	58.8	16	100.0	
Active smoker					
Yes	8	47.05	1	6.25	0.016
No	9	52.94	15	93.75	
Chronic pulmonary disease					
Yes	3	17.6	0	0.0	0.125
No	14	82.4	16	100.0	
Congestive heart failure					
Yes	1	5.9	0	0.0	0.515
No	16	94.1	16	100.0	
Hypertension					
Yes	9	52.9	0	0.0	0.001
No	8	47.1	16	100.0	
End-stage renal disease					
Yes	0	0.0	0	0.0	-
No	17	100.0	16	100.0	
Disseminated cancer					
Yes	0	0.0	0	0.0	-
No	17	100.0	16	100.0	
Others					
Yes	1	5.9	0	0.0	0.515
No	16	94.1	16	100.0	

Table 2 showed the distribution of the study population by comorbid conditions. It was observed that nearly almost half (41.2%) patients had diabetes mellitus in group I. 8(47.05%) patients had active smoker in group I and 1(6.25%) in group II. 3(17.6%) patients had chronic obstructive pulmonary disease in group I. 1(5.9%) patient had congestive heart failure in group I. 9(52.9%) patients had hypertension in group I. One (5.9%) patient had others in group I. The difference of diabetes mellitus, hypertension and smoking were statistically significant ($p<0.05$) between two groups.

Table 3: Distribution of the patients by ASA physical status classification (N=33)

ASA physical status classification	Group I (n=17)		Group II (n=16)		P value
	n	%	n	%	
Normal healthy patient					
Yes	4	23.5	11	68.8	0.009
No	13	76.5	5	31.2	
Mild systemic disease					
Yes	8	47.1	5	31.2	0.353
No	9	52.9	11	68.8	
Severe systemic disease					
Yes	5	29.4	0	0.0	0.026
No	12	70.6	16	100.0	
Severe systemic disease that is a constant threat to life					
Yes	0	0.0	0	0.0	-
No	17	100.0	16	100.0	
Moribund patient who is not expected to survive without the operation					
Yes	0	0.0	0	0.0	-
No	17	100.0	16	100.0	

Table 3 showed the distribution of the study population by ASA physical status classification. It was observed that 4(23.5%) patients were normal healthy in group I and 11(68.8%) in group II. Almost half 8(47.1%) patients had mild systemic disease in group I and 5(31.2%) in group II. Nearly almost one third (29.4%) patients had severe systemic disease in group I. The difference of normal healthy patients and severe systemic disease were statistically significant ($p<0.05$) between two groups.

Table 4: Distribution of patients by intra-operative iatrogenic injury, blood transfusion and blood loss (N=33)

Intra-operative	Group I (n=17)		Group II (n=16)		P value
	n	%	n	%	
Iatrogenic injury					
Yes	0	0.0	0	0.0	-
No	17	100.0	16	100.0	
Intra-operative transfused blood					
Yes	17	100.0	13	81.2	0.103
No	0	0.0	3	18.8	
Intra operative blood loss					
Yes	9	52.9	6	37.5	0.373
No	8	47.1	10	62.5	

Table 4 showed the distribution of the study population by intra-operative iatrogenic injury, blood transfusion and blood loss. It was observed that all 17(100.0%) patients had intra-operative transfused blood in group I and 13(81.3%) in group II. More than half 9(52.9%) patients had intra operative blood loss in group I and 6(37.5%) in group II. The difference was statistically not significant ($p>0.05$) between two groups.

Table 5 Distribution of the patients by serum albumin level (N=33)

Serum albumin	Morbidity (n=14)		Mortality (n=3)		No complication (n=16)		P value
	n	%	n	%	n	%	
≤3.5	11	78.6	1	33.3	13	81.3	
>3.5	3	21.4	2	66.7	3	18.7	
Mean ±SD	3.36±0.54		3.7±0.52		3.44±0.21		0.430
Range (min-max)	2.7-4.5		3.1-4		3.2-3.8		

Table 5 showed the distribution of the study of the patients by serum albumin level. It was observed that majority 11(78.6%) patients belonged to serum albumin ≤3.5 in patients with morbidity, 1(33.3%) in mortality and 13(81.3%) in patients having no complication. The mean serum albumin was 3.36±0.54 mg/dl in patients with morbidity, 3.7±0.52 mg/dl in mortality and 3.44±0.21 mg/dl in patients having no complication. The difference was statistically not significant (p>0.05) between two groups.

