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Risk Factors Associated with Colorectal Cancer at Abdoel Moeloek Regional General Hospital, Lampung Province

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Abstract

Colorectal cancer is a malignant neoplasm originating or growing in the colon and rectum, which become one of the malignant diseases with the highest prevalence in Indonesia. This research aimed to determine the association between risk factors and the incidence of colorectal cancer in RSUD Dr. H. Abdul Moeloek Bandar Lampung. This research was conducted from May to July 2018 at RSUD Dr. H. Abdul Moeloek Bandar Lampung, using the observational analytic method and a case-control design. The sample of this research consisted of 92 respondents, which was determined using the consecutive sampling technique—a measurement method used in the form of interviews and medical records. Data was processed using a statistical test with a 0.05 confidence level. The result of the Chi-square test showed that there was an association between age (p = 0.01), physical activity (p = 0.001), smoking history (p = 0.001), alcohol consumption history (p = 0.021), and diabetes Mellitus history (p = 0.012) with the incidence of colorectal cancer. There was an association between age, physical activity, smoking history, alcohol consumption history, and diabetes Mellitus history with the incidence of colorectal cancer in RSUD Dr. H. Abdul Moeloek Bandar Lampung.

Keywords: Age, Alcohol, Colorectal Cancer, Diabetes Mellitus, Physical Activity, Risk Factors, Smoking

1. Introduction

Colorectal cancer ranks as the fourth most prevalent malignant disease, following lung, breast, and prostate cancer. Additionally, this form of cancer ranks as the third most prevalent cause of cancer-related fatalities on a global scale.[1-2] According to a survey conducted at an Indonesian tertiary hospital, this malignancy constituted 73.7% of all gastrointestinal malignancies between 2002 and 2011.[3] Colorectal cancer primarily manifests through gastrointestinal bleeding, abdominal pain, and alterations in bowel habits, such as diarrhea and constipation. These symptoms are frequently misinterpreted as signs of benign anorectal conditions like hemorrhoids or anal fissures. Consequently, numerous instances of colorectal cancer that manifest in the first phase are subsequently identified at a later stage in the progression of the illness, thereby presenting as an advanced stage upon diagnosis.[4]

Ongoing research is being conducted to investigate the primary factors contributing to the rising prevalence of cancer. Several studies indicate that this phenomena may be linked to the rise of changeable risk factors, such as lack of physical exercise, obesity, gut microbiome, socioeconomic variables, and the adoption of a Westernized diet and lifestyle, which includes smoking, high-calorie intake, and low-fiber diet. Further data indicates that nonmodifiable risk factors, including genetics, race/ethnicity, diabetes mellitus, and family history of cancer, also contribute to the development of this particular type of cancer.[5]

Given the escalating prevalence of this malignancy in Indonesia, it is imperative to prioritize screening and early identification for

individuals at high risk. Nevertheless, there is a dearth of clinical data concerning risk factors for colorectal cancer in Indonesia. The objective of this study is to identify the risk factors linked to colorectal cancer among individuals in Lampung Province, Indonesia. Identifying the risk factors for colorectal cancer allows for targeted and proactive screening in high-risk populations, leading to enhanced early detection and optimal treatment outcomes for this kind of cancer.[6]

2. Methods

This research was observational analytical research with a case-control design. This research had received ethical approval from the Health Research Ethics Commission, Faculty of Medicine, University of Lampung, with letter number 5149/UN26.18/PP.05.02.00/2018. The research was conducted in May-July 2018 at RSUD Dr. H. Abdoel Moeloek Lampung Province. The population in this study was all patient data in the Digestive Surgery Department who were diagnosed and registered at RSUD Dr. H Abdoel Moeloek Bandar Lampung 2013–2018. The consecutive sampling method was used, and 92 patients were obtained and were divided into 46 patients for the case group and 46 patients for the control group. The case group is patients diagnosed with colorectal cancer and willing to become respondents. The control group was patients diagnosed with digestive disease and non-colorectal cancer. They were willing to become respondents—analysis of medical record documentation and interviews with respondents at RSUD Dr. H. Abdul Moeloek Bandar Lampung. The Chi-square test was used to find the relationship between variables, and the Odd Ratio (OR) value was also calculated.

