

ORIGINAL ARTICLE

Pancreatic Cancer in a Northern African Population: A Retrospective Analysis Spanning Two Decades

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ABSTRACT

Background Pancreatic cancer has the highest mortality rate of all major cancers. 94% of pancreatic cancer patients will die within five years of diagnosis. **Objective** To study the epidemiological and pathological characteristics of pancreatic cancer in North African population over a period of twenty two years from 1991 to 2013. **Patients and method** This was an epidemiological descriptive study conducted in Sidi bel Abbes University Hospital (Western Algeria, Northern Africa). We made a retrospective analysis of records of patients diagnosed with pancreatic cancer and for this purpose the study period was sub-classified into two periods: 1991-2002 and 2003-2013. **Results** 264 patients aged between 16-96 years were diagnosed with pancreatic cancer; 107 females (40.5%) and 157 males (59.5%) were recorded between 1991 and 2013; with a sex ratio of 1.46, and age range 16–96 years (median 66.2). Ninety patients (34%) were diagnosed with pancreatic cancer during the first period (1991-2002), and 147 patients (66%) during the second one (2003 – 2013). A significant association was reported between male patients and their medical histories in the second period ($p=0.012$); 29% of those patients suffered from diabetes mellitus and 23% from high blood pressure. Another significant correlation was noted between male gender and TNM classification during the first period where $p=0.047$, mainly at M1 and T4 stages with respectively the rates of 26.3% and 19.3%. **Conclusion** Pancreatic cancer remains one of the deadliest cancers worldwide and even in developing countries.

INTRODUCTION

Pancreatic cancer is the only cancer for which deaths are predicted to increase in men and women rather than decrease in 2014 and beyond, according to a comprehensive study published in the leading cancer journal *Annals of Oncology* [1].

Pancreatic cancer is the 11th most commonly diagnosed cancer in men and the 9th in women, but the 4th leading cause of cancer death for both men and women in the United States [2]. It is a lethal malignancy with an overall 5- year survival rate of less than 5% [3]. Of all the racial/ethnic groups in the United States, African-Americans have the highest incidence rate of pancreatic cancer, between 31 percent and 65 percent higher than the other ethnic groups [4].

Its incidence is high in North America and Europe (11.8–12.5 cases per 100,000 people) and rather low in southern

and eastern Asia and most of Africa (<3.5 cases per 100,000 people) [5]. Pancreatic cancer has the highest mortality rate of all major cancers. 94% of pancreatic cancer patients will die within five years of diagnosis – only 6% will survive more than five years. 74% of patients die within the first year of diagnosis [6]. This is due to the fact that pancreatic cancer is hard to catch early; it is notoriously difficult to diagnose in its early stages. At the time of diagnosis, 52% of all patients have distant disease and 26% have regional spread [7]. Today, only a few risk factors for pancreatic cancer are known. Additional researches are needed to understand their direct relationship to the disease. Further complicating matters, there are no effective early detection methods available, and most symptoms are vague and could be attributed to many different conditions [2]. In order to study the epidemiological and pathological aspects of pancreatic cancer in Sidi-bel-Abbes region (Western Algeria) we conducted a scientific analysis of various characteristics of pancreatic cancer diagnosed in patients over a period of twenty two years (1991 - 2013).

MATERIAL AND METHODS

The Population

This was a hospital-based descriptive study in Sidi Bel Abbes population in western Algeria. The medical record of a total number of 264 patients diagnosed with pancreatic cancer from 1991 to 2013 was collected from departments

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of pathology and surgery, Sidi-bel-Abbes University Hospital. Data analysis was done in a retrospective manner and included characteristics such as their age, gender, medical history, tumor location, histological type and TNM (Tumor Node Metastasis) histological classification. We also aimed to make a comparative analysis of pancreatic cancer characteristics between the two decades: (1991-2002) and (2003-2013).

Statistical Analyses

Concerning the statistical analytical study, the data were summarized using rates and cross-tabulations. Associations between categorical parameters were tested using Pearson's chi-squared test (χ^2) and Cramér's phi (ϕ_c) test. Results were presented using *p* value; the level of its significance was limited by the rate of 5%. All data were processed and analyzed via SPSS 20.0 (Statistical Package for the Social Sciences, IBM Corporation; Chicago, IL. August 2011).

