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Risk Factors and Dietary Patterns in Digestive Cancers: A Case Series from Ibn Rochd University Hospital Center of Casablanca

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Abstract

Background: Cancer represents a major public health problem, with growing evidence suggesting a potential influence of dietary factors. The aim of this study is to characterize the socio-demographic and dietary profile of patients diagnosed with digestive cancers (esophagus, gastric and colorectal) at the Ibn Rochd University Hospital Center of Casablanca.

Methods: This prospective epidemiological study included 110 patients recruited at the Ibn Rochd University Hospital of Casablanca between January 2020 and July 2021. Data were analyzed using SPSS software.

Results: The mean age of our patients was 59.76 years (SD = 13.13) with a slight male predominance (56.4%). The majority of the patients are married (64.5%), 10.9% are single and 8.2% are divorced. Approximately 47.3% of the participants are illiterate, 36.4% are unemployed and 57.3% reside in urban areas. Regarding dietary habits, poultry, red meat and fish were consumed by 99.1%, 95.5% and 92.7% of patients, respectively. Nearly all participants reported consuming vegetables and fruits, while 76.4% consume French fries. The most frequently consumed dairy products are milk (70.9%), fermented milk (50%) and cheese (61.8%). Tea was among the most commonly consumed beverages with a proportion of 98.2%. Colorectal cancer was the most prevalent digestive tract cancer, accounting for 67.2% of cases, followed by gastric cancer (28.1%) and esophageal cancer (3.6%).

Conclusion: These results suggest that dietary habits may be involved in the development of certain digestive cancers in Morocco. Further case-control studies are required to more accurately assess this association.

Keywords: Digestive cancers; Diet; Risk factors.

Introduction

By the end of this century, cancer is expected to be the leading cause of death in every country in the world [1,2]. In 2020, an estimated 19.3 million new cases of cancer will be diagnosed worldwide and nearly 10 million people will die from cancer [3]. The global burden of cancer is projected to continue to increase around the world. By 2040, the worldwide incidence of cancers is estimated to increase by 47% compared to 2020 (28.4 million *vs.* 19.3 million) [1]. This increase would be even more pronounced (64% to 95% increase) in low and medium HDI (Human Development Index) countries such as Morocco [1,4]. The aging and demographic growth of the populations in these areas, along with the rising prevalence of recognized risk

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factors (such as smoking, physical inactivity, poor diet, and obesity), would all contribute to this projected increase [5]. A growing body of studies has identified certain dietary patterns as one of these risk factors that enhance the risk of cancer development. Therefore, foods such as processed meats, red meats, sugar, food additives, and various cooking methods are suspected to promote carcinogenesis process. However, it is still unclear to what extent dietary habits have an influence on the development of malignancies [6].-

Digestive tract cancers rank first among nutrition-related cancers. In Morocco, they are a major public health concern, accounting for 12.41% of all diagnosed cancers and 13.7% of cancer-related mortality, according to the Global Cancer Observatory. Estimates suggest that digestive tract cancers are among those whose incidence is expected to increase significantly in the coming decades, as they are most closely linked to lifestyle changes [1,6].

The aim of the present study is to describe the socio-demographic and dietary profile of patients with digestive tract cancers (esophageal, gastric and colorectal cancer) in the Moroccan population in order to propose dietary strategies that could prevent or at least reduce the incidence of these cancers.

Patients and Methods

Setting and study design

This is a cross-sectional epidemiological study, conducted at the Mohammed VI Center for Cancer Treatment and the Department of Digestive Cancer Surgery and Liver Transplantation at the Ibn Rochd University Hospital Center of Casablanca.

Study population

The study included 110 cases of digestive tract cancers (esophageal, gastric and colorectal cancer) diagnosed and histologically confirmed during an 18-month period from January 2020 to July 2021.

Data collection

Data were collected from medical records and through a self-administered information sheet completed by the patients, which included various clinical, medical, and sociodemographic information, including cancer type, age, sex, marital status, education level, occupation, place of residence, socioeconomic level, family and medical history, and toxicologic behaviors. Concerning dietary habits, data were collected regarding the frequency of consumption of foods prevalent in the Moroccan diet.

Data analysis

Statistical analysis of the data was performed using IBM SPSS (SPSS version 25) Statistics software.

Results

Sociodemographic information

A total of 110 patients with digestive cancers participated in this study **(Table 1).** The mean age of patients of all sexes is 59.76 years with a standard deviation of 13.13 and a slight predominance of males (56.4%) over females (43.6%). We note that almost the majority of our patients of both sexes are married, with a percentage of 64.5%. Regarding the level of education, about half of our patients (47.3%) are illiterate, and only 5.5% of our study population had a university education.

