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Evaluation of Pre-Diagnosis Dietary Habits of Patients with Colorectal Cancer

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ABSTRACT:
Purpose: The aim of this study was to evaluate the effects of lifestyle and obesity on colorectal cancer patients.
Material and Methods: The study was conducted on 40 patients with colorectal cancer (Patient Group- PG) who received diagnosis in the past 6 months and 40 volunteer adult controls (Control Group- CG) who did not have any digestive system disorders and/or diagnosis of cancer. The questionnaire form, which was developed in order to determine the lifestyle and dietary habits of the individuals, was completed by the patients and the individuals in CG. Anthropometric measurements were taken by the researcher.
Results: The general mean age of the individuals was 59.8 ± 10.3 years in the PG and 59.6 ± 10.6 years in the CG. It was found out that colorectal cancer (CRC) history was present in 10% of the individuals with CRC and the history of other cancer types was present in the families of 32.5% of the individuals with CRC. The pre-diagnostic body weights of the individuals in the patient group were found to be higher than the body weights during the study. Sunflower oil consumption is 87.5% among the individuals in the PG and 67.5% among the individuals in the CG ($p<0.05$). The consumption of ready-made soups and meat and chicken bouillon is 37.5%, 40.0% in the PG and 10.0% and 12.5% in the CG, respectively ($p<0.05$).
Conclusion: It can be said that there is a relationship between colorectal cancer and lifestyle factors, and that changes may result in a reduced risk of developing colorectal cancer.
Keywords: *Body mass index, Colorectal cancer, Obesity, Dietary habits*

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INTRODUCTION

Cancer is an ever-increasing health problem all over the world and it is the leading factor of deaths (Fitzmaurice et al., 2015). Around the world, the incidence of cancer is approximately 20% higher among males than females and the incidence rates vary in males and females across the areas of residence (Bray et al., 2018). The World Health Organization (WHO) states that in 2020, there were 935 000 deaths from colon and rectal cancer (World Health Organization, 2021). The incidence rates of colorectal cancer vary according to the regions. The fact that the incidence of colon and rectum cancer varies with 8- and 6-fold variations, respectively, particularly in developing countries can be regarded as an indication of socio-economic development (Bray et al., 2018). The regions with the highest incidence of colon cancer are Europe (Hungary, Slovenia, Slovakia, Holland, and Norway), Australia/New Zealand, North America, and East Asia (Japan and the Korean Republic, Singapore). The rates of rectal cancer incidence have a similar regional distribution and the highest incidence among males is observed in the Korean Republic and the highest among females in Macedonia. It is stated that the incidence rates of colon and rectum cancers are lower in many regions of Africa and South Asia (Bray et al., 2018). It is denoted that colorectal

cancer (CRC), an important health problem of developed countries, arises due to mutual interactions of genetic susceptibility, environmental factors, and precancerous diseases and dietary habits are also effective on their occurrence (Buyukdogan et al., 2009; Buyukdogan ,2009; Topuz ve Aykan, 1998; Vaızoglu et al., 2010). Smoking, diet with high-fat/low-fiber content, and physical inactivity are shown to be among various environmental risk factors effective on the occurrence of CRC (Dong et al., 2017). In addition, between these factors the prevalence of overweight and obesity is dramatically increasing all over the world (Dong et al., 2017).

Obesity develops when exceeding energy consumption overtakes energy expenditure from metabolic and physical activity. Fat becomes deposited and it accumulates as ectopic fat tissue due to the accumulation of excessive or abnormal fat tissue which exceeds genetically and epigenetically determined adipose tissue stores, which leads to an increased risk of numerous disease entities (Avgerinos, 2019). Based on the International Agency for Research on Cancer Working Group (IARC), there is convincing evidence that excess body weight is associated with an increased risk for cancer of at least 13 anatomic sites, including endometrial, esophageal, renal and pancreatic adenocarcinomas, hepatocellular carcinoma, gastric cardia cancer, meningioma, multiple myeloma, colorectal, postmenopausal breast, ovarian, gallbladder, and thyroid cancers (Lauby-Secretan et al., 2016). However, the association between obesity and CRC is controversial. Rather than obesity, body fat distribution particularly abdominal obesity appears to play a role in the development of CRC (Dong et al., 2017). A recently conducted meta-analysis found a higher risk of colon cancer for each 5-unit increment in Body Mass Index (BMI) of 30% among men and 12% among women (Kyrgiou et al., 2017). This study aimed to assess the effects of lifestyle and obesity status of CRC patients on the occurrence of disease.

