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Epidemiological and Histopathological Aspects of New Cancer Cases Diagnosed In South of Tunisia during 2015-2016

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Abstract

Introduction: Cancer is a national and global public health problem. Updated epidemiological data are needed to develop cancer control plans.

Material and methods: This is a retrospective, observational study of new cancer cases reported in the governorate of Medenine during the years 2015 and 2016.

Results: A total of 1061 cases of cancer were collected. A slight female predominance was noted. The Age Standardized Incidence Rate (ASIR) was 104.55/100000. The patients' mean age was 60.5 years. The five most common cancers in men were bladder (19.1%), lung (14.4%), colorectal (13.6%), prostate (11.8%), and stomach (5.1%). However, the five most common cancers diagnosed in women were breast (35.6%), colorectal (12.3%), stomach (5.2%), uterine corpus (4.5%) and bladder (4%).

Conclusion: This work would be the draft of a cancer register in the governorate of Medenine. This register is essential for the development of a health policy adapted to the specificities of the region.

Keywords: Cancer; Incidence; Epidemiology; Pathology; Tunisia

Introduction

Cancer is a major public health problem responsible for significant morbidity and mortality worldwide. It is a pathology that has a significant cost, both human and economic. According to the 2014 World Cancer Report, it accounted for an estimated 12.7 million new cases in 2008 and 14.1 million new cases in 2012. Mortality from cancer was estimated at more than 8 million cases in 2012. This trend is expected to continue for the next years. Indeed, the number of new cases is expected to witness a further increase by 75%. This will bring the number of cancer cases to nearly 25 million over the next two decades [1]. Taking these predictions into account, prompt decisions to establish a national cancer register and cancer control programs incorporating a prevention policy are needed.

In Tunisia, in the absence of a national cancer register, three regional cancer registers were developed from 1998; in Tunis for the North region, in Sousse for the Center region, and in Sfax for the South region, respectively. The latter only involved the governorate of Sfax according to the 2007 edition.

This study is the first to investigate the epidemiological and histopathological aspects in a region belonging to the South of the country, apart from Sfax. It is part of the efforts made to develop a cancer register in the governorate of Medenine and more generally in the South. The ultimate goal would be a valid national register, which would be the starting point for a health policy on cancer, adapted to the Tunisian context and responding to the specificities of all the regions. These data will allow decision-makers in the field of public health to assess the population needs in terms of cancer care, to place prevention strategies, and to evaluate their efficiency.

The objective of this work was to study the epidemiological aspects and the histopathological characteristics of the new cancer cases diagnosed in the governorate of MEDENINE over the period extending from January 1, 2015 to December 31, 2016.

Presentation of the region and the population

The governorate of MEDENINE is located in the south-east of Tunisia on the Tunisian-Libyan border. It covers an area of 9,167 km2, representing 5.9% of the total area of the country [2]. In 2014, it had 479,520 inhabitants with a population density of 52 inhabitants/km2 [3] **(Figure 1)**.

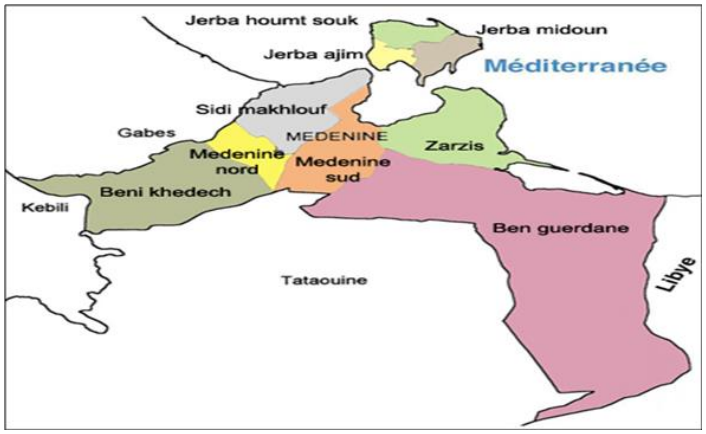

Figure 1 Geographical location of the governorate of MEDENINE

The governorate of MEDENINE has 119 basic health centers, 3 district hospitals, 3 regional hospitals, and 1 university hospital with a total of public beds estimated at 774 beds. The governorate has 7 private clinics with 407 beds and it has 219 free practice practitioners. The average access distance to a regional hospital is 20 km. The total number of doctors in the governorate is equal to 502 i.e. it has a density of doctors of 103.6/100,000 inhabitants (Health map 2015) [4].