RESULTS

A total sample of 264 patients was enrolled into the study. There were 107 females (40.5%) and 157 males (59.5%) diagnosed between 1991 and 2013; with a sex ratio of 1.46, and age range 16 – 96 years (median 66.2). Most of them belonged to the age group of 61-80 years (**Figure 1**). 90 patients (34%) were diagnosed with pancreatic cancer during the first period (1991-2002), while 147 patients (66%) during the second one (2003 – 2013).

As shown in table 01, the majority of patients diagnosed with pancreatic cancer were males in both periods, during the first decade 58.7% were males and 41.2% were females, whereas in the second decade 59.8% of patients were males and 40.1% were females.

Table 1 illustrates also patients' medical history distribution according to their gender; we noticed that the majority of the patients (25.8%) suffered from diabetes

mellitus; 16.5% had type1 diabetes and 9.3% had type 2 diabetes. 18.6% were those who suffered from high blood pressure. Pearson's chi-squared test reported any significant correlation between the latter studied parameters in the first decade; nevertheless we found a significant association between male patients and their medical histories in the second decade where *p*=0.012. 29% of those patients suffered from diabetes mellitus and 23% from high blood pressure. Any significant correlation was reported between female gender and medical histories during the both decades.

Table 02 shows that during the first decade; (97%) of the tumors were located at the head of pancreas; 2.06% at the body of the pancreas and 1.03% at the tail of the pancreas. While during the second decade (92%) were located at the head; 4.2% at the body and 4.06% at the tail of the pancreas.

We reported as well that during both periods adocarcinoma was the most predominant histological type; it represented 78.8% of the whole histological cases during the first decade and 80% during the second one (**Figure 2**).

For the statistical study; we used cross-tabulations to analyze the following parameters: patients' gender, age range and TNM classification. After the calculation of *p* value using Pearson's chi-squared test we noted a significant correlation between male gender and TNM classification during the first decade where *p* value=0.047, mainly at M1 and T4 stages with the respectively rates of 26.3% and 19.3%.

Unlike males, *p* value for female gender was about 0.708 during the first decade and thus not significant (**Table 2**).

We performed the same statistical analysis for the second period and at the opposite of the first one there were any correlation either between male gender and TNM classification or between females and TNM classification, since *p* value was respectively equal to 0.113 and 0.726.