3. Results

The characteristics of this research sample can be seen in Table 1. The distribution of the largest age group in the sample was ≥50 years, namely 67 people (72.82%. Half of the respondents had low physical activity, namely 47 patients (51.09%). A total of 65 patients (70.65%) were smokers. Many patients who experienced digestive disorders had a history of alcohol consumption (66 patients, 71.74%). In addition, a family history of diabetes mellitus (DM) was found in more than half, namely 50 patients (54.35%).

Tabel 1. Demographic and the clinical characteristics of subject's

Variables	Category	Frequency (n)	Percentage (%)
Ages	≥50 Years	67	72.82
	<50 Years	25	27.18
Physical activity	Sedentary	63	68.40
	Active	29	31.60
Smoking	Smokers	65	70.65
	Non-smokers	27	29.35
Alcohol	Yes	66	71.74
	No	26	28.26
Diabetes mellitus history	Yes	50	54.35
	No	42	45.65
Colorectal cancer	No	46	50
	Yes	46	50

In Table 2, it can be seen that the majority of people with colorectal cancer are over 50 years old. Only a few colorectal cancer sufferers are young. A significant relationship was found between age over 50 years and colorectal cancer with an Odds Ratio (OR) of 3.582, which means the risk of developing colorectal cancer is 3.582 times more significant in patients in the age category ≥50 years than in patients <50 years.

In Table 2, it can be seen that the highest number of people with colorectal cancer were in the sedentary life style group (p-value =

0.025 with an OR of 1.50. This means that in this study, the possibility of colorectal cancer occurring was 1.5 times greater in patients with low physical activity than in patients with low physical activity)—high physical activity patients.

Table. 2 Chi square test of association between risk factors and colorectal cancer

	Colorectal cancer	non colorectal cancer	p-value	Odd Ratio (OR)
≥ 50 years old	39	28	0.001	3.582
< 50 years old	7	18		
Sedentary life style	35	28	0.025	1.5
Phisically active	11	18		
Smokers	40	25	0.001	5.60
Non-smokers	6	21		
Alcohol consumer	38	28	0.021	3.054
Never consume alcohol	8	18		
Diabetic family history	31	19	0.012	2.937
No diabetic family hystory	15	27		

In Table 2, we see that many colorectal cancer patients had a history of smoking (p-value = 0.001, OR= 5.60). It was found that smokers were 5.60 times more likely to suffer from colorectal cancer than non-smokers. A relationship was also found between the history of alcohol consumption and the incidence of colorectal cancer at RSUD Dr. H. Abdul Moeloek Bandar Lampung, which can be seen in Table 2 (p-value = 0.021, OR= 3.054). The relation between family diabetic history and colorectal cancer value = 0.012 and 0R 2.937. This means that the risk of developing colorectal cancer is 2.937 times greater in patients with a history of diabetes mellitus than in patients without a history of diabetes mellitus.

4. Discussions

The results of our research in Lampung Province found that colorectal cancer (CRC) patients were more common in the age group ≥ 50 years. This data is by the epidemiology of this disease where the average age of colorectal cancer patients when diagnosed is 71 years, so this disease is often considered a disease of the elderly. However, this disease also occurs in young people.[7] The risk of colon cancer begins to increase after age 40 years and then increases sharply at age 50–55 years, then doubles each subsequent decade. Currently, many cases of colorectal cancer are found at a young age. Data from GLOBOCAN shows that the incidence of CRC in the United States decreases at ages over 50 years, and at ages 20-49 years, the incidence increases. The incidence of colorectal cancer in those aged 20–49 years in 1975 was 9.3/100,000, increasing to 13.7/100,000 in 2015, an increase of around 47.31%, while the incidence in the age group over 50 years decreased. Indonesia has a more significant percentage of young colorectal cancer patients than other countries.[8] Government policy is needed to make screening for this disease more targeted, as carried out by the Turkish government, which has a National Cancer Control Program that includes a population-based colorectal cancer screening program. The program recommends fecal occult blood testing (FOBT) every two years and colonoscopy every ten years for individuals aged 50–70. It aims to invite individuals in the target population to healthcare institutions to be screened, perform FOBTs, and provide the information and guidance required.[9]

