Open Access Library Journal, 2014, 1, 1-7
Published Online June 2014 in OALib. http://www.oalib.com/journal
http://dx.doi.org/10.4236/oalib.1100555

OALib

Epidemiologic Profile of the Stomach Cancers in Morocco

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Received 22 April 2014; revised 31 May 2014; accepted 10 June 2014

Abstract

Background: The aim of this study was to estimate the proportion of stomach cancer and to determine linked risk factors. Methods: A retrospective study on available data in three oncology centers was performed. Random systematic selection was conducted among all patients registered over four years (2008-2011). Results: A total of 1145 cancer cases were included. Stomach cancer was more prevalent in men (sex ratio M/F = 2.5). This cancer was significantly more frequent in the age group between 51 and 70 years (p = 0.02), in smokers (p = 0.04), and in alcohol consumers (p = 0.04). Conclusion: This retrospective study highlights that even if the incidence of stomach cancer has declined over the last two decades in many countries, this cancer is still a serious public health problem in Morocco. Other prospective studies to identify other risk factors are highly recommended to adjust health strategies in our country.

Keywords

Stomach Cancer, Risk Factors, Morocco

Subject Areas: **Epidemiology, Oncology, Public Health**

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How to cite this paper: Obtel, M., Nejjari, C., Zidouh, A., Belakhel, L., Bendahhou, K., El Menzhi, O., Mathoulin Pelissier, S. and Bekkali, R. (2014) Epidemiologic Profile of the Stomach Cancers in Morocco. *Open Access Library Journal*, **1**: e555.
http://dx.doi.org/10.4236/oalib.1100555

1. Introduction

Cancer is now among the leading causes of death in the world. All communities are affected by cancer, but there are striking regional differences. Today the situation is distinguished by the emergence of cancers in countries that have an average economic level [1]. Cancer disease remains a public health problem and is the current subject of many much epidemiological and therapeutic research. Stomach cancers are frequent and severe digestive diseases. Recent scientific advances have clarified the etiopathogenicity of these cancers, confirming the relationship with Helicobacter pylori. Diagnosis is based primarily on upper gastrointestinal endoscopy and pathological analysis. The use of radiological examinations has great utility in staging and therapeutic orientation. The treatment is mainly based on surgical excision associated with lymph node dissection for curative purposes. Other methods have a palliative effect. The prognosis is poor with the 5-year survival rate not exceeding 25%. The incidence of stomach cancers has decreased over the last decade in developed countries, however, in Morocco, the only available epidemiological data on these cancers (excluding Globocan database [2]) are those of the Casablanca Cancer Registry (2007) and the Rabat Cancer Registry (2008) [3] [4].

Unsystematic clinical observations have raised questions about the frequency and the outcome of stomach cancers in the Regional Oncology Centre (ROC) of Agadir. This implies that there is a high incidence of stomach cancer in the catchment area of the ROC, which consists mainly of Agadir Souss-Massa Draa Guelmim-Es-Smara, Laayoune-Boujdour-Sakia El Hamra and Oued Ed-Dahab-Lagouira. But we do not have reliable data, populationnal or hospital on the types of stomach cancer and stages of diagnosis in the region. The approach of our research topic in studying stomach cancers at the Regional Oncology Centre of Agadir is mainly based on the files of cancer patients. These patient files remain a tool for recording, monitoring and archiving cancer information and are also a data source, enlightening physicians on the patient's medical history, the clinical and pathological diagnosis, and facilitation of medico-surgical care. The purpose of this epidemiological study was to determine the frequency of stomach cancer in Agadir and compare this frequency with other oncology centers in Morocco. The aim of this study was to estimate the proportion of stomach cancer and to determine same linked risk factors.

2. Methods

2.1. Study Design

It is an exploratory retrospective study based on available data in three oncology centers in Morocco *i.e.*: Agadir, Casablanca and Oujda. All patients registered during the four years (2008-2011) were included in the study. The study was conducted between March 21 and May 25, 2012, in the three oncology centers.

