

Associations of Body Mass Index at Different Ages with Early-Onset Colorectal Cancer

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ABSTRACT

Background and Aim: The risk of colorectal cancer is significantly associated with excessive body mass index, the relationship between body fatness at a young age and the risk of colorectal cancer has proven equivocal. The aim of the present study was to assess the association of early-onset colorectal cancer with body mass index at different ages.

Methodology: This population-based control case study was conducted on 450 colorectal cancer patients and 410 controls in the department of Gastroenterology, Isra University Hospital, Hyderabad, Pakistan from March 2020 to February 2022. Standardized questionnaire was used for gathering patient's information such as medical history, sociodemographic, and lifestyle history with interviewers who collected information and data. All the patients with age less than 35 years and had histopathological evidence of colorectal cancer were included in this study. Prior to study conduction, ethical approval was taken from the respective hospital. Multiple regression model was used for estimating colorectal cancer. SPSS version 23 was used for data analysis.

Results: The risk of colorectal cancer at early-onset was compared in patients with body mass index of <25 kg/m² and >30 kg/m² at age between 20 and 30 years. The diagnosis of interviewers had early-onset CRC fold risk 2.6- (95% confidence interval, 1.19–5.32), 2.1- (confidence interval, 1.3–3.32), and 1.9- (95% confidence interval, 1.29–2.67). The link between BMI and early-onset CRC risk was most significant among, and virtually limited to, the majority of people who had never had a colonoscopy.

Conclusion: The present study found that being overweight or obese in early adulthood is closely connected with an increased chance of developing CRC. As a result, data strongly supports the notion that topical increases in the incidence of obesity among younger population may be a contributing cause to the rise in the prevalence of early-onset CRC. Our findings show that interventions to reduce the obesity pandemic in future generations will be important in preventing CRC.

Keywords: Early-onset colorectal cancer, Body Mass index, Different Ages

INTRODUCTION

Colorectal cancer is one of the major causes of mortality worldwide causative to almost 9% incidence of the total cancer cases [1]. Estimated cases of colorectal cancer were 1.8 million reported in 2018 [2]. The prevalence of early-onset CRC increased in Europe was mostly found in 20 years to 40 years old people. These patterns proposed that prevalence of various risk features for early-onset of CRC were unfavorably shifted [3]. The frequency of colorectal cancer has been growing in Asia, Europe, and America, while the incidence of CRC has been declined in France, Spain, and Italy [4]. The risk of colorectal cancer has been associated with several modifiable risk factors such as obesity, red meat, and sedentary behaviors [5]. In adults, the risk of colorectal cancer is significantly related with excessive body fatness measured by body mass index [6, 7]. The meticulous biotic mechanism of optimistic suggestion are not fully understood, but various parameters such as steroid hormones, insulin, inflammation, adipokines, and leptin are considered to play significant role in colorectal carcinogenesis [8].

Increased body mass commonly referred to excess body fatness is a significant risk factors for developing colorectal cancer [9, 10]. However, based on existing evidence and previous studies, mostly researches focused on investigating colorectal cancer at all ages. The incidence of CRC cases were approximately 5% to 10% in people of age between 50 and 55 years as reported in developed countries [11, 12]. The early-onset CRC caused by body fatness remains to be established. In recent decades, prevalence of obesity and overweight increased in children and adolescence [13]. As a result, it is feasible to speculate the adverse influence of body fatness on subsequent risk of colorectal cancer may have begun prior in life. Regardless of accumulating evidence associating adult body fatness to a higher risk of colorectal cancer, the relationship between body fatness at a young age and higher chances of colorectal cancer risk has remained inconclusive [14]. The present study aimed to assess the association of body mass index at different ages with early-onset colorectal cancer.