In our cohort, 36.4% of patients are unemployed, while 41.8% are employed and 15.5% are retired. Regarding the living environment, more than half of the patients live in an urban area (57.3%), while 34.5% live in a rural area. The majority (69.1%) of patients in our cohort belong to the lower socioeconomic class and (30.9%) to the middle class.

Table 1: Description of the sociodemographic data of the 110 cases of the digestive cancers studied (esophageal, gastric, and colorectal cancers) treated between 2020-2021 at the Center Mohammed VI for Cancer Treatment and the Department of Digestive Cancer Surgery and Liver Transplantation of the Ibn Rochd University Hospital Center of Casablanca.

Characteristics	Number of participants	(%)
Average age (years)	59.76 ± 13.13	
Sex		
Men	62	56.4
Women	48	43.6
Marital status		
Single	12	10.9
Married	71	64.5
Divorced	9	8.2
Widowed	18	16.4
Education		
Illiterate	52	47.3
Koranic school	14	12.7
Primary school	24	21.8
Secondary school	14	12.7
University	6	5.5
Occupation		
Unemployed	40	36.4
Employed	46	41.8
Retired	17	15.5
Other	7	6.4
Place of residence		
Urban	63	57.3
Suburban	9	8.2
Rural	38	34.5
Socioeconomic level		
Low	76	69.1
Middle	34	30.9
High	0	0

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Toxic habits

Regarding toxic habits, 13.6% of patients - both sexes - were smokers compared to 54.5% of nonsmokers, while 20% of patients were former smokers and 11.8% were exposed to passive smoking. In addition, 10.9% of patients consume alcohol **(Table 2)**.

Table 2: Toxic habits of the 110 cases of digestive cancers studied (esophageal, gastric, and colorectal cancers) treated between 2020-2021 at the Mohammed VI Center for Cancer Treatment and the Department of Digestive Cancer Surgery and Liver Transplantation of the Ibn Rochd University Hospital Center of Casablanca.

Characteristics	No. of cases	(%)
Smoking		
Smokers	15	13.6
Nonsmokers	60	54.5
Ex-smokers	22	20
Passive smoking	13	11.8
Alcohol consumption		
Yes	12	10.9
No	98	89.1

Medical history

Based on the data from the exploratory sheet, 28.2% of the patients had a first- or second-degree family history of cancer **(Table 3)**. More than half of the patients in our cohort (53.6%) had no medical history, while 10.9% had diabetes and 6.4% had *H. pylori* infection.

Table 3: Family history of cancer and medical history of the 110 cases of digestive cancers studied (esophageal, gastric, and colorectal cancers) treated between 2020-2021 at the Mohammed VI Center for Cancer Treatment and the Department of Digestive Cancer Surgery and Liver Transplantation of the Ibn Rochd University Hospital Center of Casablanca.

Characteristics	No. of cases	(%)
Family history of cancer		
No	9	71.8
Yes, 1st degree	19	17.3
Yes, 2nd degree	12	10.9
Medical history		
No history	59	53.6
Diabetes	12	10.9
Hypertension	9	8.2
Anemia	10	9.1
Helicobacter pylori	7	6.4
Other	13	11.8

Types and frequency of consumed food

The number of subjects classified by food group (shown in **Table 4)**. This study included 4 patients with esophageal cancer, 31 with gastric cancer, and 75 with colorectal cancer.

Table 4: Types and frequency of foods consumed by 110 patients diagnosed with digestive cancers (esophageal, gastric, and colorectal), treated between 2020-2021 at the Mohammed VI Center for Cancer Treatment and the Department of Digestive Cancer Surgery and Liver Transplantation of the Ibn Rochd University Hospital Center of Casablanca.