2.2. Population and Data Collection

Among patients registered at the three centers during the period between 2008 and 2011, 600 files from the Oncology Centre of Casablanca, 300 files from the ROC of Agadir, and 300 files from the Oujda ROC were randomly selected. Sociodemographic and clinical data were collected from patient files by doctors previously trained over a period of one month using a standardized collection sheet. A pilot study was conducted on 15 cases in January 2010 at the oncology center of Casablanca, and items linked to some nutrition behaviors were removed from the questionnaire because the information didn't exist in the patient files tested.

Ethical considerations were respected by preserving the anonymity of data.

2.3. Data Analysis

Data were validated and recoded for statistical analysis. Around 19 files of patients under 16 years old with no stomach cancers were excluded from the analysis. Only records of patients aged 16 years and over were included. Descriptive analysis of demographic and clinicopathologic population was performed. Analysis was performed on factors associated with stomach cancer, stages of diagnosis and delays related to diagnosis and treatment, as well as a comparison of the frequencies of stomach cancer between different centers. Finally, univariate analysis was performed using parametric (Chi2 test) and nonparametric (Fisher test) tests according to the conditions. The statistical test is considered significant if $p < 0.05$. Statistical analysis was performed using statistical software: Epi Info version 3.6.

2.4. Ethical Considerations

The survey underwent ethical review. The purpose was explained in details to each patient agreeing to participate in the study, and oral informed consent was obtained prior to interviews. Anonymity of questionnaires was strictly respected.

3. Results

The study included a total of 1,145 cases of cancer patients, including 281 from the ROC of Agadir, 293 from the ROC of Oujda, and 559 from the oncology centre of Casablanca (**Table 1**). Description of the study population was carried out according to sociodemographic and clinic-pathological characteristics.

3.1. Description of Sociodemographic and Clinicopathologic Characteristics

In total, 1,145 file cases of cancer patients were included: 281, 293, and 559 from the ROCs of Agadir, Oujda, and Casablanca, respectively. The mean age of the population included in the study was 54.7 years (standard deviation = 14.7 years and range from 17 to 96 years).

The average age of a stomach cancer patient was 54 years (SD = 15.7 years and range from 30 to 82 years). Most participants were from an urban area (61.5%), female (60%), aged between 51 and 70 years (44.4%), married (73.3%) and without health insurance (80.6%). Almost a quarter (21.4%) was in the workforce and 18% were unemployed. Furthermore, only 10.9% among the patients surveyed had a secondary level of education, whereas the illiterate accounted for more than 78.2%. In the three oncology centers, more than a quarter (27%) of patients was overweight, and 14.7% were obese. About 18% were smokers (daily and occasional smokers) and more than 8% were alcohol consumers (daily and occasional consumers). In both sexes, the most common cancers were breast cancer (25.6%), followed by cervical cancer (10.7%), lung cancer (8.7%), and colorectal cancer (6%). Cancer of the stomach came in fifth position (5.2%). More than 87% of these cancers were primitive tumors. **Table 1** shows that a significant number of patients from the Agadir and Casablanca oncology centers were from urban areas (55.4 % and 76.0 % versus 44.6% and 24.0 % from rural areas, respectively p = 0,001). At the oncology center of Oujda, on the other hand, the majority of patients were from rural areas (59.3% versus 40.7% from urban areas, p = 0.001). In both sexes, the most common cancers were breast cancer (25.6%), followed by cervical cancer (10.7%), lung cancer (8.7%), and colorectal cancer (6%). Cancer of the stomach came in fifth position (5.2%). More than 87% of these cancers were primitive tumors. **Table 1** shows that stomach cancer represented 6.4%, 5.6% and 4.5% of all cancers registered in oncology centers of Agadir, Oujda and Casablanca, respectively.

Among the 21 stomach cancer files with information on the localization and histological type of cancer, distal location (antrum) (71.4%) and well differentiated adenocarcinoma (47.6%) was the most predominant location and histological types, respectively.