METHODOLOGY

This population-based control case study was conducted on 450 colorectal cancer patients and 410 controls in the department of Gastroenterology, Isra University Hospital, Hyderabad, Pakistan from March 2020 to February 2022. Standardized questionnaire was used for gathering patient's information such as medical history, sociodemographic, and lifestyle history with interviewers who collected information and data. All the patients with age less than 35 years and had histopathological evidence of colorectal cancer were included in this study. Prior to study conduction, ethical approval was taken from the respective hospital. Multiple regression model was used for estimating colorectal cancer. A proper definition of early-onset CRC has not been yet established but various studies specified 50 years age as the threshold age for screening guidelines. Women with implausible calorie consumption (500 or >3500 kcal/d) were removed, as were women with a prior diagnosis of cancer or inflammatory bowel illness at baseline. Participants who did not indicate their baseline or 18-year-old weight were also eliminated. We further removed individuals whose baseline body mass index (BMI) was less than 18.5 (measured as weight in kilograms divided by height in meters squared). Participants signed written informed consent forms.

The current body mass status were categorized based on standard acceptable criteria 18.5 to 20.5, 21 to 22.9, 23 to 24.9, 25 to 29.9, and >30 kg/m². Risk of EOCRC and current body mass index were evaluated as the primary analysis. Body mass index contribution to EOCRC, weight gain with age, and body shape were examined. SPSS version 23 was used for data analysis. In short, all the CRC incidence cases were followed and association of body mass index with early-onset CRC were examined. Cases of early-onset CRC were censored upon diagnosis for the analysis. Using a likelihood ratio test, P for heterogeneity was determined assuming a linear connection between current BMI and early-onset CRC. In 2-tailed testing, statistical significance was defined at P<.05.

RESULTS

The risk of colorectal cancer at early-onset was compared in patients with body mass index of <25 kg/m² and >30 kg/m² at age

between 20 and 30 years. The diagnosis of interviewers had early-onset CRC fold risk 2.6- (95% confidence interval, 1.19–5.32), 2.1- (confidence interval, 1.3–3.32), and 1.9- (95% confidence interval, 1.29–2.67). The link between BMI and early-onset CRC risk was most significant among, and virtually limited to, the majority of people who had never had a colonoscopy. Table-I shows the characteristics of younger participants. Figure-1 and Figure-2 illustrates the gender and age-wise distribution of the participants. Early-onset CRC risk association with current BMI is shown in Table-II. Table-III represent the risk of early-onset CRC with changes in weight and current BMI.

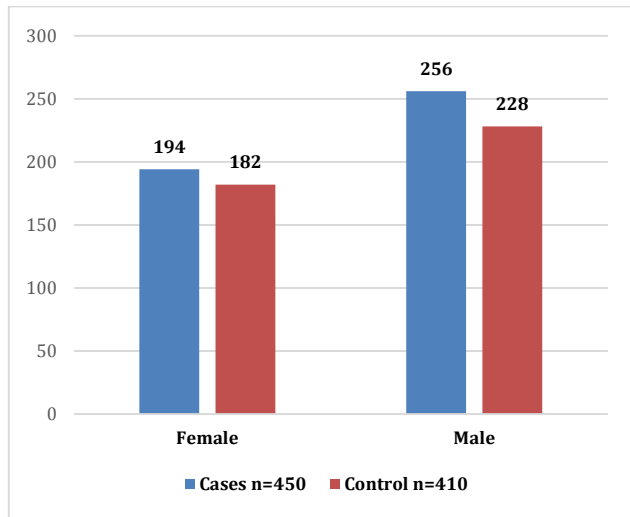


Figure-1: Gender distribution

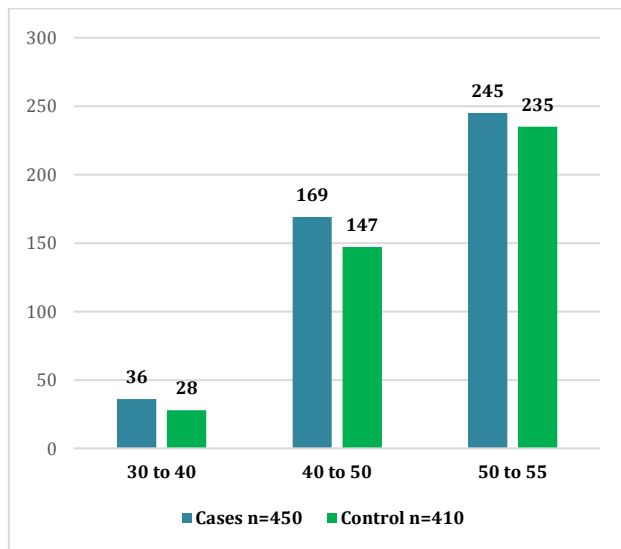


Figure-2: Age-wise distribution

Table 1:

Features	Current Body Mass Index			
	18.5-22.9	23-24.9	25-29.9	≥30
Age (years)	38.5	40.6	41.3	42.7
Height Mean (cm)	133 (7)	165 (6)	167 (7)	165 (7)
BMI at 18 y of age, mean (SD)	19.7 (1.8)	20.6 (2.2)	22.3 (2.6)	23.8 (3.9)
Family history of colorectal cancer	5.5	5.2	5.1	5.8
History of diabetes	0.6	0.8	1.3	4.5
Smoking status	32.3	32.4	32.5	32.8

Table-2: Early-onset CRC risk association with current BMI

Current BMI	Frequency (%)
18.5-22.9	103 (25.1)
23-24.9	136 (33.2)
25-29.9	158 (38.5)
≥30	13 (3.2)

Table-3: risk of early-onset CRC with changes in weight and current BMI.

Variable	Frequency	Age-Adjusted RR (95% CI)	Multivariable-Adjusted RR (95% CI)
<18.5	17	2.6 (1.19–5.32)	1.37 (0.79-2.19)
18.5-22.9	49	2.1 (1.3–3.32)	1.83 (1.09-2.81)
≥23	45	1.9 (1.29–2.67)	1.7 (0.92-1.29)

DISCUSSION

The current study is the primary investigative research to go thoroughly and statistically found the link between the risk of developing colon cancer and early-life body fatness. Our investigation data imply that increased body fatness at a young age is related with a higher risk for developing colorectal cancer irrespective of gender distribution. Nevertheless, the perceived positive connection seems to be restricted to colon cancer, since we identified no relationship with rectal cancer.

Numerous observational studies have looked into the links between childhood obesity and specific forms of cancer. The findings of these trials differed depending on the location of the malignancy [15]. Higher body fatness at a young age is related with a higher risk of endometrial cancer but with a lower risk of breast cancer [16]. In contrast, the link between early body fatness and prostate cancer appears to be less clear [17].

The exact mechanism of biochemical processes through which body mass index increased and contribute to cancer are needs to be determined, though multiple factors such as steroid hormones, insulin, and inflammation is associated with developing cancer [18]. Some authors associated increased body fatness with metabolic issues which includes hyperinsulinemia, and insulin in turn result to diabetes [19]. Carcinogenesis might be induced by insulin-like growth factor (IGF), excessive chronic hyperinsulinemia, and proteins binding [20].

The increased risk of colorectal cancer have been associated with several medical diseases like metabolic syndrome and type-2 diabetes [21, 22]. The risk of colorectal cancer has been established inverse association with use of Metformin [23]. Compared to rectal cancer, the chances of colon cancer could be developed slightly higher in patients with metabolic syndrome and type-2 diabetes [24].

Individuals with extra body fat had higher levels of inflammatory indicators, as evaluated by blood C-reactive protein [25]. Hyperinsulinemia and inflammation could play significant role in colon cancer and had less chances of rectal carcinogenic. Numerous research reveal that having more body fat in parenthood is related with colorectal cancer risk, with males having a larger relationship than women. Additionally, extra body mass fatness is connected with an increased risk of colon and rectal cancers, however the connection is slightly less for risk of rectal cancer [26, 27].

Excess abdominal fat has been linked to adverse metabolic profiles (e.g., hyperinsulinemia), which may lead to carcinogenesis [28]. It is very hard to identify the effects of childhood obesity on the risk of colon cancer. In contrast, obese children are more likely to be overweight or obese as adults. This emphasizes the importance of early intervention to avoid overweight or obesity.

CONCLUSION

The present study found that being overweight or obese in early adulthood is closely connected with an increased chance of developing CRC. As a result, data strongly supports the notion that topical increases in the incidence of obesity among younger population may be a contributing cause to the rise in the prevalence of early-onset CRC. Our findings show that

interventions to reduce the obesity pandemic in future generations will be important in preventing CRC.

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