The governorate urbanization rate is 78.6%. The schooling rate is 97.21% for the age group 6-14 and 37.29% for the age group 19-24. The mean age varies between 30.3 and 33.1 years, with 25.31% of the inhabitants being children under the age of 15 and 25.11% of the inhabitants belong to the age group between 15 and 29 years. Residents over the age of 60 represent only 11.44%. The population distribution according to age and sex is shown in **Figure 2**. The total fertility rate is 2.2 with an Overall Fertility Rate of 71.4 per 1000 women of reproductive age (15 to 49 years). The proportion of women of reproductive age is 56%, accounting for 247886 women. In 81.43% of all marriages, the wife is under 35 years **(Figure 2)**.

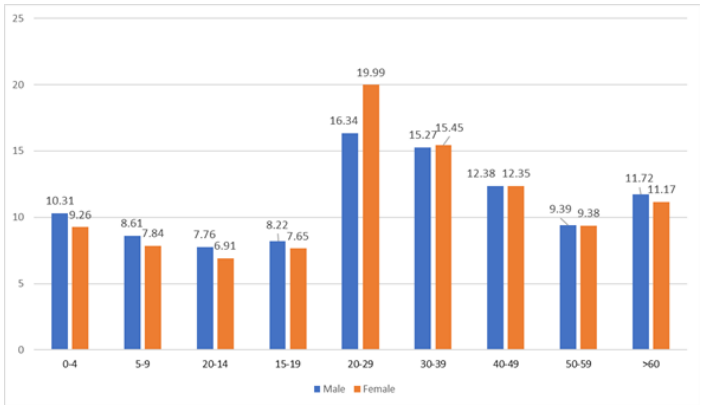

Figure 2 Distribution of the population according to age group and sex (%)

Materials and Methods

Type of study

It is a retrospective observational study, focusing on new cancer cases diagnosed or declared in the governorate of MEDENINE in 2015 and 2016.

Data sources

Data were collected from the Departments of Pathology at the University Hospital of MEDENINE and SFAX, the private laboratory of Pathology of Dr Nejib BEN YAHIA located in Djerba, the University Department of Medical Carcinology of Gabes, and the Private practice carcinology office of Dr Zied ZIDI in Djerba, to be able to collect the maximum of cancer cases from the inhabitants in the governorate of MEDENINE.

Inclusion criteria:

- All cases considered to be malignant according to the International Classification of Diseases for Oncology (ICD-O).
- New cancer cases declared from January 1, 2015 to December 31, 2016.
- Patients resident in MEDENINE governorate.
- The exclusion criterion:
- Patient's non-resident in the governorate of MEDENINE.

Target population

The main characteristics (age, sex, place of residence, etc.) of the population were obtained from the 2014 general population census and estimates data from the National Statistics Institute (NSI) [3].

Course of the study

Data collection was carried out using the anatomopathological reports of the aforementioned pathology laboratories, the medical files of the carcinology department, and the carcinologist's free practice office.

Statistical analysis

Data processing was carried out using Microsoft © office Excel 2016 and IBM SPSS Statistics 22. All the collected data were individualized into separate items.

Incidence rates were calculated per 100,000 inhabitants per year. Incidence rates were standardized by reference to standard world population distribution of the World Health Organization (WHO) [5].

Results

A total of 1061 cancer cases, diagnosed between January 1, 2015 and December 31, 2016 in the governorate of MEDENINE, were collected. The crude incidence was 108.23/100,000 inhabitants/year. The age-standardized incidence rate (ASIR) in the governorate of Medenine was estimated at 104.55/100,000 Inhabitants/year.