The most common type of cancer in the oncology center of Agadir was breast cancer (23.1%), followed by cervical cancer (11.4%), and colorectal cancer (6.9%). Stomach and lung cancer rank in the fourth position (6.2%) (**Table 1**). In the oncology center of Casablanca, the most frequent cancer was breast cancer (23.5%), followed by cervical cancer (11.9%), lung cancer (11.3%) and colorectal cancer (5.7%). Stomach cancer was classed fifth (4.4%). In the oncology center of Oujda, breast cancer was the most common cancer (30.9%), followed by cervical cancer (6.9%), and lung cancer (6.2%). Stomach cancer was in the fourth position with colorectal cancer (5.6%). In addition, other types of cancer were less frequent in the three study centers (**Table 1**). These differences in cancer localization among the oncology centers were statistically significant (p = 0.02). **Table 1** also shows that the patients of the three oncology centers presented significant differences associated with profession, health insurance, Body Mass Index, cancer localization, and cancer type. **Table 2** and **Table 3** show the different localization of cancers in men and women in the oncology centers.

3.2. Factors Associated to Stomach Cancer in Morocco

Stomach cancer was significantly more frequent in the age group between 51 and 70 years (p = 0.02), in men (p < 0.001), and unemployed patients (p = 0.002). Stomach cancer was also significantly related to alcohol and tobacco use and to body mass index (**Table 4**). Indeed, smoking was significantly higher in stomach cancer patients (30.8%) than in those with other cancers (17.3%) (p = 0.04). Alcohol consumption was significantly higher in

Table 1. Distribution of demographic and clinicopathologic in the oncology centers.

	Agadir		Casablanca		Oujda		p-value
	N	%	N	%	N	%	
Age							
≤30	16	5.7	25	4.5	16	5.5	0.14
[31]-[50]	105	37.4	180	32.2	115	39.2	
[51]-[70]	112	39.9	273	48.8	118	40.3	
>70	48	17.1	81	14.5	44	15.0	
Sex							0.6
Female	168	58.1	339	59.3	186	62.2	
Male	121	41.9	233	40.7	113	37.8	
Residence Area							<0.001
Rural	128	44.6	135	24.0	176	59.3	
Urban	159	55.4	428	76.0	121	40.7	
Education Level							NA
Illiterate	43	78.2	0	0.0	0	0.0	
Primary	6	10.9	0	0.0	0	0.0	
Secondary	6	10.9	0	0.0	0	0.0	
Profession							<0.001
Active	13	17.1	141	27.3	32	11.4	
Unemployed	1	1.3	84	16.3	71	25.4	
Student	1	1.3	6	1.2	1	0.4	
Housewife	55	72.4	257	49.8	160	57.1	
Retired	6	7.9	28	5.4	16	5.7	
Marital Status							0.2
Single	17	13.8	71	13.0	37	12.6	
Divorced	2	1.6	26	4.7	5	1.7	
Married	94	76.4	388	70.8	220	74.8	
Widowed	10	8.1	63	11.5	32	10.9	
Medical Insurance							<0.001
No	180	71.7	427	82.0	255	85.6	
Yes	71	28.3	94	18.0	43	14.4	
IMC							0.003
Normal	36	52.9	217	63.6	66	48.9	
Obese	12	17.6	51	15.0	17	12.6	
Overweight	20	29.4	73	21.4	52	38.5	
Tabacco							0.006
Ex Smoker	4	2.1	38	7.1	12	4.2	
Smoker	33	17.2	108	20.0	38	13.4	
No Smoker	155	80.7	393	72.9	233	82.3	
Alcohol							0.02
Consumer	18	9.3	52	9.6	11	3.9	
Ex consumer	3	1.5	22	4.1	6	2.1	
No Consumer	169	87.1	460	85.3	263	92.9	
Tumor Localization							0.02
Colorectal Cancer	20	6.9	32	5.7	16	5.6	
Prostate Cancer	9	3.1	13	2.3	7	2.4	
Bladder Cancer	4	1.4	18	3.2	9	3.1	
Lung Cancer	18	6.2	64	11.3	18	6.2	
Cervical Cancer	33	11.4	67	11.9	20	6.9	
Breast Cancer	67	23.1	133	23.5	89	30.9	
Gastric Cancer	18	6.2	25	4.4	16	5.6	
Lymphoma	19	6.6	15	2.7	13	4.5	
Other	102	35.2	198	35.0	100	34.7	
Tumor Type							<0.001
Primitive	270	96.8	512	95.9	184	63.7	
Secondary	9	3.3	22	4.1	105	36.3	

