The Dual Role of Diabetes Mellitus in Pancreatic Adenocarcinoma: A Decade of Multidisciplinary Insights from Eastern Algeria

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DOI: https://doi.org/10.47772/IJRISS.2026.100700949

Received: 05 August 2026; Accepted: 10 August 2026; Published: 18 August 2026

ABSTRACT

Background: Pancreatic ductal adenocarcinoma remains difficult to treat, mostly because it is often clinically silent until advanced stages. Growing evidence points to a two-way relationship between diabetes mellitus (DM) and pancreatic cancer: DM can act as both a metabolic risk factor and an early warning sign of a paraneoplastic process. This study looks at how the timing of a DM diagnosis relates to a pancreatic cancer diagnosis in an Algerian population, highlighting this dual role.

Methods: We reviewed ten years of data (2016–2026) from two hospitals in Constantine, Algeria, including 366 patients with pancreatic cancer. We divided the patients based on when their diabetes was diagnosed compared to their cancer: long-standing DM (diagnosed 24 months or more before cancer) and new-onset diabetes (NOD; diagnosed less than 24 months before or at the same time as cancer). We then compared these groups with their tumor stages and weight changes.

Results: The average age was 67 (±9.4), with more men affected (58.2%). Diabetes was common, found in 64.8% of patients. Notably, 41.5% of the entire group had NOD. Patients with NOD were more often diagnosed at earlier, potentially operable stages (stages I–II: 24.3% vs. 11.7% for long-standing DM; p=0.021). Severe weight loss (>10% of body weight) was also closely linked to the NOD group ($p<0.001$).

Conclusion: Our results support the idea that diabetes, especially when it is new-onset, is both a metabolic companion and an early clinical signal of pancreatic cancer. Better collaboration between endocrinologists and oncologists could help catch these tumors earlier and improve outcomes for these high-risk patients.

Keywords: Pancreatic adenocarcinoma, diabetes mellitus, new-onset diabetes, paraneoplastic marker, retrospective study, Algeria, male predominance.

INTRODUCTION

Even with new treatments, pancreatic adenocarcinoma still has a very poor prognosis [1]. This is mainly due to the cancer's aggressive nature and the lack of good early biomarkers [2]. Because early symptoms are vague, researchers are increasingly looking at new-onset diabetes (NOD) as a possible early warning sign of hidden pancreatic cancer [3]. This two-way relationship—where diabetes can precede [4] or result from the cancer—has become a major topic in oncology research.

However, this time-linked association hasn't been studied much in North African populations [5]. Healthcare systems and disease trends in these regions might create different clinical profiles than those seen in Western countries [6]. To help fill this gap, we looked back at pancreatic cancer cases in eastern Algeria. Our goals were

to find out how common diabetes is in these patients and when it starts, to see if NOD is linked to finding the cancer earlier, and to understand what this means for screening guidelines [2].

METHODS

2.1. Setting and Participants We reviewed the charts of 366 patients diagnosed with pancreatic adenocarcinoma between 2016 and 2026. The data came from two hospitals in Constantine, Algeria: EH Didouche Mourad (Medical Oncology) and the Constantine Military Hospital (Endocrinology and Diabetology). To be included, patients needed a biopsy confirming the cancer and clear medical records about their blood sugar levels.

2.2. Key Variables We split patients into two groups based on when their diabetes started compared to their cancer. Long-standing DM meant diabetes was diagnosed 24 months or more before the cancer. NOD meant diabetes was diagnosed less than 24 months before, or at the same time as, the cancer. We staged the tumors using the 8th edition AJCC TNM system. We defined significant weight loss as losing more than 10% of body weight in the year before diagnosis without a clear reason.

2.3. Statistical Approach We used SPSS (Version 28) for our statistics. Chi-square tests checked for links between categories, and logistic regression found independent predictors of advanced cancer. A p-value under 0.05 was considered significant.

RESULTS

3.1. Patient Characteristics Table 1 shows the baseline patient data. The average age at diagnosis was 67 (±9.4), and men made up most of the group (58.2%, n=213). Also, 41.5% (n=152) were active smokers when diagnosed, and 12.8% had a family history of cancer.