Among the 1061 cases, 508 cases were males, representing 47.9%. The sex ratio was 0.92. In men, the ASIR was estimated at 100.70/100,000 Inhabitants/year and the crude incidence was 106.36/100,000 Inhabitants/year. In women, the ASIR was estimated at 107.57/100,000 Inhabitants/year and the crude incidence was 110.13/100,000 Inhabitants/year **(Table 1)**.

Table 1 Summary table of the main global epidemiological data.

	Male	Female
Number of cases	508	553
Percentage (%)	47.9	52.1
ASIR (/ 100,000 / year)	100.70	107.57
Crude Incidence Rate (/ 100,000)	106.36	110.13
Average age (years)	64.04	57.18
Median age (years)	65	57

The crude incidence varied from 5.59/100,000/year in the age group between 10 and 14 years to 499.04/100,000/year in the age group between 65 and 79 years to 580.62/100,000/year in patients over 80 years of age **(Figure 3)**.

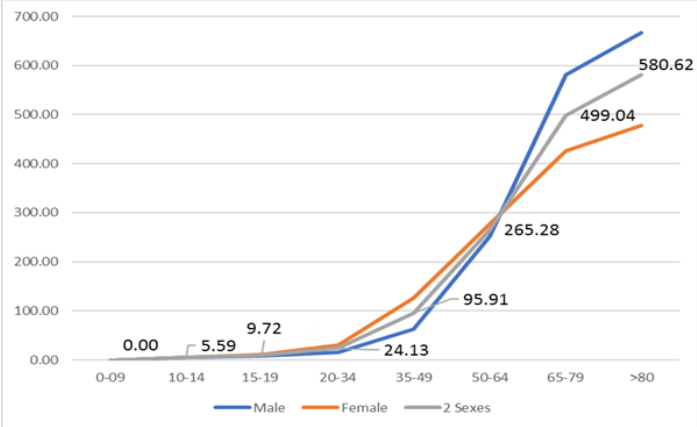

Figure 3 Crude incidence rate according to the age group and sex (/100,000)

The mean age at diagnosis was 60.5 years with a median of 61 years. It was 64 years in men and 57.2 years in women with a median of 65 years and 57 years, respectively.

Among the 1061 cancer cases, 4 cases (0.4%) involved children under the age of 15, 13 cases (1.2%) concerned young adults (aged 15-24), 593 cases (55.9%) included adults (aged between 25 and 64), and 451 cases (42.5%) involved elderly people (aged over 64). The patients were over 50 years in 778 cases (73.3%) **(Figure 4)**.

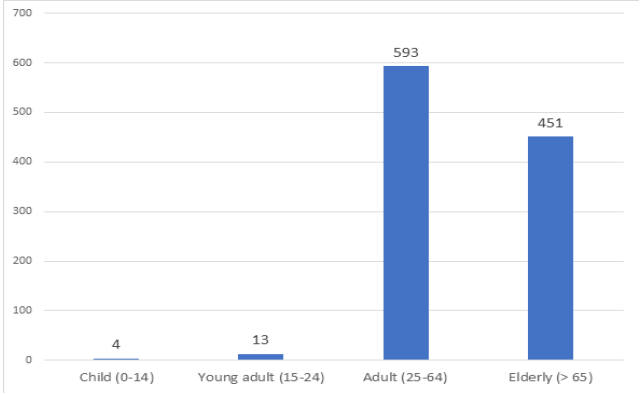

Figure 4 Distribution of patients according to age group

The geographic origin of the patient's resident in the governorate of MEDENINE was specified in 858 cases (or 80.9%). The patients were from Djerba in 514 cases (48.4%), with a crude incidence rate of 153.56/100,000 inhabitants/year, from Medenine in 186 cases (or 17.5%) with a crude incidence rate of 56.68/100,000 inhabitants/year, from Zarzis in 91 cases (8.6%) with a crude incidence rate of 59.05/100,000 inhabitants/year, and from Ben Guerdane in 67 cases (6.3%) with a crude incidence rate of 41.01/100,000 inhabitants/year **(Figures 5 and 6)**.