Table 2. Description cancer types in the oncology centers in women.

	Agadir		Casablanca		Oujda	
	N	%	N	%	N	%
Stomach Cancer	5	3.0	9	2.7	3	1.7
Lung Cancer	66	40.2	130	39.3	87	48.6
Prostate Cancer	33	20.1	68	20.5	20	11.2
Bladder Cancer	9	5.5	17	5.1	10	5.6
Colorectal Cancer	1	0.6	6	1.8	0	0.0
Breast Cancer	2	1.2	3	0.9	1	0.6
Lymphoma	5	3.0	9	2.7	8	4.5
Other	43	26.2	89	26.9	50	27.9

Table 3. Description of cancer types in the oncology centers in men.

	Agadir		Casablanca		Oujda	
	N	%	N	%	N	%
Stomach Cancer	13	11.2	16	7.1	13	12.3
Lung Cancer	17	14.7	58	25.7	17	16.0
Prostate Cancer	9	7.8	12	5.3	7	6.6
Bladder Cancer	2	1.7	15	6.6	8	7.5
Colorectal Cancer	9	7.8	14	6.2	6	5.7
Breast Cancer	1	0.9	2	0.9	2	1.9
Lymphoma	13	11.2	5	2.2	5	4.7
Other	52	44.8	104	46.0	48	45.3

stomach cancer patients (17.3%) than in those with other cancers (7.8%) ($p = 0.04$). Alcohol was associated with smoking at 17.3%. Patients with stomach cancer had a significantly lower BMI than those with other cancers (**Table 4**). In addition, no other statistically significant associations between stomach cancer and other factors were found.

4. Discussion

In Morocco, the only available data source of cancers is the cancer registries of Casablanca and Rabat. These cancer sources show that stomach cancer is ranke d in the 6 - 7th position among all cancers in Morocco and is the second most common digestive cancer after colorectal cancer [2]-[4]. The aim of the study was to estimate the proportion of stomach cancer and to determine risk factors associated with it in Morocco. The incidence of gastric cancer is higher for men than for women in all regions of the world with a sex ratio (M/F) ranging from 1.3 to 2.5 [5]-[9]. In our study, this dominance was highlighted by 42 men (71.2%) versus 17 women (28.8%), with a sex ratio (M/F) of 2.5. The incidence of stomach cancer increases with age in both sexes [5]-[9]. This cancer rarely occurs before the age of 40. The average age at diagnosis is around 55 years in several studies including ours, where the average age of patients with stomach cancer was 54 years (SD = 15.7 years). This cancer was significantly more frequent in the age group between 51 and 70 years ($p = 0.02$). In the Western countries, the average age of primitive stomach cancer is higher [10] [11]. Regarding socioeconomic status, in several epidemiological studies of occupational analysis the predominance of stomach cancer is in disadvantaged social groups [9]. In our study, the majority of stomach cancer patients were not in the workforce (38.3% are unemployed and 31.9% housewives, $p = 0.002$). Stomach cancer was also significantly related to alcohol and tobacco use. The association between smoking and stomach cancer has been widely raised. According to some authors, stomach cancer risk increases by 50% in smokers [12] [13]. At the Moroccan oncology centers, tobacco and alcohol behaviors were significantly higher in patients with stomach cancer than in those with other cancers. Worldwide, incidence rates have declined by about 15 percent since 1985 and continue downward, at least in higher income countries, especially in Western industrialized countries *i.e.*, USA, Denmark, Iceland, Australia, New Zealand, Norway and England [14] [15]. Possible reasons are lower rates of Helicobacter pylori infection

Table 4. Factors associated with gastric cancer at three centres.

