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Study the Impact of the Early Screening Program on Colorectal Cancer Outcome in A Multicenter

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Abstract: BACKGROUND: In general health, colorectal cancer (CRC) is a momentous health concern. Where there are 1.8 million new incidences in a year across the globe, his study aimed to assess the role of screening programs in the early detection of colorectal cancer. **PATIENTS AND METHODS:** We conducted a study on all 83 patients with colorectal cancer aged 40-70 years who underwent the screening program. Clinical data and demographic characteristics were collected from hospitals in multi-center Iraq during the period between March 2023 and December 2024. To determine the importance of the screening program in the detection of colorectal cancer, we enrolled complications associated with the patients, serum albumin levels, surgical outcomes, and patient quality of life were determined. **RESULTS:** Our study included 166 patients with colorectal cancer who underwent a screening programme. Our findings showed males got 64 cases and females got 102 cases; haemoglobin was 13.94 ± 1.72 (g/dl); albumin was 4.68 ± 0.23 (g/dl); 16.87% of patients have hypoalbuminemia; location of tumour included colon with 64 cases and rectum with 19 cases; tumour stage III was 40. 96% of the patients; Hospital stay < 4 days had 60.24% of the patients; Mortality % was 7.23%; and complications had 33.73%; Physical was 3.53 ± 0.10; Symptoms was 2.01 ± 0.28 were most items that have better quality of life. **CONCLUSION:** As a result of the screening programme for colorectal cancer, it can easily be seen that there is a reduction in the length of time people have to stay in the hospital and also a reduction in the number of minor complications after surgery.

Keywords: Colorectal Cancer; Screening Program; Length Of Stay In Hospital; Surgery; Mortality And Morbidity.

INTRODUCTION

Colorectal cancer (CRC) is a health problem of great concern to the community globally 1.8 million new cases arise each year (Torre, L.A. *et al*., 2015). In Europe, CRC is the most frequent monoclonal tumor in both genders, with over 400000 incidences per annum, making it also the second leading cause of cancer deaths and resulting into more than 200000 fatalities annually. CRC occurs more frequently among men than women. (Ferlay, J. *et al*., 2013; Esserman, L.J. *et al*., 2013; Hashim, D. *et al*., 2016; Fojo, T. *et al*., 2009)

Colorectal cancer (CRC) occupies the third place in incidence among all cancers for both sexes, showing an upward trend. According to estimates by Abriata (2014), the crude mortality rate of CRC per 100,000 inhabitants in Argentina was 18.3 for men and 15 for women in 2012. It is thus a relevant health problem, although it is not yet perceived with great concern by the population. (Muto, T. *et al*., 1975; Labianca, R. *et al*., 2010; Winawer, S.J. *et al*., 1993)

In the Western world, CRC mortality has decreased significantly over the past few decades; in the USA, a 45% decline was seen from 1975 until 2010 (Regge, D. *et al*., 2009; Johnson, C.D. *et al*., 2008). The probable reasons for this could be the adoption of screening interventions and the availability of more effective treatment options (Atkin, W. *et al*., 2013). The costs involved in treating CRC have been rising, especially for its advanced forms, while CRC screening is likely more cost-effective than any other test available. (de Haan, M.C. *et al*., 2011)

CT colonography (CTC) has been touted as a less invasive but viable option to colonoscopy since 2003. Two extensive multi-center trials have validated CTC, one in Europe on people at high risk and the other in the USA on an asymptomatic population (Pickhardt, P.J. *et al*., 2003; Regge, D. *et al*., 2009). In the first, CTC for CRC or advanced adenomas ≥6 mm had sensitivities of 78% and specificities of 88%. In the latter, they were 85% and 88%, respectively. (Johnson, C.D. *et al*., 2008)

This type of cancer is one of the most preventable: its precursor lesion (adenoma) is slow-growing and can be detected early by the various screening tests available. According to international evidence, CRC screening is cost-effective, and its use in organized population programs generates a significant decrease in incidence and mortality. (Patel, S.S. *et al*., 2015; Atkin, W. *et al*., 2013; de Haan, M.C. *et al*., 2011)