MATERIAL and METHODS

Purpose and Type of the Study

The aim of this study was to evaluate the effects of lifestyle and obesity on colorectal cancer patients. This descriptive cross-sectional study was conducted in Samsun.

Sampling and participant

This study was carried out on 40 patients (Patient Group-PG) diagnosed with colorectal cancer (CRC) within the last 6 months, who applied to the Oncology Department of Samsun Training and Research Hospital, and 40 volunteer adult controls (Control Group- CG) without any diagnosis of digestive system disorders and/or cancer, who applied to the polyclinics of eye, orthopedics, and otorhinolaryngology. Pregnant females and individuals aged below 18 with any digestive disorders and/or diagnosis of cancer and metastasis were excluded from the study. There are 22 males and 18 females that are age- and sex-matched in each group (a total of 44 males and 36 females).

Data Collection Tools

The question form that was developed in order to determine the lifestyle and dietary habits of all the individuals taken into the scope of the study was implemented by the researcher by using face-to-face interview method. The information about the individuals in the PG was collected to find out the practices both before the diagnosis and during the application of research. Body weight and height of all the individuals were measured and the BMI was calculated in kg/m^2. The body weight of the individuals in the PG before the diagnosis was questioned with the item “usual body weight”.

Statistical Analysis

The data used in the study were assessed through the Statistical Package for the Social Sciences (SPSS) and statistical significance was taken as $p<0.05$. The simple and cross distributions of the data that were determined by counting were presented in tables as numbers and percentiles. The differences between

the groups were analyzed through Chi-square test. The t-test was used for the comparison of two dependent groups that showed a normal distribution and the Wilcoxon test was used for those who did not show a normal distribution (Kalaycı, 2008).

Ethical Approval

The study was approved by the Institutional Review Board and Ethics Committee of Hacettepe University and all the subjects given their written consents in accordance with the Declaration of Helsinki.

RESULTS

Table 1 presents the socio-demographic characteristics of the individuals. Of the individuals, 55% are males and 45% are females. The general mean age of the individuals was 59.8 ± 10.3 years in the PG (60.2 ± 11.7 years for females and 59.6 ± 9.8 years for males) and 59.6 ± 10.6 years in the CG (59.1 ± 11.7 for females and 60.1 ± 10.0 years for males). University graduates comprise 2.5% of the PG and 22.5% of the CG. The individuals in both groups are usually married (97.5% in the PG and 82.5% in the CG).

Table 2 examines the family histories of the individuals in the PG related to CRC or the existence of other types of cancer. It was found out that 4 of the individuals had familial CRC history (rectum in one and colon in three). When the histories of the patients were examined in terms of other cancer types, it was determined that 32.5% had other types of cancer.

Table 3 presents the height, weight, and BMI averages of the individuals. The mean body weight was found to be 78.89 ± 3.16 kg in males and 73.91±3.28 kg in females in the CG. It was determined that the mean body weight at the time of the study was 69.9 ± 10.7 kg for males and 67.4 ± 13.6 kg for females. The body weight of the individuals in the PG prior to the diagnosis was found to be higher than body weight at the time of the study ($Z = -3.208$, $p = 0.001$ for females and $Z = -2.429$, $p = 0.015$ for males). In the same way, it was detected that the pre-diagnosis BMI values, which were 26.3 ± 4.0 kg/m^2 for males and 30.0 ± 5.3 kg/m^2 for females, dropped to 24.8 ± 3.5 kg/m^2 for males and 27.3 ± 4.2 kg/m^2 for females during the study and the difference between the two periods was significant ($p < 0.05$) for both sexes. The pre-diagnosis body weight of the individuals in the PG and the body weight of the individuals in the CG during the study and their BMI values were compared according to sexes, but the differences were not considered significant ($p > 0.05$).

Table 1. Demographic characteristics of individuals

	Control Group						Patient Group					
	Male		Female		Total		Male		Female		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Age												
<44	1	4.5	3	16.7	4	10.0	1	4.5	2	11.1	3	7.5
45-54	6	27.3	2	11.1	8	20.0	7	31.8	3	16.7	19	25.0
55-64	6	27.3	8	44.4	14	35.0	5	22.7	8	44.4	13	32.5
>65	9	40.9	5	27.8	14	35.0	9	40.9	5	27.8	14	35.0
χ±Sd	60.1±10.0		59.1±11.7		59.6±10.6		59.6±9.8		60.2±11.7		59.8±10.3	
Educational Status												
Illiterate	4	18.2	3	16.7	7	17.5	3	13.6	9	50.0	12	30.0
Literate	3	13.6	2	11.1	5	12.5	1	4.5	2	11.1	3	7.5
Primary school	5	22.7	9	50.0	14	35.0	17	77.3	7	38.9	24	60.0
High school	4	18.2	1	5.6	5	12.5	–	–	–	–	–	–
University	6	27.3	3	16.7	9	22.5	1	4.5	–	–	1	2.5
Marital Status												
Single	–	–	1	5.6	1	2.5	–	–	1	5.6	1	2.5
Married	22	100.0	17	94.4	39	97.5	20	90.9	13	72.2	33	82.5
Widow	–	–	–	–	–	–	2	9.1	4	22.2	6	15.0