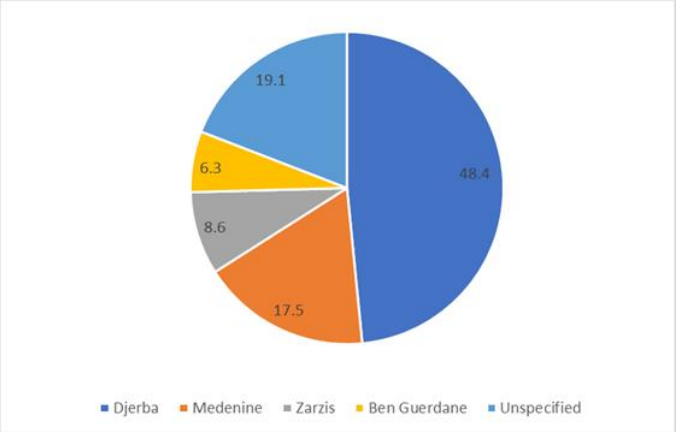

Figure 5 Distribution of patients according to geographic origin (%)

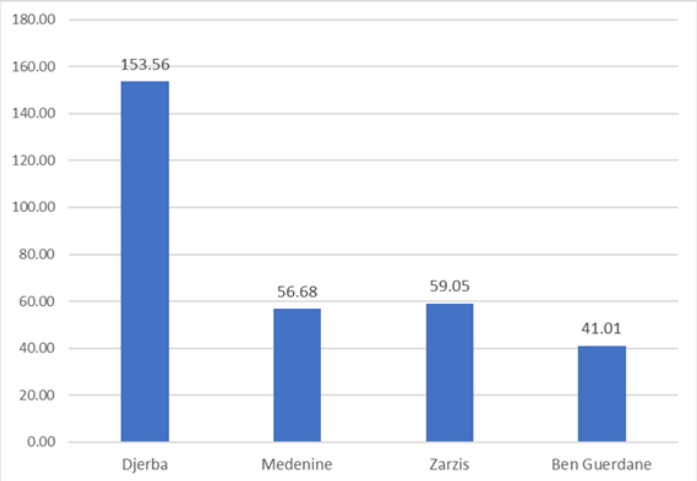

Figure 6 Crude incidence rate according to geographic origin (/100,000l)

The 10 most common cancers in both sexes combined are summarized in **(Table 2)**.

Table 2 The 10 most common cancers sites.

	Number of cases	Percentage %
1- Breast	197	18,57
2- Colon and rectum	137	12,91
3- Bladder	119	11,22
4- Skin	94	8,86

5- Lung	86	8,11
6- Lymphomas	68	6,41
7- Prostate	60	5,66
8- Stomach	55	5,18
9- Nasopharynx	35	3,30
10- Uterine Corpus	25	2,36

The five most common cancer sites in men were the bladder (19.1%), the lung (14.4%), the colon and rectum (13.6%), the prostate (11.8%) and the stomach (5.1%). These five sites represented 64% of all cancers diagnosed in men **(Table 3)**.

Table 3 The 5 most common cancers sites according to sex

	Male	Percentage %	Female	Percentage %
1	Bladder	19.1	Breast	35.6
2	Lung	14.4	Colon and rectum	12.3
3	Colon and rectum	13.6	Stomach	5.2
4	Prostate	11.8	Uterine Corpus	4.5
5	Stomach	5.1	Bladder	4
	Total	64	Total	61.6

However, the five most common sites in women were the breast (35.6%), the colon and rectum (12.3%), the stomach (5.2%), the uterine body (4.5%), and the bladder (4%). Overall, it represented 61.6% of all cancers diagnosed in women **(Table 3)**.

Discussion

Cancer is a leading cause of death and morbidity with around 14 million new cases and 8 million cancer-related deaths worldwide [1]. The ASIR varies from one country to another. It is higher in high-income countries, including North America, Western Europe, Japan, the Republic of Korea, Australia, and New Zealand [1]. The ASIR reaches 483/100,000 inhabitants in men and 409.9/100,000 inhabitants in women in the United States [6,7]. In Asia, this incidence is 174.1/100,000 I in men and 134.3/100,000 I in women [8]. However, in Africa, it does not exceed 115.6/100,000 I in men and 132.4/100,000 I in women [8]. In Tunisia, the incidence is between 123.7 and 143.8/100,000 I in men and between 89.1 and 102/100,000 I in women [9-11]. According to this study, the ASIR was 100.7/100,000 I in men and 107.57/100,000 I in women **(Figure 7)**.