Table 1: Sociodemographic and Clinical Baseline (N=366)

Characteristic	Value
Mean age (years)	67 ± 9.4
Male sex	58.2% (n=213)
Current smoking	41.5% (n=152)
Family cancer history	12.8% (n=47)

3.2. Diabetes Chronology and Tumor Staging Table 2 shows how the timing of DM relates to the tumor stage. Overall, 237 patients (64.8%) had diabetes. NOD made up 41.5% of the whole group, while long-standing DM was 23.2%. Importantly, patients with NOD were more often diagnosed at an earlier stage (Stages I–II) than those with long-standing DM (24.3% vs. 11.7%; p=0.021).

Table 2: Correlation Between Diabetes Timeline and Tumor Stage

Diabetes Type	n (%)	Early Stage (I–II) (%)	Late Stage (III–IV) (%)	p-value
NOD	152 (41.5%)	24.3%	75.7%	0.021
Long-standing	85 (23.2%)	11.7%	88.3%	
No diabetes	129 (35.3%)	18.6%	81.4%	

3.3. Clinical Correlates of NOD We used logistic regression to find factors linked to NOD (Table 3). Rapid, severe weight loss (>10%) was a strong factor (OR = 3.2; 95% CI: 2.1–4.9; p<0.001). There was also an inverse link between NOD and advanced cancer stage (OR = 0.6; 95% CI: 0.4–0.9; p=0.018). This supports the idea that sudden metabolic changes lead to earlier imaging and detection.

Table 3: Predictors Associated with New-Onset Diabetes (NOD)

Factor	Odds Ratio (95% CI)	p-value
Rapid weight loss (>10%)	3.2 (2.1–4.9)	<0.001

Advanced tumor stage (III-IV)	0.6 (0.4–0.9)	0.018
Age >65 years	1.8 (1.2–2.7)	0.005

3.4. Qualitative Observations Chart reviews showed that 82% of NOD patients had unusual metabolic issues, mostly erratic blood sugar that didn't respond to usual oral medications. Also, tumors in the NOD group were more often found in the tail of the pancreas (68%). This location might explain why metabolic symptoms show up early, as tumors in the tail often cause systemic symptoms before they block the bile duct and cause jaundice.

DISCUSSION

4.1. Diabetes as a Clinical Sentinel Our findings from Algeria match what is seen globally: new-onset diabetes often appears months before pancreatic cancer does [3], giving a short but important window for treatment. The higher rate of early-stage tumors (Stages I–II) in NOD patients (24.3% vs. 11.7% in long-standing DM) suggests that sudden metabolic problems lead patients to seek medical help sooner. This often leads to imaging that accidentally catches the cancer earlier [2].

4.2. The Algerian Context and Multidisciplinary Imperative The high number of older men in our study is similar to trends seen across the Middle East and North Africa (MENA) [5]. Combined with high smoking rates (41.5%) and limited access to preventive imaging, these factors likely contribute to delayed diagnoses [6]. The strong link between NOD and rapid weight loss also highlights the need to include nutritional and metabolic checks in standard cancer care [4]. Our use of both civilian and military hospitals shows how important teamwork is in treating complex cancers.

4.3. Strengths and Limitations The main strength of this study is its 10-year span and multidisciplinary data. However, because it looks back in time, we must be careful with the results; selection bias and missing data on how long patients had diabetes are possible. Future studies that follow patients forward and use new molecular biomarkers (like CA 19-9 kinetics or circulating tumor DNA) are needed to better understand this paraneoplastic process [2].

CONCLUSION

In conclusion, this ten-year study supports the idea that diabetes plays a double role in pancreatic cancer—it is both a metabolic risk factor and an early clinical warning sign [4]. By improving communication between endocrinologists and oncologists, we can find this cancer earlier when it is more treatable. We recommend creating clinical guidelines that treat new-onset diabetes, especially with rapid weight loss in older men, as a major red flag that requires prompt pancreatic imaging [2,3].

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