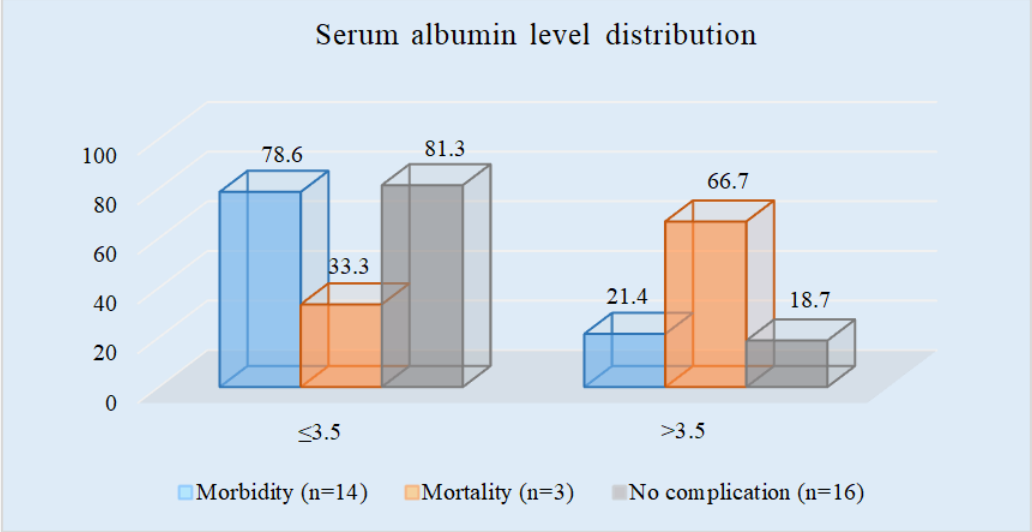

Figure II: Bar chart showed group wise patients serum albumin level. (N=33)

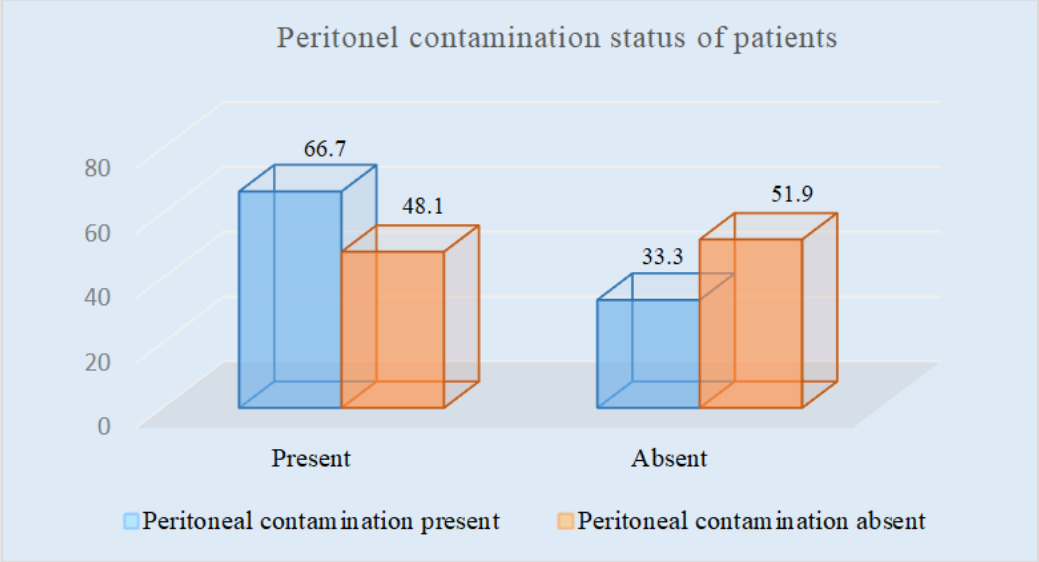

Figure III: Bar chart showed group wise patients by Morbidity and mortality. (N=33)

Figure III showed the relation of peritoneal contamination with morbidity and mortality status. It was observed that two third (66.7%) patients had morbidity and mortality in presence of peritoneal contamination and 13(48.1%) in absence of peritoneal contamination. The difference was statistically not significant (p>0.05) between two groups.