		Other Cancers		Stomach Cancer		P
		N	%	N	%	
Age	≤30	55	5.2	1	1.7	0.02
	[31]-[50]	380	36.0	13	22.0	
	[51]-[70]	457	43.3	37	62.7	
	>70	163	15.5	8	13.6	
Sex	Female	657	61.8	17	28.8	<0.001
	Male	406	38.2	42	71.2	
Residence Area	Rural	400	38.1	25	43.1	0.44
	Urban	651	61.9	33	56.9	
Educational Level	Illiterate	39	79.6	3	60.0	0.60
	Primary	5	10.2	1	20.0	
	Secondary	5	10.2	1	20.0	
Profession	Active	170	21.1	10	21.3	0.002
	Unemployed	136	16.9	18	38.3	
	Student	5	0.6	0	0.0	
	Housewife	449	55.8	15	31.9	
	Retired	45	5.6	4	8.5	
Marital Status	Single	110	12.3	5	10.4	0.41
	Divorced	30	3.4	2	4.2	
	Married	651	72.9	39	81.3	
	Widowed	102	11.4	2	4.2	
Medical Insurance	No	787	80.3	48	84.2	0.47
	Yes	193	19.7	9	15.8	
BMI	Normal	283	56.8	25	86.2	0.007
	Obese	77	15.5	1	3.4	
	Overweight	138	27.7	3	10.3	
Smoking Status	Ex-Smoker	50	5.4	3	5.8	0.04
	Smoker	161	17.3	16	30.8	
	Non-Smoker	718	77.3	33	63.5	
Alcohol	Consumer	72	7.8	9	17.3	0.04
	Ex-consumer	27	2.9	2	3.8	
	Non-consumer	821	89.2	41	78.8	

over time (possibly a result of better living conditions), better food storage and preservation, and greater availability of fresh fruits and vegetables. Even if the current long term trends continue, however, there will be more than 1 million cases of stomach cancer in 2010 [16]. This decrease concerns only distal cancers (antrum and pylorus) while proximal cancers (especially around the cardia) tend to increase [9]. In our study, the antrum cancer was the most important location relative to other locations (71.4%), and well differentiated adenocarcinoma was the most frequent (47.6%). Data on other risk factors implicated in cancer of the stomach, Helicobacter Pylori included, salty food and personal and family history of precancerous lesions of gastric cancer were absent in the patient files in the three oncology centres. Therefore, we were not able to clearly define the high-risk population; other more detailed studies would be very useful and complementary. In addition, data for cancer-related mortality in Morocco is still not available and the only sources are those reported by WHO (Globocan 2008) which states that stomach cancer is the fourth leading cause of death from all cancers for both genders [4].

Based on these results and in the light of the literature, the following recommendations could be made:

- Conduct prospective studies to assess the epidemiology of actual Helicobacter pylori infection in Morocco and its involvement in the genesis of stomach cancer.
- Determine high population risk of stomach cancer.
- Strengthen existing cancer registries and implement other regional registries in order to assess clearly the epidemiology of stomach cancer.
- Establish a system for monitoring medical patients with stomach cancer to assess their survival.

In conclusion, even if the incidence of stomach cancer has declined over the last two decades in many countries, it is still a serious public health problem in Morocco. Results showed that it is the second digestive cancer after colorectal cancers, not just in the oncology center of Agadir, but also in the Oujda and Casablanca oncology centers. The lack of surveillance policies focused on stomach cancers makes the assessment of its prognosis difficult. A multidisciplinary approach targeted at the treatment of this cancer is highly recommended.

Conflicts of Interest

None.

Acknowledgments

We dedicate special thanks to all those who contributed to data collection in the three oncology centers of Agadir, Casablanca and Oujda.

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