This study showed that most colorectal cancer patients have low physical activity. Epidemiological data indicate that the increasing incidence of colorectal cancer in developed and developing countries may be caused by a sedentary lifestyle. It is estimated that people who are not physically active have a 50% higher risk of developing colorectal cancer compared to the most physically active people. Prolonged television viewing, sitting time at work, and total sitting time are associated with an increased risk of colorectal cancer. Regular physical exercise has been shown to improve immune system function, reduce inflammation, reduce stress, optimize metabolic rate, help regulate hormone levels, and prevent obesity and, as a result, may help protect individuals from cancer. [11]

The results of the study showed that many of the colorectal cancer patients studied had a history of smoking. This is in line with previous research, where tobacco smoke is a risk factor for the development of various types of cancer, including colorectal cancer. The results showed that people who smoke had a 2-3-fold increased risk of developing CRC compared with non-smokers and that the risk increased with the dose and duration of exposure.[12]

Additionally, smoking is thought to cause 12% of colorectal cancer deaths. Tobacco smoke contains a mixture of thousands of chemicals, more than 60 of which are carcinogens (e.g., N-nitrosamines, polycyclic aromatic hydrocarbons, aromatic amines, aldehydes, and metals) that are known to damage DNA. Mutations in colorectal epithelial cells can lead to the development of polyposis, which can transform into invasive adenocarcinoma.[13]

The results of this study showed that many of the colorectal cancer patients studied had a history of consuming alcohol. These results are from various previous studies; for example, a meta-analysis of 61 studies reported that moderate and heavy alcohol drinkers had a higher risk of colorectal cancer compared to non-drinkers or occasional drinkers.[14] Several mechanisms have been proposed for the association between alcohol consumption and the risk of developing colorectal cancer, including the metabolism of alcohol to acetaldehyde, carcinogenic effects of nitrosamines, increased folate degradation, modulation of folate absorption, mucosal and DNA damage, and modulation of gene expression.[15] Alcohol also induces hepatic inflammatory cytokines while reducing systemic natural killer and $CD8^+$ T cell populations. In preclinical tests, there was an increase in the expression of hepatic prometastatic factors (e.g., cytokines, chemokines, and adhesion molecules) in mice treated with alcohol.[16] Furthermore, processing the prognostic indicator carcinoembryonic antigen (CEA) by macrophages in alcohol-exposed livers produces tumor-promoting factors.[17]

The results of this study indicated that many of the colorectal cancer patients studied had a family history of diabetes mellitus. Diabetes mellitus is a metabolic disorder characterized by chronic hyperglycaemia due to abnormalities in insulin secretion and action. It is estimated that around 460 million people worldwide currently have diabetes, and that number will continue to increase.[18] Epidemiological data indicate that diabetes is an independent risk factor for several gastrointestinal cancers, including colorectal cancer. Individuals with type 2 diabetes have a two to three times greater risk of developing colorectal cancer compared to the non-diabetic population.[19] The development of colorectal cancer is thought to be related to the increased insulin concentrations and inflammatory conditions associated with the disease. Hyperinsulinemia may contribute to colorectal cancer directly by stimulating colonic cell proliferation and indirectly by

increasing levels of insulin-like growth factor 1 (IGF-1). IGF-1 is a mitogenic factor that increases cell growth and decreases cell death. In addition, chronic inflammation associated with diabetes also promotes carcinogenesis, malignant transformation, tumor growth, invasion, and metastasis through proinflammatory cytokines, such as tumor necrosis factor-alpha (TNF-α) and interleukin-6 (Il-6). Primary prevention is needed to prevent this cancer from occurring and targets people who have not yet had colorectal cancer.[20]

Primary prevention that must be carried out focuses on encouraging lifestyle modifications, including healthy eating patterns, increasing physical activity, stopping smoking, and stopping consuming alcohol. Health promotion targeting the young population is also needed to form healthy lifestyle habits in the future and increase cancer prevention behaviours. We can use social media marketing strategies through various platforms and channels, such as Twitter, TikTok, and Facebook, to deliver health promotion content.[21]

5. Conclusion

There was a significant relationship between age over 50 years, lack of physical activity, smoking behavior, alcohol consumption, and a history of diabetes mellitus with the incidence of colorectal cancer. To prevent and reduce the incidence of colorectal cancer, it is necessary to screen individuals who have these risk factors and modify their lifestyle to a healthy lifestyle, for example, increasing physical activity and avoiding the consumption of cigarettes and alcohol.

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