Type of food	Workforce	(%)	Type of food	Workforce	(%)
Red meats			**Pasta**		
Yes	105	95.5	Yes	58	52.7
No	5	4.5	No	52	47.3
Poultry			**Rice**		
Yes	109	99.1	Yes	92	83.6
No	1	0.9	No	18	16.4
Fish			**Moroccan pancakes**		
Yes	102	92.7	Yes	95	86.4
No	8	7.3	No	15	13.6
Khlii (Guedid)*			**Butter**		
Yes	29	26.4	Yes	86	78.2
No	81	73.6	No	24	21.8
Charcuterie			**Cooking oil**		
Yes	36	32.7	Yes	101	91.8
No	74	67.3	No	9	8.2
Sausages			**Olive oil**		
Yes	27	24.5	Yes	110	100
No	83	75.5	No	0	0
Canned fish			**Fermented milk**		
Yes	65	59.1	Yes	55	50
No	45	40.1	No	55	50
Eggs			**Cheese**		
Yes	101	91.8	Yes	68	61.8
No	9	8.2	No	42	38.2
Fruits			**Tea**		
Yes	109	99.1	Yes	108	98.2
No	1	0.9	No	2	1.8
Vegetables			**Coffee**		
Yes	110	100	Yes	65	59.1
No	0	0	No	45	40.9
French fries			**Milk**		
Yes	84	76.4	Yes	78	70.9
No	26	23.6	No	32	29.1
Fried foods					
Yes	93	84.5	* : dried and salted meats.		
No	17	15.5			

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All patients with digestive cancers enrolled in this study - both sexes combined - consume poultry, red meat, and fish with percentages of 99.1%, 95.5% and 92.7%, respectively. Eggs (91.8%) and canned fish (59.1%) were the next most commonly consumed foods. In contrast, patients reported less consumption of charcuterie (32.7%), followed by khlii/ guedid - a Moroccan dried and salted meat - (26.4%), and sausages (24.5%). Fruits and vegetables were consumed by all patients. However, 76.4% of the latter also reported eating French fries. The carbohydrates consumed by the patients in our cohort were rice (83.6%), Moroccan pancakes (86.4%), and pasta (52.7%). Regarding fatty products, our results showed a high consumption of olive oil, cooking oil, and butter by 100%, 91.8%, and 78.2% of patients, respectively. In addition, 84.5% of our patients consume fried foods. The results regarding the consumption of dairy products show that a significant proportion of our patients - 70.9%, 50% and 61.8%, respectively - consume milk, *raib* (fermented milk) and cheese.

Finally, in the category of beverages, we note a very important consumption of tea by 98.2% of the respondents, followed by the consumption of coffee (59.1%).

The frequency of consumption for each food type (in **Table 5)**. Patients were categorized into four groups based on their consumption frequency: never, 1–3 times per month, 1–3 times per week, and 4–7 times per week.

Table 5: Frequency of food type consumption among 110 patients diagnosed with digestive cancers (esophageal, gastric, and colorectal cancers) treated between 2020-2021 at the Mohammed VI Center for Cancer Treatment and the Department of Digestive Cancer Surgery and Liver Transplantation of the Ibn Rochd University Hospital Center of Casablanca.

Type of food	Never	1-3/month	1-3/week	4-7/week
	No. of cases (%)	No. of cases (%)	No. of cases (%)	No. of cases (%)
Red meats	5 (4.5)	10 (9.1)	57 (51.8)	38 (34.5)
Poultry	1 (0.9)	3 (2.7)	72 (65.5)	34 (30.9)
Fish	8 (7.3)	31 (28.2)	65 (59.1)	6 (5.5)
Khlii (guedid)	81 (73.6)	29 (26.4)	0 (0)	0 (0)
Charcuterie	74 (67.3)	12 (10.9)	21 (19.1)	3 (2.7)
Sausages	83 (75.5)	19 (17.3)	8 (7.3)	0 (0)
Canned fish	45 (40.9)	29 (26.4)	31 (28.2)	5 (4.5)
Eggs	9 (8.2)	14 (12.7)	68 (61.8)	19 (17.3)
Fruits	1 (0.9)	7 (6.4)	52 (47.3)	50 (45.5)
Vegetables	0 (0)	0 (0)	14 (12.7)	96 (87.3)
French fries	26 (23.6)	31 (28.2)	45 (40.9)	8 (7.3)
Pasta	52 (47.3)	18 (16.4)	39 (35.5)	1 (0.9)
Rice	18 (16.4)	22 (20)	62 (56.4)	8 (7.3)
Moroccan pancakes	16 (14.5)	26 (23.6)	60 (54.5)	8 (7.3)
Butter	23 (20.9)	22 (20)	48 (43.6)	17 (15.5)
Cooking oil	9 (8.2)	0 (0)	8 (7.3)	93 (84.5)
Olive oil	0 (0)	2 (1.8)	26 (23.6)	82 (74.5)
Fermented milk	55 (50)	0 (0)	47 (42.7)	8 (7.3)
Cheese	42 (38.2)	8 (7.3)	35 (31.8)	25 (22.7)
Tea	2 (1.8)	0 (0)	8 (7.3)	100 (90.9)
Coffee	46 (41.8)	11 (10)	24 (21.8)	29 (26.4)
Milk	33 (30)	9 (8.2)	47 (42.7)	21 (19.1)
Fried foods	17 (15.5)	36 (32.7)	40 (36.4)	17 (15.5)