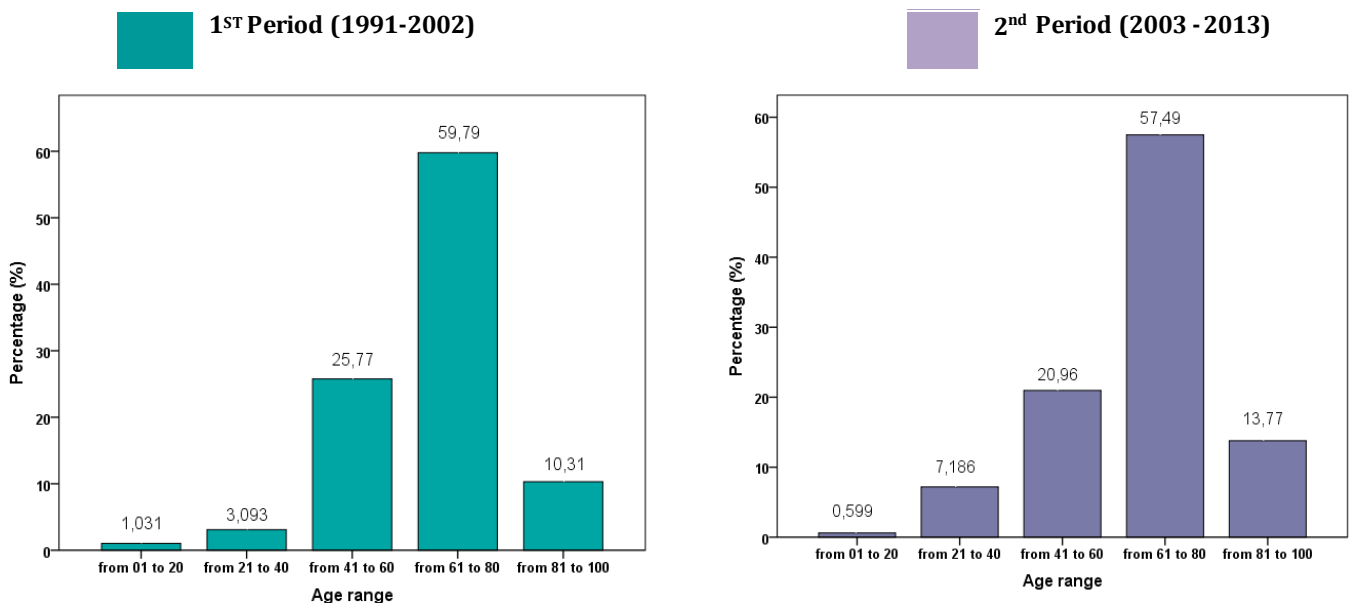


Figure 1. Age ranges distribution along the two periods

Table 1. Patients' Clinical Characteristics

Clinical Characteristics	1st decade (1991- 2002)		Second decade (2002-2013)	
	Number	Percentage	Number	Percentage
Sex (n= 264)	90	34.0%	147	66.0%
Male	53	58.7%	88	59.8%
Female	37	41.2%	59	40.1%
Sex ratio	-	1.7%	-	1.5%
Age				
(> 20)	1	1.03%	1	0.5%
(21-40)	3	3.09%	10	7.1%
(41-60)	23	25.7%	31	20.9%
(61-80)	54	59.5%	85	57.4%
(< 80)	9	10.3%	20	13.7%
Medical History				
High blood pressure	17	18.6%	34	23.4%
Type 1 diabetes	15	16.5%	13	9.0%
Type 2 diabetes	8	9.3%	29	19.8%

Table 2. Patients' histological Characteristics

Histological Characteristics	1st decade (1991- 2002)		Second decade (2002-2013)	
	Number	Percentage	Number	Percentage
(n= 264)				
Head of the pancreas	87	97.0%	135	92.0%
Body of the pancreas	2	2.06%	6	4.2%
Tail of the pancreas	1	1.03%	6	4.06%
Histo-pathology				
Adenocarcinoma	71	78.8%	118	80.2%
Carcinoma	3	3.3%	6	4.08%
Solid papillary tumour	4	4.4%	5	3.4%
Solid pseudopapillary tumour	3	3.3%	5	3.4%
Not mentioned	9	10%	13	8.8%
Stage of diagnosis				
Tis	1	1.03%	3	1.7%
T1	5	5.1%	4	2.9%
T2	15	16.4%	17	11.9%
T3	16	17.5%	29	19.7%
T4	18	20.6%	35	23.9%
N1	12	13.4%	16	10.7%
M1	23	25.7%	43	28.7%

DISCUSSION

The current research work is the first retrospective study of pancreatic cancer occurring in subjects over 22 years (1991-2013) in the region of Sidi-bel-Abbes, Western Algeria.

Additionally, a comparison was made between the two decades and various factors have been identified and associated with pancreatic cancer such as patients' gender, medical history, and the stage of diagnosis.

Our survey demonstrated an increasing frequency of pancreatic cancer with advanced age. The mean age of patients was 66.2± 8.7 years; most of them belonged to the age group of 61-80 years. This was in accordance with the results reported by Mouaqit *et al.* and those of the US National Cancer Institute (2012) which reported that

pancreatic cancer incidence and death rates increase with advancing age with a steep increase after age of 50 years [8-10].

Our survey reported an increasing incidence of pancreatic cancer over the recent previous years; 90 patients (34%) were diagnosed with pancreatic cancer during the first decade (1991-2002), while 147 patients (66%) during the second one (2003 – 2013). These results concord to those of Jemal *et al.* who noted that in the US; during the past 10 years (2000-2009); pancreatic cancer incidence rates increased by 0.9% per year among white men, white women, and even African American men [11].

With a sex ratio of 1.46; our results confirmed that males are more likely to develop pancreatic cancer than females which match with the findings of Soufi *et al.* and *El Majed et al.* who found a higher rate of male patients with pancreatic cancer in Kuwait due to increased tobacco use in men [9, 10, 12].