Table 6: Distribution of the patients by pre-operative bowel preparation. (N=33)

Pre-operative bowel preparation	Group I (n=17)		Group II (n=16)		P value
	n	%	n	%	
Yes	14	82.4	15	93.8	0.316
No	3	17.6	1	6.2	

Table 6 showed the distribution of the study population by pre-operative bowel preparation. It was observed that majority 14(82.4%) patients had pre-operative bowel preparation in group I and 15(93.8%) in group II. The difference was statistically not significant (p>0.05) between two groups.

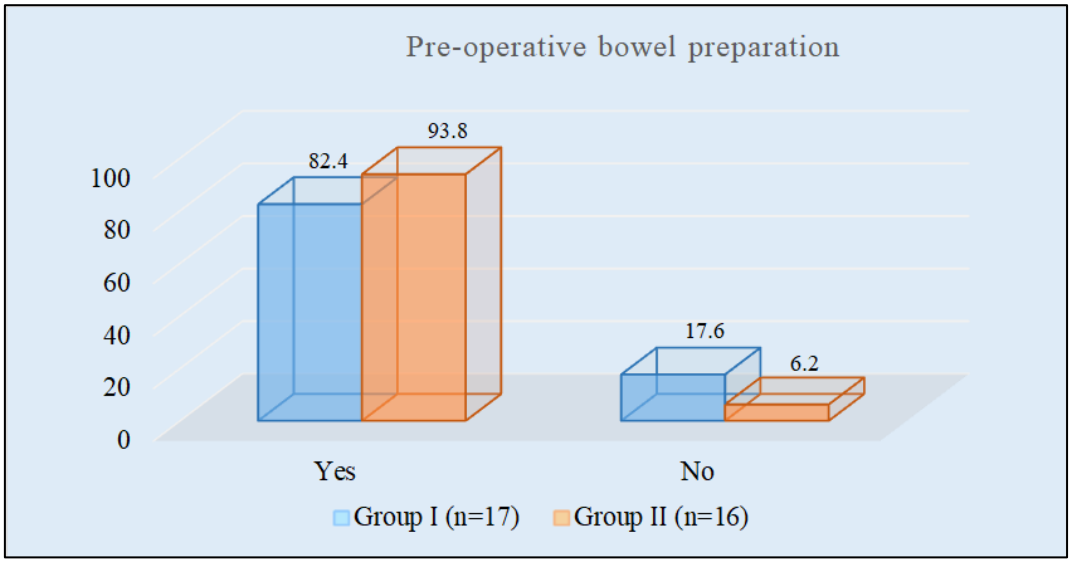

Figure IV: Bar chart showed group wise patients pre-operative bowel preparation. (N=33)

Table 7: Distribution of the patients by intra-operative time (N=33)

Intra-operative time	**Group I (n=17)**		**Group II (n=16)**		**P value**
	n	**%**	**n**	**%**	
More than 2 hours	14	82.4	5	31.2	0.003
Less than 2 hours	3	17.6	11	68.8	

Table 7 showed the distribution of the study population by intra-operative time. It was observed that majority 14(82.4%) patients required more than 2 hours in group I and 5(31.2%) in group II. The difference was statistically significant (p<0.05) between two groups.