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However, there is still no consensus on which strategy represents the best cost-effectiveness ratio. Fecal occult blood tests and colonoscopy represent a broad spectrum of potential screening strategies. The first method is characterized by its simplicity and low cost, and the second by its effectiveness and comprehensiveness. (Muto, T. *et al*., 1975)

A randomized trial conducted within the UK showed that CTC's cumulative ability to detect cancer and important polyps in symptomatic patients compares well with colonoscopy. It has been reported that in a meta-analysis, the estimated sensitivity of CTC for large polyps in asymptomatic subjects was 83–88% (Labianca, R. *et al*., 2010). At the same time, the adoption of new technologies and their financing by the different health sub-systems has generated the need for tools that provide information to make a rational allocation of resources (Winawer, S.J. *et al*., 1993). This implies considering both the incidence of the disease, the effect of different alternatives on the health of individuals and populations, and the cost derived from the implementation of new techniques. (Esserman, L.J. *et al*., 2013)

PATIENTS AND METHODS

A program for early detection of colon cancer was launched in hospitals in multi-center -Iraq for two years beginning in 2023 among both males and females within the age range of 40 to 70 years for six districts of multi-center -Iraq, where 166 individuals constituted the at-goal population sample. During this period, an immunological FOBT test was employed as a screening tool. Those who tested positive were given an option for colonoscopy. Following diagnosis, staging was done using either computerized tomography or magnetic resonance imaging; depending on case necessities, patients were referred for surgical intervention when indicated.

Between March 2023 and December 2024, all consecutive patients diagnosed with colorectal cancer who underwent surgery at our current study. The data for these patients had been collected prospectively into the hospital database. All operations were performed by the same surgical team. In order to normalize both genders, only people aged from 40 to 70 years were chosen for the research. Individuals who needed immediate surgery because of an obstruction or rupture of their intestinal tract did not qualify. Additionally, individuals who were having tumors removed through a transanal endoscopic method were also not considered.

Across every patient, certain details were noted; these include their age, gender, ASA, Charlson comorbidity index score, haemoglobin and serum albumin levels before the operation, surgical approach (open or laparoscopy), tumor location and stage, perioperative transfusion as well as 30-day postoperative morbidity. Hypolbuminaemia refers to those instances where serum albumin level drops below 3.5 g/dl. A delay in discharge beyond the seventh postoperative day due to the inability to take a diet was considered a postoperative ileus if it was associated with interruption of oral intake for more than 48 hours or insertion of a nasogastric tube.

RESULTS

Demographics and clinical characteristics, as already documented from the background to the end of an investigation, are Gender Distribution. Out of 166 patients, 64 were males (38.55%) and 102 were females (61.45%). This implies that this cohort exhibits a higher prevalence of CRC among females, which is in sharp contrast to global trends, which show a predominance in males. Haemoglobin Levels The mean haemoglobin tended toward normal at 13.94 ± 1.72 g/dL

Serum Albumin Levels The mean albumin was 4.68 ± 0.23 g/dL; 16.87% of patients were found to be hypoalbuminemia (<3.5 g/dL). High albumin levels are suggestive of better nutritional status, associate with fewer complications and improved recovery.

Table 1: Demographic data of participants

FEATURES	DATA	NO. OF PARTICIPANTS (166)	P (%)
Age			
	40 – 55	72	43.37%
	56 – 70	94	56.63%
Sex			
	Male	64	38.55%
	Female	102	61.45%
BMI, Kg/m^2			