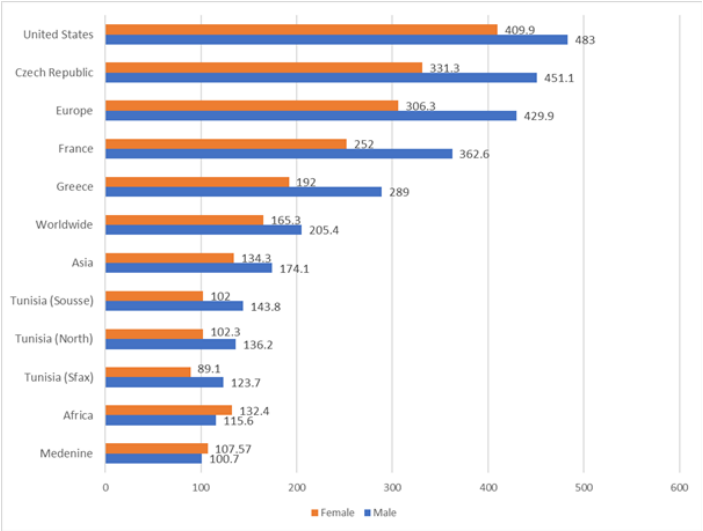

Figure 7 The Age-Standardized Incidence Rate (ASIR) of cancer (/100,000I)

Generally, the sex ratio is greater than one worldwide, in Europe, in North America, in Asia, and even in Tunisia (North, Sousse and Sfax) (6,8-12). However, there is a slight female predominance both in Africa and in our series of patients from the governorate of Medenine [8].

According to the World Cancer Report published in 2014 [1], cancer incidence is higher in women up to the age of 50, the age at which rates in men exceed those in women. Then, rates become significantly higher in men after the age of 60. The crude incidence rate by sex in the governorate of Medenine follows this pattern. Indeed, the crude incidence rate in women aged 35 to 49 was 126.35/100,000 while it was 62.12/100,000 in men. For the 65 to 79 age group, the crude incidence was 580.93/100,000 and 426.46/100,000 in men and women, respectively. The higher incidence in women before the age of 50 is explained by the relatively young age at diagnosis of breast cancer [1]. After the age of 60, prostate and lung cancer become more common in men [1]. The most common cancers vary from one population to another. In the governorate of Medenine, the 3 most common locations in men were the bladder, followed by the lung and the colorectal locations. For women, it was the breast, followed by colorectal and then gastric locations.

In Tunisia (North, Sousse and Sfax), lung cancer and bladder cancer are the 2 most common cancers in men, followed by prostate cancer (North and Sfax) or colorectal cancer (Sousse). Concerning women, the 2 most frequent cancers are breast cancer and colorectal cancer, followed by cervical cancer (Sousse and North) or leukemias (Sfax) [9-11].

Compared to Tunisia, the regions of North Africa and the Middle East present some particularities. Indeed, prostate cancer moves from third to second position in men. In women, thyroid cancer is the third most common cancer after breast cancer and colorectal cancer [1].

Sub-Saharan Africa has a particular pattern with a high incidence of liver cancer, representing the second most common male cancer and the third female cancer [1]. Breast cancer is the most common cancer in women, followed by cervical cancer [1].

In Asia, stomach cancer is the second most common cancer in men, followed by liver cancer [1]. In women, the cervix is the third most common location after the breast and the lung [1].

In Europe and the United States, lung cancer and prostate cancer are the most common cancers in men, followed by colorectal cancer [1,6,12-15].

In women, the most frequent location is the breast, followed by colorectal and pulmonary locations [1,6,13]. The 5 most common cancrs (skin cancer excluded) are summarized in **(Table 4)** [1,6,9- 11,13].