Table 8: Distribution of the study population by morbidity in different follow up (n=17)

Morbidity	**Follow up**						
	First (n=17)		**Second (n=17)**		**Third (n=15)**		**P value**
	n	%	n	%	n	%	
Wound infection	8	47.1	4	23.5	5	29.4	0.351
Pneumonia	4	23.5	0	0.0	0	0.0	0.017
Anastomotic leakage	0	0.0	2	11.8	6	35.3	0.008
P/O ileus	2	11.8	0	0.0	0	0.0	0.141
UTI	2	11.8	0	0.0	0	0.0	0.141
Paralytic ileus	2	11.8	0	0.0	0	0.0	0.141
Renal failure	2	11.8	0	0.0	0	0.0	0.141
Cardiac arrest	1	5.9	0	0.0	0	0.0	0.382
Confusion	1	5.9	0	0.0	0	0.0	0.382
Stroke	1	5.9	0	0.0	0	0.0	0.382

Dyselectrolytemia	1	5.9	0	0.0	0	0.0	0.382
prolonged intubation	1	5.9	0	0.0	0	0.0	0.382
Post-operative fever	1	5.9	0	0.0	0	0.0	0.382
Deep vein thrombosis	1	5.9	0	0.0	0	0.0	0.382
ARDS	0	0.0	1	5.9	0	0.0	0.382
Wound ischaemia	0	0.0	1	5.9	1	5.9	0.571
Bleeding from perineum	0	0.0	0	0.0	1	5.9	0.314
Stomal abscess(mild)	0	0.0	0	0.0	1	5.9	0.314

Table 8 showed the distribution of the study population morbidity status in different follow up. It was observed that 8(47.1%) patients had developed wound infection in first follow up, 4(23.5%) in second follow-up and 5(29.4%) in third follow-up. Wound infection mostly developed in first follow up but the difference was statistically not significant. 4(23.5%) patients had developed pneumonia in first follow up and not found in second and third follow up. Anastomotic leakage was not found in first follow up, 2(11.8%) developed in second follow up and 6(35.3%) in third follow up and other complication were statistically not significant in different follow up.

DISCUSSION

In the present study, regarding the distribution of the study population by comorbid conditions, it was observed that nearly almost half (41.2%) patients had diabetes mellitus in group I. 8(47.05%) patients had active smoker in group I and 1(6.25%) in group II. 3(17.6%) patients had chronic obstructive pulmonary disease in group I. 1(5.9%) patient had congestive heart failure in group I. 9(52.9%) patients had hypertension in group I. 1(5.9%) patient had others in group I. The difference of diabetes mellitus, hypertension and smoking were statistically significant between two groups. In accordance with our study, a meta-analysis of 29 prospective cohort studies (62,924 cases) in China reported a 27% higher risk of colorectal cancers (CRC) associated with diabetes [9]. In another Chinese prospective study of 0.5 million participants with diabetes, the adjusted HR of CRC was 1.18 (95% CI: 1.04-1.33). Pang *et al.* (2018) [10] stated that longer duration of diabetes was associated with decreased HR. Diabetes mellitus is known to predispose towards a vast array of cancers and mostly, this increased risk is due to shared risk factors such as obesity and a sedentary lifestyle [11]. Diabetics also present with abnormally high blood sugar levels, which can promote the carcinogenic shift to glycolysis by accelerating glucose metabolism. However, those with type 2 diabetes have an increased risk of CRC even after adjusting for BMI, physical activity, and other shared factors [10,11]. Niemeläinen *et al.* (2020) [12] reported that diabetes mellitus (51% vs 37%,), coronary artery disease (52% vs 36%) and rheumatic diseases (67% vs 39%) were related to higher risk of complications. van Eeghen *et al.* (2015) [13] stated that the post-operative mortality very often is the direct result of pre-existing co-morbidity and not always the direct result of the surgical procedure. 11 patients died due to complications induced by their pre-existing co-morbidity [cardiovascular, pulmonary complications, complications of pre-operative palliative chemotherapy, septicemia not related to the operation with multi organ failure, acute rupturing aneurysm. Moreover, factors that negatively influence results of surgery are diabetes and pre-existing cardiac pathology.