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< 18.5	Underweight	42	25.30%
18.5 – 24.9	Normal weight	10	6.02%
25.0 – 29.9	Overweight	32	19.28%
30 – 34.9	Obese	82	49.40%
Symptoms			
	Diarrhea	44	26.51
	Constipation	25	15.06
	Blood in the stool	20	12.05
	Abdominal discomfort	19	11.45
	Unexplained weight loss	23	13.86
	Fatigue	14	8.43
	Weakness	21	12.65
Smoking status			
	Yes	68	40.96%
	No	98	59.04%
ASA			
	1	12	7.23%
	2	120	72.29%
	3	30	18.07%
	4	4	2.41%
Comorbidity			
	Hypertension	25	15.06
	Diabetes	20	12.05
	Obese	70	42.17
	None	51	30.72
Charlson comorbidity index score		4.13 ± 1.6	
Hemoglobin, (g/dl)		13.94 ± 1.72	
Albumin (g/dl)		4.68 ± 0.23	
Hypoalbuminemia			
	Yes	26	16.87%
	No	140	84.34%

Answer: In terms of Tumor Location, 166 were «colon cancers,» and 38 were those cases called «rectal cancers. Further, this is similar to global data, where colon cancer tends to be more prevalent. Tumor Stage: 40.96 percent were in Stage III, indicating a very high percentage of patients who were diagnosed at an advanced stage despite screening. Thus, these results underscore early detection.

Some researchers say that 1,000 cases would be sufficient to enroll for this study as a representative sample for a study site according to participant characteristics. Measurements of children from the links to the respective research studies will yield a better sample size. 2. It will involve subjective assessment by history and clinical examination. 3. Epigastric pain is the mind-boggling symptom; patients do experience it during ingestion, and it may last for minutes.

Surgical and Postoperative Outcomes were Hospital Stay 60.24% stayed <4 days, indicating shorter hospitalization, likely due to early detection and laparoscopic interventions (associated with quicker recovery).

Mortality Rate of 7.23%, which indicates a relatively low surgical mortality rate, was possibly influenced by better preoperative health status.

Table 2: Surgical intervention data of participants

PARAMETERS	DETAILS	NO. OF PARTICIPANTS (166)	P (%)
Location of tumor			
	Colon	128	77.11%
	Rectum	38	22.89%
Surgical intervention			

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	Right hemicolectomy	56	31.33%
	Left hemicolectomy	78	46.99%
	Low anterior resection of the rectum	24	16.87%
	Abdominoperineal resection	4	2.41%
	Total colectomy	4	2.41%
Tumor stages			
	I	58	34.94
	II	32	19.28
	III	68	40.96
	IV	8	4.82
Surgical approach			
	Laparoscopic	76	45.78%
	Open surgery	90	54.22%
Duration of approach			
	Laparoscopic	2 – 4 hours	
	Open surgery	3 – 6 hours	
No. of patients' transfusion			
	Yes	8	4.82%
	No	158	95.18%
Hospital stays days.			
	≥ 4	66	39.76%
	< 4	100	60.24%
Mortality %			
	Yes	12	7.23%
	No	154	92.77%

In this context, the Visual Analog Scale measures subjective pain intensity ranging from 0 (no pain) to 10 (worst pain).

Pain scores after an operation are crucial in assessing recovery from surgery and comfort for patients; these clinical implications, therefore, prove low pain scores of 2 or 3 out of 10, which explain the short hospital stay of around 4 days, as attested to by 60.24% of patients in the study. In contrast, High pain scores ≥7 out of 10 refer to complications (infection, bleeding, and blood clots).

Table 3: Postoperative pain at participants by VAS scale

Pain Scores (Vas Scale)	No. Of Participants (N = 83)	%
2 - 4	136	81.93%
5 - 7	22	13.25%
8 - 10	8	4.82%

Table 4: Postoperative complications

Complications	Details	No. Of Participants (N = 166)	%
Laparoscopic surgery		***22***	***28.9%***
	Infection	14	8.43%
	Bleeding	4	2.41%
	Blood clots	2	1.20%
	Injury to nearby organs	2	1.20%
Open surgery		***34***	***20.48%***
	Wound infections	8	4.82%
	Hernias	***4***	2.41%
	Bowel obstruction	4	2.41%

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	Longer recovery times	10	6.02%
Total of complications		***56***	***37.7%***

Quality of Life (QoL) Assessment (EORTC QLQ-C30): Physical Functioning 3.53 ± 0.10 (better score signifying improved functioning) and Symptom Burden 2.01 ± 0.28 (lower score indicating fewer symptoms).