Table 4 The 5 most common cancers (Skin cancer excluded)

	First cancer		**Second cancer**		**Third cancer**		**Fourth cancer**		**Fifth Cancer**	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Mede-nine	Bladder	Breast	Lung	Colorectal	Colorectal	Stomach	Prostate	Uterine C	Stomach	Bladder
Sousse (TN)	Lung	Breast	Bladder	Colorectal	Colorectal	Cervix	Prostate	NHL	NHL	Ovary
Tunis (TN)	Lung	Breast	Bladder	Colorectal	Prostate	Cervix	Colorectal	Ovary	Stomach	NHL
Sfax (TN)	Lung	Breast	Bladder	Colorectal	Prostate	Leukemia	Colorectal	NHL	NHL	Ovary
N Africa	Lung	Breast	Prostate	Colorectal	Bladder	Thyroid	Colorectal	NHL	Liver	Ovary
SS Africa	Prostate	Breast	Liver	Cervix	K.S	Liver	NHL	Colorectal	Colorectal	K.S
C.E Asia	Lung	Breast	Stomach	Lung	Liver	Cervix	Colorectal	Colorectal	Esopha-gus	Stomach
Russia	Lung	Breast	Prostate	Colorectal	Colorectal	Uterine C	Stomach	Stomach	Bladder	Ovary
Europe	Prostate	Breast	Lung	Colorectal	Colorectal	Lung	Bladder	Uterine C	Kidney	Ovary
Greece	Lung	Breast	Prostate	Colorectal	Bladder	Lung	Colorectal	Ovary	Leukemia	Uterine C
USA	Prostate	Breast	Lung	Lung	Colorectal	Colorectal	Bladder	Uterine C	Kidney	Thyroid

*NHL: Non Hodgkin lymphoma, K.S: Kaposi Sarcoma, C.E Asia: Central and East Asia, SS Africa: Sub-Saharan Africa, N Africa: North Africa, TN: Tunisia, Uterin C: Uterine Corpus.

The ASIR for cancers according to location and region are shown in **(Table 5)**.

Table 5 The ASIR of cancers according to tumor location and region.

	Mede-nine	Tunisia (North)	Tunisia (Sousse)	Tunisia (Sfax)	Africa	Europe	USA	Asia	Lung	Lung	Lung	Lung	Lung	Lung	Lung	Lung
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Breast		39.3		31.8		28.3		28		36.2		94.2		126		29.1
Colorec-tal	14.1	13.3	7.1	5.9	12.4	10.1	6.7	5.3	7.0	5.8	55.7	34.6	41.6	32.9	16.5	11.1
Lung	15.4	2.5	32.5	2.9	32.6	1	24.6	1.7	7.7	2.6	68.3	21.6	69.3	51.6	35.2	12.7
Prostate	10.7		11.8		11.2		11.5		23.2		96		112.6		9.4	
Stomach	5.3	5.3	6.1	3.7	4.4		4	3	4.5	3.2	19.5	9.3	9.8	5.2	22.8	9.3
Uterine Corpus		4.9		3.6		3.3		2.8		3.5		19.3		25.2		5.9
Bladder	19.2	4.5	13.7	1.3	16.9		16.9	2.3	6.3	2	26.9	5.3	34.3	8.3	5.5	1.4
Skin (mela-noma exclud-ed)	8.9	7.9	7.7	5.6	10.7	8.8	19.6	12.8			98	170			Lung	Lung