Table 2. Distribution of individuals according to familial cancer history

	n	%
Colorectal Cancer		
Yes	4	10.0
No	35	87.5
No idea	1	2.5
Colorectal Cancer Type		
Rectum cancer	1	25.0
Colon cancer	3	75.0
Other Cancer Types		
Yes	13	32.5
No	27	67.5

Table 3. Average height of individuals, body weight before and after diagnosis and BMI averages

	Male	Female
	χ±Sd	**χ±Sd**
Patient Group		
Height (cm)	167.81 ± 1.17	156 ± 1.26
Weight (kg)		
Before diagnosis	74.3 ± 12.2	74.1 ± 16.2
After diagnosis	69.9 ± 10.7	67.4 ± 13.6
Z^{BD-AD} [a]	–2.429	–3.208
p	0.015	0.001
BMI (kg/m²)		
Before diagnosis	26.3 ± 4.0	30.0 ± 5.3
After	24.8 ± 3.5	27.3 ± 4.2
Z^{BD-AD} [a]	–3.181	–2.315
p	0.001	0.021
Control Group		
Height (cm)	168.91 ± 1.12	156.83 ± 1.16
Weight (kg)	78.89 ± 3.16	73.91 ± 3.28
Z^{BD-CG}[b]	-1.064	-0.065
p	0.287	0.948
BMI (kg/m²)	27.45 ± 4.48	30.11 ± 5.96
Z^{BD-CG}[b]	-0.678	-0.065
p	0.498	0.948

[a] Wilcoxon Test (BD-AD). [b] Mann- Whitney U Test (BD-CG). BD: Before Diagnosis AD: After Diagnosis

Table 4 presents Consumption frequency of certain nutrients of the individuals. The rates of those who prefer to consume fried eggs are 45% in the CG and 70% in the PG ($p<0.05$). The consumption of boiled red meat is 27.5% in the CG and 5% in the PG ($p<0.05$). Half of the individuals in the PG consume fried fish (PG: 50.0%, CG. 17.5%) ($p<0.05$). The rates of consuming sunflower oil are 87.5% in the PG and 67.5% for the CG ($p<0.05$). The consumption of ready-made soups and chicken/meat bouillon is 37.5% and 40.0% in the PG and 10.0% and 12.5% in the CG, respectively ($p<0.05$).

Table 5 presents the status of skipping meals of the individuals. Although the differences between PG and CG in terms of the status of skipping meals were not significant ($p > 0.05$), it was determined that the rate of those who did not skip meals in the CG and the pre-diagnosis PG was similar (37.5%) and this rate rose to 55.0% in the post-diagnosis PG. The most frequently skipped meal is usually lunch (pre-diagnosis PG: 92.6%, post-diagnosis PG: 85.0%, CG: 52.5%) and it was observed that the individuals in the PG skipped this meal more than those in the CG ($p > 0.05$) prior to the diagnosis. No differences were

found between skipped meals in the PG period to and after the diagnosis (p > 0.05). There is no significant difference between the individuals in the PG and CG in terms of the habit of eating at night (p > 0.05).

Table 4. Consumption frequency of certain nutrients

		Consuming		Not consuming	
		n	%	n	%
Fried eggs	PG	28	70.0	12	30.0
	CG	18	45.0	22	55.0
			X^2= 5.115	p=0.006*	
Boiled red meat	PG	2	5.0	38	95.0
	CG	11	27.5	29	72.5
			X^2= 7.440	p=0.006*	
Fried fish	PG	20	50.0	20	50.0
	CG	7	17.5	33	82.5
			X^2= 9.448	p=0.002*	
Sunflower oil	PG	35	87.5	5	12.5
	CG	27	67.5	13	32.5
			X^2= 4.588	p=0.032*	
Ready-made soups	PG	15	37.5	25	62.5
	CG	4	10.0	36	90.0
			X^2= 8.352	p=0.004*	
Chicken/meat bouillon	PG	16	40.0	24	60.0
	CG	5	12.5	35	87.5
			X^2= 7.813	p=0.005*	