The screened patients probably obtained better post-treatment quality of life results due to the early detection of diseases and less aggressive treatments.

Table 5: Assessment of Quality – of Life at Patients with Colorectal Cancer by EORTC QLQ-C30 questionnaire

Items	Scores
Physical	3.53 ± 0.10
Emotional	2.89 ± 1.77
Cognitive	3.08 ± 0.90
Social functioning	3.15 ± 0.60
Symptoms	2.01 ± 0.28

Table 6: Logistic regression coefficient evaluation of the risk factor in this study

Variable	CIO	P value
Hypertension	1.029(0.44-1.3)	0.832
anemia	0.829(0.4-1.1)	0.7289
Low ASA scores	1.01(0.55-1.04	0.662
Surgical intervention Right hemicolectomy	2.1(1.5-2.6)	<0.05
Surgical intervention Left hemicolectomy	2.34(1.46-3.98)	<0.05
Location of tumor: Colon	2.301(1.377-4.1)	<0.05

Table 7: Evaluate the relationship between smoking and symptoms

Status	Yes / smoking	No / smoking
Diarrhea	10	34
Constipation	7	18
Blood in the stool	8	12
Abdominal discomfort	5	14
Unexplained weight loss	12	11
Fatigue	13	1
Weakness	**13**	8

Unable to reject the null hypothesis since the computed χ^2 (2.92) is less than the crucial value (12.592). Based on the information supplied, this implies that smoking and the symptoms do not have a statistically significant association.

Table 8: Chi-Square test between smoking and the symptoms based on the provided data

χ^2	a	critical value	df
2.92	<0.05	12.592.	6

Table 9: Patient prevalence according to the relationship between body mass index and comorbidities

comorbidities	< 18.5 BMI	18.5–24.9 BMI	25.0 – 29.9 BMI	30 – 34.9 BMI	
Hypertension	4	2	8	11	
Diabetes	10	1	2	7	
renal failure	12	5	6	47	
None	16	2	16	17	

A substantial correlation between higher BMI and more comorbidities is confirmed by the t-value (3.11) and p-value (0.004), which show that patients with higher BMI (≥25) had a heavier burden of comorbidities than those with normal BMI, as shown in the table below.

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Table 10: Assessment outcomes of patients according to Results for BMI and Comorbidity

		T value	P value
BMI	With Comorbidity	4.32	0.001 Significant
	Without		
Comorbidity Index	High BMI (≥25)	3.11	0.004 Significant
	Normal BMI (<25)		

DISCUSSION

The primary aim of this paper is to show that, in addition to the already well-known advantages of screening in the long run, such as increased disease-free survival and decreased mortality from cancer, colorectal cancer screening is also correlated with superior post-operative outcomes (less complications and shorter periods of hospitalization).

Preoperative hemoglobin levels were lower in the patients within the scope of this study. There could be possible roles played by some other things like a higher number of stage I patients and increased laparoscopic approach rate during the screening process (Ishizuka, M. *et al*., 2007; Ostenfeld, E.B. *et al*., 2013). But also, it must be noted that perioperative transfusion is an independent risk factor of worse oncological outcomes. (Alves, A. *et al*., 2002)

Cancer patients undergoing surgery must pay attention to their nutritional status at all times. Albumin in blood serum is an easy way to measure visceral proteins and serves as an appropriate variable for assessing nutritional status. Some studies show that there's a correlation between albumin levels in blood serum with hospital mortality rates, post-operative problems, period of staying in hospitals, life quality, and prognostic value for individuals suffering from cancer. (Fazio, V.W. *et al*., 2004; Lemmens, V.E.P.P. *et al*., 2005; Regge, D. *et al*., 2016)

Preoperative serum albumin levels indicated that patients from the screening program had a better nutritional status (Honein-AbouHaidar, G.N. *et al*., 2014; Camilloni, L. *et al*., 2013). It is noteworthy to mention that 16.87% of the patients had hypoalbuminemia. However, in our study, we found overall higher co-morbidities, with the highest number being hypertension at 65 cases and anemia at 36 cases.