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Discussion

Digestive cancers remain the most frequent cancers worldwide. Colorectal, gastric and esophageal cancers together account for 19.1% of the global incidence and 22.5% of all cancer-related deaths [7]. In Morocco, colorectal and gastric cancers are among the most frequent and the deadly digestive cancers [8]. Indeed, the mortality rates of these cancers in relation to the incidence rates are higher in developing countries than in developed countries [1]. The current study aims to characterize the socio-demographic and nutritional profile of patients with digestive cancers (esophageal, gastric, and colorectal cancers) in the Moroccan population.

In our cohort, the mean age of our patients was 59.76 years with a standard deviation of 13.13 years. Our results are consistent with those of the Cancer Registry of the Greater Casablanca Region for the cancers studied [9] and with those of the Rabat Cancer Registry [10]. The sex distribution of digestive cancers (colorectal, gastric and esophageal) shows a sex ratio of 1.29 with a slight male predominance. This result is comparable to the situation in Morocco and in the world and regarding the male predominance in colorectal cancer patients [11,12]. Similar patterns in incidence were also noted in gastric cancer which is more frequent in men than in women [1,13]. This difference observed between men and women can be explained by the high prevalence of risk factors such as smoking, alcohol and bad eating habits in men [14–16].

In our study, 13.6% of the patients smoked tobacco, 20% were ex-smokers and the rest were non-smokers (54.9%). International studies have shown an association between smoking and the risk of developing colorectal cancer and gastric cancer [17,18]. The other toxic habit, which is alcohol consumption, is associated with a higher risk of colorectal, gastric and esophageal cancers [19,20]. According to data from the 2017 Stepwise survey conducted by the Moroccan Ministry of Health, only 1.7% of Moroccans aged 18 years and older consume alcohol [21]. In our cohort, 10.9% of the patients were regular drinkers. Considering the low rate of alcohol consumption in the Moroccan population, this clearly confirms the association between alcohol and the occurrence of digestive cancers.

Regarding medical history, we notice that 10.9% of our patients are diabetic. Diabetes increases the risk of cancer in several organs/tissues, including the colon/rectum [22]. Although, this association is less evident in gastric cancer [23], but diabetes shares several risk factors with digestive cancers such as obesity [24], hyperinsulinemia [25,26], hyperglycemia [27,28], insulin resistance [26,29], *H. pylori* infection [30,31] and some of the hypoglycemic therapeutic agents (e.g., sulfonylureas and insulin) [32].

Diet is a major contributor to the increasing incidence of cancer worldwide, including cancers of the digestive tract [33]. In our study, red meat consumption is high. Nearly 95.5% of the surveyed patients of both sexes reported eating red meat every day. Although the results of research on the relationship between red meat consumption and cancer risk have been inconsistent, the findings were robust enough for the International Agency for Research on Cancer (IARC) to categorize red meat as a probable human carcinogen (Group 2A) [34], and for the World Cancer Research Fund (WCRF) to recommend limiting red meat consumption to 350-500 g per week [17]. Consumption of processed meats (charcuterie and sausages) was relatively low among our patient, which was a favorable factor considering that the consumption of processed meats has been associated with the development of several cancers, including colorectal cancer [35–39]. Consequently, for these reasons, processed meats have been classified by the IARC agency as carcinogenic to humans (Group 1) [40]. Poultry, fish, eggs, and dairy products are highly consumed by our patients (more than 50%) and could be valuable sources of protein and micronutrients that can help replace red meat. Several studies have shown either no causal relationship between white meat consumption and the risk of digestive tract cancers or even a reduced risk [41–43].

Among our patients, 26.4% reported the consumption of a Moroccan variety of salt-preserved meat (Khlii/guedid), although it remains a rather infrequent consumption. In fact, previous findings suggest that salt-preserved foods may have a greater impact than salt itself [44–46]. A significant proportion of our patients regularly consume fried foods. Previous studies have suggested a possible link between high-fat fried foods and cancer risk, including colorectal, gastric, and esophageal cancers [47,48].

Other dietary behaviors observed in our patients are, however, thought to be protective against certain types of cancer, such as consumption of fruits and vegetables, dairy products, vegetable oils, and beverages such as tea and coffee.

Conclusion

Our results show that several dietary patterns and toxic habits that increase cancer risk were observed among patients with digestive cancers in this study.

Conflicts of interest

The authors declare no conflict of interest.

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