Mela-noma	0.42	0.2	0.7	0.5			0.57	0.68	0.9	1.1	13.2	13.1	29.8	17.7	0.5	0.4
Naso-pharynx	3.9	3.1	3.6	1.6	2.8	0.9	3.8	0.9	1.5	0.2	0.6	0.2	0.9	0.4	2.3	0.9
Hodgkin lym-phoma	1.3	1.4	2.2	1.4	2.6	2.1	1.6	1.2	1	0.7	2.5	2.1	2.9	2.2	0.7	0.4
Non-Hodg-kin's lym-phoma	5.8	4.7	5	3.1	6	4.7	7.6	4.2	5.5	3.8	11.9	8	23.6	15.9	4.2	2.7
Ovary		2.6		4.1		4.6		3.7		4.8		13.1		11.6		5
Oral cavity	2.4	1.3	1.2	0.7			1.9	1	3.3	2	18.2	4.9	17.1	6.3	5.2	2.5
Thyroid	0.4	3	1	3.3		2.6	0.8	3	0.9	2.4	3.1	9.3	7.3	21.4	1.5	5
Kidney	1.5	2.1	2.6	1.6	1.1	1.9	3	2.3	1.4	1.1	17.2	8.1	21.7	10.9	3.8	1.9
Bones and Soft Tissues	1.9	1.8	1.6	1.3			2.6	2.4					4.2	2.9		
Small intestine	0.4	1.4	0.5	0.4			0.3	0.3					2.6	2		
Bilio-pancre-atic	1.7	1.6	2.9	1.5			2.2	1.6	2.3	1.7	12.1	8.3	14.4	11.2	3.8	2.6
Vulva		0.8		0.6				0.8						2.5		
Larynx	1.4	----	5.6	0.3	4.9	----	4.6	0.3	2.7	0.3	6.8	1	5.2	1.1	3.3	0.4
Cervix		2.7		4.2		4.9		2.3		27.6		13.4		7.4		12.7
Liver	1.4	0.8	1.8	1.2			1.9	0.6	12.4	5.8	10	3.3	12.2	4.3	20	6.9
Anus	0.4	0.5	0.3	0.1			0.2	0					1.5	2.4		
All loca-tions	100.7	107.6	136.2	102.3	143.8	102	123.7	89.1	115.6	132.4	429.9	306.3	488.5	423.1	174.1	134.3

Conclusion

The overall epidemiological profile of cancer in the governorate of Medenine follows the profile in Africa. Indeed, the ASIR is lower than the world average with a slight female predominance.

The five most common cancer sites in men were the bladder (19.1%), the lung (14.4%), the colon and rectum (13.6%), the prostate (11.8%) and the stomach (5.1%). In women, the five most common sites were the breast (35.6%), the colon and rectum (12.3%), the stomach (5.2%), the uterine corpus (4.5%), and the bladder (4%).

Breast cancer accounted for more than 1/3 of all female cancers. Bladder cancer was the most common cancer in men in the governorate of Medenine. It accounted for about 20% of all cancers in men. This cancer is the second most common one in men according to the registers of northern, central and southern Tunisia. It is the seventh most common cancer worldwide.

Colorectal cancer represents the second most common cancer in women and the third most common cancer in men both in Medenine and worldwide. The importance of colorectal cancer incidence and its evolution over time in a given country are key indicators of transitions in human development. Thus, raising public awareness with regard to the adoption of certain diet and hygiene measures would decrease this cancer incidence.

Our main recommendations include the need to develop a national cancer register conforming to the international standards. This national register would be a valuable epidemiological tool to develop and evaluate a national cancer control plan. This plan, adapted to the context of our country and to the specificities of the regions, must reduce cancer incidence, mortality and morbidity, and improve the quality of life of people at risk or those suffering from cancer. In addition, even with the existence of rigorous regulations imposing both systematic declaration of deaths and medical certification delivery of the causes of death, it is essential to improve the system of death declaration.

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Conflict of interest

The authors, Dr Moez HAMDANI, Dr Kamel KTARI and Dr Abdelmajid KHABIR, declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contributions Statement

Dr Moez HAMDANI and Dr Abdelmajid KHABIR were involved in substantial contributions to conception of the study and acquisition of data. Dr Moez HAMDANI was involved in substantial contributions to literature search. Dr Moez HAMDANI was involved in substantial contribution to writing of the paper manuscript with revision. Dr Abdelmajid KHABIR and Dr Kamel Ktari was involved in substantial contributions to critical revision. All authors have read and approved the final version of the manuscript.

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- Precis for use in the Table of Contents:
- The Age Standardized Incidence Rate was below the world average.
- Breast cancer was the first most common cancer in women and bladder cancer was the first most common cancer in men.

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