In consistent with our findings, researchers concluded that smoking tobacco does indeed cause CRC [14]. Smoking is the leading preventable cause of cancer deaths, largely due to its impact on lung cancer. The relative CRC risk of regular smoking was found to be 1.18. Smoking was found to predispose more towards rectal cancer and to be more likely to cause tumors associated with common molecular abnormalities, such as high microsatellite instability, CpG methylation, and BRAF mutation. The mutagens in tobacco smoke probably promote these and other carcinogenic mutations [15]. A meta-analysis of 14 prospective cohort studies showed that former (HR=1.12; 95% CI: 1.04-1.20) and current smoking (HR=1.29, 95% CI: 1.04-1.60) were associated with poorer CRC prognosis compared with never smoking and current smoking. Ordóñez-Mena *et al.* (2018) [6] emphasized that smoking cessation was associated with improved overall and CRC-specific survival. In accordance with our study, Yu *et al.* (2016) [17] investigated the association between perioperative hypertension and long-term survival outcomes in patients with rectal cancer and concluded that hypertension is positively related to cancer incidence, morbidity and mortality. Multiple studies have evaluated predictors of overall morbidity following colorectal surgery. Patient factors predicting postoperative complications include older age, co-morbidity, and low preoperative albumin (Alves *et al.* 2005) [18]. The global burden of CRC is expected to increase by 60%, to over 2.2 million new cases and 1.1 million annual deaths, by the year 2030. This growth is expected as a product of the economic development of transitioning and low-to-medium-HDI nations, as well as generational changes in developed nations. Increases in the incidence of CRC seem to increase uniformly with economic development. The growth is hypothesized to be a product of environmental changes, such as more sedentary lifestyle, greater obesity, processed food, alcohol, and meat consumption, and

greater overall longevity [19]. In this study, the distribution of the study population by stage of cancer, it was observed that more than half (52.9%) patients had stage II in group I and 11(68.8%) in group II. The difference was statistically not significant between two groups. Moreover, almost two third (64.7%) patients had rectal carcinoma in group I and 9(56.2%) in group II. The difference was statistically not significant between two groups. Artinyan *et al.* (2015) [20] reported that patients with complications were also more likely to have rectal site of disease (21.6% vs 15.6%) and trended towards higher cancer stage (70.8% vs 67.9%, with stage ≥2). Huang *et al.* (2018) [21] stated that poor outcome of surgery is related to the severity of the complications and cancer stage of the patient. Another study reveals resection of the cancer involving the middle or lower rectum with sphincter saving procedures was associated with 2.5% mortality and 43% morbidity [22]. In current study, the distribution of the study population by American Society of Anesthesiologists (ASA) physical status classification, it was observed that 4(23.5%) patients had normal healthy in group I and 11(68.8%) in group II. Almost half (47.1%) patients had mild systemic disease in group I and 5(31.2%) in group II. Nearly almost one third (27.4%) patients had severe systemic disease in group I. The difference of normal healthy patients and severe systemic disease were statistically significant between two groups. Bakker *et al.* (2014) [23] observed that higher ASA was associated with morbidity and mortality which is consistent with our study. Artinyan *et al.* (2015) [20] observed that other factors that were significantly associated with worse long-term survival included higher ASA classification, increasing stage, partial/complete functional dependence, lower preoperative albumin and increasing age. Multiple studies have evaluated predictors of overall morbidity following colorectal surgery. Patient factors include older age, co-morbidities, and low preoperative albumin. ASA Score>2 is independent risk factors for postoperative morbidity [8]. In this study, it was observed that majority (82.4%) patients had pre-operative bowel preparation in group I and 15(93.8%) in group II. The difference was statistically not significant between two groups. Mechanical bowel preparation (MBP) before elective colorectal surgery has been the standard in surgical practice for over a century. It is believed that MBP decreases intraluminal fecal mass and presumably decreases bacterial load in the bowel [24, 25]. It has been argued that this decrease in fecal load and bacterial contents reduces the rates of infectious postoperative complications, such as anastomotic dehiscence. These theories, however, have been based largely on clinical experience and expert opinion. However, there has been mounting Level-I evidence indicating that MBP does not reduce the rate of postoperative complications, including anastomotic failure [26]. Eskicioglu *et al.* (2010) [25] reported that mechanical bowel preparation is generally safe, but it has been associated with serious complications in patients with existing cardiac and renal disease as well as previously healthy patients. In the present study, regarding the distribution of the study population by intra-operative time, it was observed that majority (82.4%) patients had more than 2 hour's operative time in group I and 5(31.2%) in group II. The difference was statistically significant between two groups. de Silva *et al.* (2011) [27] outlined that the operative variables found to predict morbidity included emergent operation, longer operative time (>2 hours), and peritoneal contamination which is comparable to our study. Artinyan *et al.* (2015) [20] found that a univariate comparison, patients with complications were significantly likely to had a higher rate of intraoperative transfusion (19.3% vs 12.5%). In this study, regarding the relation of peritoneal contamination with morbidity and mortality, it was observed that two third (66.7%) patients had morbidity and mortality in presence of peritoneal contamination and 13(48.1%) in absence of peritoneal contamination. The difference was statistically not significant between two groups. de Silva *et al.* (2011) [27] observed that among the operative variables, peritoneal contamination is associated with postoperative morbidity and mortality which influences surgical outcome. Left sided colorectal cancer usually present with obstruction (8% - 29%) and most common cause of emergency surgery which increase postoperative risk usually due to peritoneal contamination [1]. Yoo *et al.* (2017) [28] hypothesized that patients with retroperitoneal contamination would have a higher mortality rate than those without retroperitoneal contamination. Because retroperitoneal contamination would influence septic status due to the abundant lymphatic channels in the retroperitoneum, it allows the septic focus to infiltrate systemic circulation easily. In this study, regarding the distribution of the study population morbidity and mortality status in different follow up, it was observed that majority (82.4%) patients had complication in first follow up, 8(47.1%) in second follow up and 9(52.9%) in third follow up. Most complications developed in first follow up but the difference was statistically not significant. Majority of the cases mortality occurred in second follow up (11.8%), 1(6.7%) in third follow up. No mortality was found in first follow up. mortality. Overall mortality rate following colorectal surgery range from 1 to 16.4% with morbidity rate as high as 35%. Godhi *et al.* (2017) [29] stated that follow-up and surveillance form is an important aspect of care in patients with CRC. Some advocate intensive postoperative surveillance in a bid to detect potentially curable recurrences at the earliest possible time. The objective of follow-up programmes is to identify early complications and recurrence of the disease. In the present study, regarding the morbidity status in different follow up, it was observed that 8(47.1%) patients had developed wound infection in first follow up, 4(23.5%) in second follow-up and 5(29.4%) in third follow-up. Wound infection mostly developed in first follow up but the difference was statistically not significant.