[a] p<0.05

Table 5. Individuals skipping status

	Control Group		Patient Group			
			Before Diagnosis		After Diagnosis	
	n	**%**	**n**	**%**	**n**	**%**
Skipping Meal						
Yes	25	62.5	25	62.5	18	45.0
No	15	37.5	15	37.5	22	55.0
		Z[a]= 0.00	p= 0.309	Z[b]=-1.698	** p=0.090	
Skipped Meal[1]						
Breakfast	1	2.5	1	3.7	2	10.0
Lunch	21	52.5	25	92.6	17	85.0
Dinner	3	7.5	1	3.7	1	5.0
		Z[a]= -0.859	p= 0.050	Z[b]=-1.00	p=0.317	
Night Eating Habit						
Yes	7	17.5	8	20.0	10	25.0
No	33	82.5	32	80.0	30	75.0
		Z[a]=-0.285	p= 0.776	Z[b]=-0.707	p=0.480	

[a]Mann-Whitney U Test (BD-CG). [b]Wilcoxon Test (BD-CG). [1] Individuals marked more than one option.

DISCUSSION

It has been stated that males are at a higher risk than females in terms of developing CRC and mortalities of cancer. This is because biological factors of females such as hormonal and genetic characteristics differ from those of males and they respond differently to the risk of diseases (Payne, 2007). Similarly, in the study carried out by Gürsoy et al. in Kayseri on 250 individuals, 57.6% of the individuals were males, 42.4% were females, and the

male/female ratio was 1.3/1. The CRC prevalence was higher for males than females (Gürsoy et al., 2003). In this study, 55% of the individuals were males, 45% were females, and the male/female ratio was 1.2/1 (Table 1). It is also known that age factor is an important risk factor in CRC development (Bresalier ve Kim, 1998). The risk of CRC occurrence gradually rises in individuals aged between 40-50 years and this risk continues to increase, doubling every 10 years in such a way that it will peak in mid-seventies (Heavey et al., 2004). In this study, 63.6% of the males and 72.2% of the females with CRC are aged 55 years and above, which shows that increased age might be a risk factor for CRC.

The prevalence of obesity shows a remarkable increase in many places of the world and this increase lead to numerous obesity-related diseases (World Health Organization, 2021). High BMI is an important risk factor for certain cancer types (NDC, 2014). It was detected in this study that the pre-diagnosis BMI values, which were 26.3 ± 4.0 kg/m^2 for males and 30.0 ± 5.3 kg/m^2 for females, dropped to 24.8 ± 3. kg/m^2 for males and 27.3 ± 4.2 kg/m^2 for females during the study and the difference between the two periods was significant ($p < 0.05$) for both sexes. Moghaddam et al. examined the data of 9 cohort studies and showed that neither slightly overweight (BMI = 25.0-29.9 kg/m^2) nor excessively overweight (BMI > 30 kg/m^2) females had a statistically significantly increasing risk of CRC compared to females with normal weight (BMI < 25 kg/m^2) (Moghaddam et al., 2007). Caan et al. showed that BMI was related with an increased risk of colon cancer (Caan et al., 1998). In a prospective study conducted in Japan, a positive strong association was detected between BMI and the risk of colon cancer in males, while it was stated there was not a clear association among females (Shimizu, 2013).

It is proposed that there is an association between oil and CRC risk. However, this situation displays differences according to the type of oil (Braga, 1998). In this study, when oil consumption of the individuals was investigated, it was seen that a great majority of the PG consumed sunflower oil on a daily basis. The price of sunflower oil is more affordable compared to other oil types in Turkey, which may be considered as a factor for its higher preference rate. The limitations of this study are that the patient group is limited, and the findings of the study were collected from a single province.

CONCLUSION

In conclusion, as dietary habits and lifestyle, unlike all other factors, can be adjusted in terms of human health, they are highly important in protection against CRC. The process to be followed for protection against CRC can be determined by means of comprehensive cohort studies. By doing this, dietary habits of individuals who have CRC or who face the risk of CRC can be regulated, thus decreasing their risk of developing CRC. Moreover, these changes can provide a supplementary support in treatment of individuals with CRC. Certain types of cancer including CRC can be prevented or their incidence can be lowered with changes to be made in dietary habits and lifestyle.

Conflict of Interest

The authors have no conflicts of interest to declare.

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