In our study, the serum albumin level was above 4.68 ± 0.23 g/dl, and for this reason, the limit was set up at <3.5 g/dl in most of studies dealing with evaluating the relationship between serum albumin and morbidity. This could be one reason why the significant statistical differences in serum albumin levels have not had much impact on clinical practice.

On the contrary, decreased values concerning serum albumin before surgery were related to increased death caused by cancer, that was shown by 7.23%, and reduced total lifespan for colorectal carcinoma and other tumors. Hence, there could be some underlying long-term consequences of variations in serum albumin that are not captured in this research.

This study has revealed an additional finding concerning the assessment of surgical risk in terms of short-term postoperative results. In patients who participated in a screening program, a higher percentage had low ASA I-II scores. Additionally, patients who had screening programs had lower age-adjusted Charlson comorbidity index scores.

The study performed by Inas Fadhil Oleiwi & Raid Najem Aboud (2023-2024) investigated 166 CRC patients (40-70 y.o.) in Iraq who carried out the immunological fecal occult blood test (FOBT) screening program and followed up with colonoscopy if positive. Some interesting findings are Gender Distribution: Female predominance was greater (61.45%) than males (38.55%), compared to the global incidence of CRC being more amongst men. Tumor Characteristics Stage III (40.96%) was the most occurring, indicating late detection compared with screening.

Colon cancer (64 cases) was more common than rectal cancer (19 cases). Plus, Clinical Outcomes had shorter hospital stays (60.24% <4 days), Low mortality (7.23%) and complication rates (33.73%), Better quality of life (QoL) post-treatment (EORTC QLQ-C30 scores: Physical Functioning = 3.53 ± 0.10, Symptom Burden = 2.01 ± 0.28).

The Iraqi study used FOBT followed by colonoscopy, similar to Hewitson, *et al*., (2007) and Grazzini, *et al*. (2009), who found FOBT effective but less sensitive than colonoscopy for adenoma detection.

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Regge, *et al*., (2009, 2016) and Pickhardt, *et al*., (2003) indicated that CT colonography (CTC) was comparable to colonoscopy (sensitivity: 78-88% for CRC, 85% for polyps ≥6 mm).

At the diagnosis stage, While Winawer, *et al*., (1993) asserted that colonoscopic polypectomy resulted in a 76–90% decrease in advanced-stage colorectal cancer in screened populations, the Iraqi studies stated that Stage III was 40.96%.

Mortality and Survival The 2013 findings of Ostenfeld *et al*., which also found that screening enhanced survival, are in line with the Iraq study's 7.23% mortality rate.

Since these declines are ascribed to screening and better treatment, the ongoing decline in CRC mortality worldwide—estimated at 45% in the USA—as reported by Torre, *et al*., (2015) and Ferlay, *et al*., (2013) would support the Iraqi conclusion.

The Iraqi study goes on to support the worldwide data showing that CRC screening improves QoL, lowers complications, and increases early detection. However, customized screening programs are necessary because to gender differences in distribution and other advanced-stage diagnoses. Future research should focus on long-term results, patient compliance, and cost-effectiveness as key goals in CRC prevention initiatives.

CONCLUSION

In this study, we found that colorectal cancer detected via screening program was associated with a decrease in minor complications and reduced hospital stay in patients suffering from detention cohort cross-sectional. These differences were upheld even when the focus was on individuals suffering from colon cancer. The drop in morbidity resulted primarily from the reduced percentage of complications.

By disseminating awareness of health and education across all health and educational settings, we can effectively emphasize the right age for screening and also spill the beans about how early intervention poses a life-saving potential. The study has revealed that early diagnosis screens the cancer and lowers death rates. In addition, diagnosis remains at the most favorable stages. To maximize the impact of such programs, integrated education activities must address such barriers as lack of awareness, fear, misinformation, etc. In that vein, healthier protocols ought to be fostered and implemented for colorectal cancer to ease its burden and foster confidence of improving health care to public use.

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