4(23.5%) patients had developed pneumonia in first follow up and not found in second and third follow up. Anastomotic leakage was not found in first follow up, 2(11.8%) developed in second follow up and 6(35.3%) in third follow up and other complications were statistically not significant in different follow up. It could be speculated from the observations of different studies that most of the surgery related complication will be detected at first follow up which is in agreement with our study [30]. Khan *et al.* (2011) [1] found that the commonest surgical complications was surgical site infection (17.8%) which was statistically significant. In this study, it was observed that majority (78.6%) patients belonged to serum albumin ≤3.5 in patients with morbidity, 1(33.3%) in mortality and 13(81.3%) in patients having no complication. The mean serum albumin was 3.36±0.54 mg/dl in patients with morbidity, 3.7±0.52 mg/dl in mortality and 3.44±0.21 mg/dl in patients having no complication. The difference was statistically not significant between groups. Therefore, hypoalbuminaemia predisposes patients not only to surgical complications such as SSI and poor anastomotic healing but also to remote infections like pneumonia. In accordance with our study, Artinyan *et al.* (2015) [20] reported that on patients with any postoperative complication had a significantly worse long-term survival compared with patients without complications.

CONCLUSION

The study revealed that Diabetes mellitus and hypertension were predominant co-morbidity in colorectal cancer. Active smoking also affects the outcome following colorectal cancer surgery. It can be concluded that colorectal cancer surgery can be performed to reduce morbidity and mortality rates with improved survival through proper patient selection, careful consideration of appropriate surgical candidates, pre-operative optimization of medical co-morbidities, nutritional status, and physical performance. In order to make the current colorectal cancer surveillance program more successful, it is also conceivable that the future may entail collecting prospective data, developing cancer monitoring, and combining the data from significant oncological institutes.

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