Regarding tumors' site, our results revealed that cancer of the head of the pancreas was the most prevalent site with a proportion more than 90%, followed respectively by cancer of the body and the tail of the pancreas which represented a tiny minority. In accordance with our results, the study of *Kalser et al.* which demonstrated that more than two thirds of pancreatic cancers occur at the head of the pancreas [13]. Similarly, *Lau et al.*'s survey using SEER (surveillance epidemiology and end results) registry data base indicated that the incidence rate for pancreatic head cancer was 5.6 per 100,000, whereas the rate for pancreatic body/tail cancers was 1.6 per 100,000 between 1973 and 2002 in the United States of America [14].

Adenocarcinoma was the most predominant histological type reported in our survey which is in accordance with literature [2, 9]. This histological type is considered as one of the deadliest and the most aggressive kind of pancreatic cancers [2, 9].

Our comparative study of the two decades reported a major positive correlation between male patients' diagnosed during the first decade (1991- 2002) and the advanced stage of diagnosis ($p=0.047$). The majority of those patients were diagnosed at M1 stage; this could be explained by the very poor means of diagnosis and the lack of health professional during the 90's; the misinterpreted symptoms of that cancer as well as the anatomic deeper site of the pancreas also play a major role. The American Cancer Society argued that more than half of pancreatic cancer patients are diagnosed when they have advanced (metastatic) disease that has spread to other organs, because of the deep location of the pancreas in the body, the absence of specific symptoms, and the lack of good early detection methods [1].

The other major significant correlation found was the one between male patients and their medical histories during the second decade ($p=0.012$); 29% of those patients had diabetes mellitus. Our results agree with those of several other surveys who found that 25% of patients with

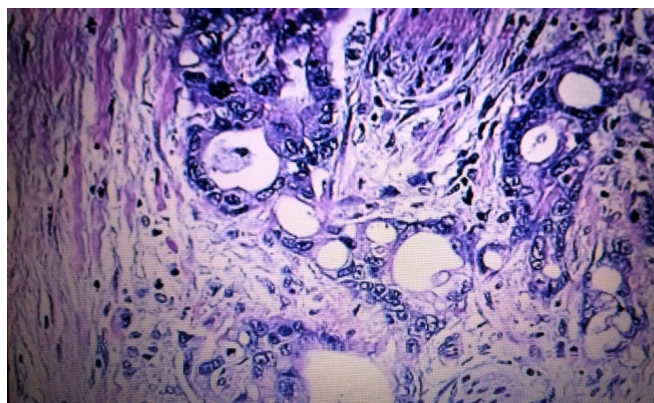


Figure 2. Well differentiated pancreatic adenocarcinoma (X60)

pancreatic cancer suffered from diabetes mellitus at the time of diagnosis, and roughly 40% have pre-diabetes (higher than normal blood glucose levels) [11, 15-17]. Compared with non-diabetic individuals, patients with type-2 diabetes are reported to have a 50% increased risk of pancreatic cancer [15, 18, 19]. Hyperinsulinemia also likely favors the development of cancer in patients with diabetes mellitus, since insulin represents a growth factor with not only metabolic but also mitogenic effects [20]. In addition, some medications used in the treatment of diabetes mellitus have been suspected to stimulate insulin-mediated mitogenesis leading to a heightened risk of cancer in treated patients [21, 22]. Further, diabetes was found to be more prevalent in males than in females after the age of 25, where the incidence ratio was approximately 1.5 [23].

We may explain the difference in developing diabetes between the two decades by the unhealthy life style of Algerian people at the recent years, lack of physical activity; daily technological development as well as the change of their dietary habits. In fact; some literature review confirms that the lack of physical activity may increase the risk of pancreatic cancer [16, 17, 24]. Also, a number of dietary factors have been suspected regarding their association with pancreatic cancer risk. There is some evidence that the consumption of red and processed meat may slightly increase the risk of pancreatic cancer [16, 17, 25, 26]. Hence more studies on the dietary intake of Algerian population are required to emphasize the risk factors associated with pancreatic cancer in our population

CONCLUSION

Our survey is the first of its kind conducted in Sidi-bel-Abbes region and has uncovered facts about pancreatic cancer very similar to those associated with pancreatic cancer occurring world-wide.

Limitations of the study: The survey was performed at a single center.

Conflicting Interest

The authors had no conflicts of interest

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