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# EPIDEMIOLOGICAL ANALYSIS OF THE INCIDENCE OF MALIGNANT NEOPLASMS OF THE ESOPHAGUS IN PIAUÍ: DATA FROM THE LAST 5 YEARS

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## ABSTRACT

Esophageal cancer is a neoplasm with high incidence and mortality, affecting more men than women in Brazil, with about 10,990 new cases annually. The most frequent type is squamous cell carcinoma, while adenocarcinoma has increased due to obesity and gastroesophageal reflux disease. Risk factors include tobacco, alcohol, and eating hot foods. Treatment varies according to staging and may involve chemotherapy, radiotherapy, and surgery, with neoadjuvant approaches being effective in increasing surgical success. This pathology is related to regions with low human development indexes, and in Brazil, Piauí stands out for having one of the lowest rates, which negatively impacts access to prevention, early diagnosis and treatment, reflecting on the evolution of the disease and survival rates. Therefore, the analysis of this study is essential to develop more equitable and effective public health policies in the state of Piauí. OBJECTIVE: To analyze the number and variables of esophageal cancer cases in Piauí in the last 5 years. METHODOLOGY: This is an epidemiological, retrospective and descriptive research, with a quantitative approach, based on data obtained from the Department of Informatics of the Unified Health System (DATASUS), carried out through data on notifications of esophageal cancer cases in Piauí in the last 5 years. RESULTS AND DISCUSSIONS: Between 2019 and 2023, 381 cases of esophageal neoplasia were analyzed in Piauí, with a predominance of males (72%, n = 274) compared to females (28%, n = 107). The disease mainly affects older adults, with the incidence increasing from the age of 50, with the groups of 60 to 64 years (16.8%, n = 64) and 65 to 69 years (14.4%, n = 55) being the most affected. Only 2.9% of the cases occurred in individuals under 40 years of age. Staging indicated that 51.4% (n = 196) of the patients were diagnosed in stages 2 and 3, evidencing delays in diagnosis; Only 0.5% (n = 2) were in stage 0 and 7.6% (n = 29) in stage 1. Chemotherapy was the main therapeutic modality used (57.2%, n = 218), followed by radiotherapy (11.5%, n = 44) and surgery (5.5%, n = 21). In addition, 2.9% (n = 11) received combined chemotherapy and radiotherapy, while 22.8% (n = 87) had no information about the recorded treatment. The high percentage of cases without staging and treatment data indicates deficiencies in information collection. CONCLUSION: Between 2019 and 2023, esophageal cancer in Piauí showed a predominance in men and individuals over 50 years of age, with diagnoses mostly in advanced stages. Chemotherapy was the main form of treatment. The variation in cases, including a drop in 2020, was possibly influenced by the COVID-19 pandemic. The lack of complete information on treatment and staging highlights the need to improve registries to optimize treatment and prevention strategies.

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**Keywords:** Esophageal cancer, Malignant neoplasms, Epidemiology, Risk factors.

## INTRODUCTION

Esophageal cancer is a malignant neoplasm of insidious development, extremely aggressive, characterized by high incidence and mortality rates. In Brazil, it is among the ten most common types of cancer, ranking 6th among men and 15th among women (SIMONETTI et al., 2021).

According to INCA's estimate for the 2023-2025 triennium, the annual number of new cases of esophageal cancer is around 10,990, representing an incidence of 5.1 cases for every 100 thousand inhabitants. Of this total, about 8,200 cases occur in men, with an incidence of 7.8 new cases per 100,000, while approximately 2,790 affect women, with an incidence of 2.5 cases per 100,000. (INCA 2022).

Esophageal cancer is classified histologically, and the most frequent type is squamous cell carcinoma (SCC), which accounts for about 96% of diagnosed cases. Although less common, adenocarcinoma (CA) has shown a significant increase in recent decades, especially in developing countries such as Brazil. This growth is attributed to the increased prevalence of obesity and gastroesophageal reflux disease. Among the main risk factors associated with this neoplasm, tobacco and alcohol consumption stand out, particularly when these two are used together, in addition to the ingestion of food and beverages at high temperatures (Hull et al., 2020).

The definition of the therapeutic modality for esophageal cancer takes into account several factors, such as the staging of the disease, the patient's clinical conditions, and the histological type of the tumor. In cases of resectable tumor, treatment options include chemotherapy, radiation therapy, resection surgery, or a combination of these methods. It is common to use neoadjuvant chemotherapy and radiotherapy, applied before the surgical intervention, in order to reduce the size of the tumor and increase the chances of success in the surgery. This multidisciplinary approach has shown promising results in the control and treatment of the disease (LI et al., 2021).

The incidence and mortality from esophageal cancer are closely related to unfavorable socioeconomic conditions, with special emphasis on regions with low human development indices (FREIRE et al., 2024). In Brazil, Piauí has one of the lowest development indicators, this correlation shows how social and economic factors can influence access to prevention, early diagnosis and effective treatment, directly reflecting on the evolution of the disease and survival rates. Thus, the analysis of this study is fundamental for the implementation of more equitable and effective public health policies in the state of Piauí.

## METHODOLOGY

This study is an epidemiological, retrospective and descriptive research, with a quantitative approach, based on data obtained from the Department of Informatics of the Unified Health System (DATASUS), at the electronic address www.datasus.gov.br. Carried out using data on esophageal cancer notifications in Piauí between the years 2019 and 2023. The research involves only secondary information in the public domain and, therefore, does not require the approval of the Ethics Committee, according to Resolution 466/2012 of the National Council for Ethics in Research. The study population was composed of 381 notifications of esophageal cancer cases that occurred in Piauí in the period between 2019 and 2023, registered on the DATASUS platform.

Data collection was carried out in October 2024 by the researchers themselves. To obtain the data, the following indicators were used: gender, age, type of treatment, stage of the disease and variations over the years.

Information from esophageal cancer notifications registered in DATASUS, which were not within the sample from 2019 to 2023 and in the state of Piauí, were excluded from the survey.

Subsequently, the data were organized in Excel tables and then interpreted and presented in charts and graphs. In addition, to ensure a comprehensive and diversified discussion, a search of the academic literature was carried out using the PubMed, Scopus, SciELO (Scientific Electronic Library Online) and Google Scholar databases.

## RESULTS

Esophageal cancer is a neoplasm of high lethality and increasing prevalence, particularly in populations exposed to risk factors, such as smoking and alcoholism. This study analyzed 381 cases of esophageal neoplasia registered in the state of Piauí between 2019 and 2023, based on data provided by DATASUS. The analysis includes distribution by gender, age, type of treatment, staging of the disease, and variations over the years.

The analysis showed a marked predominance of cases in males, with 72% (n = 274) of the cases, compared to 28% (n = 107) in females (Graph 1). These findings are in line with the literature, which indicates that men are more predisposed to the development of esophageal cancer, possibly due to greater exposure to risk factors, such as smoking and alcohol consumption, which are widely known to increase susceptibility to this neoplasm.

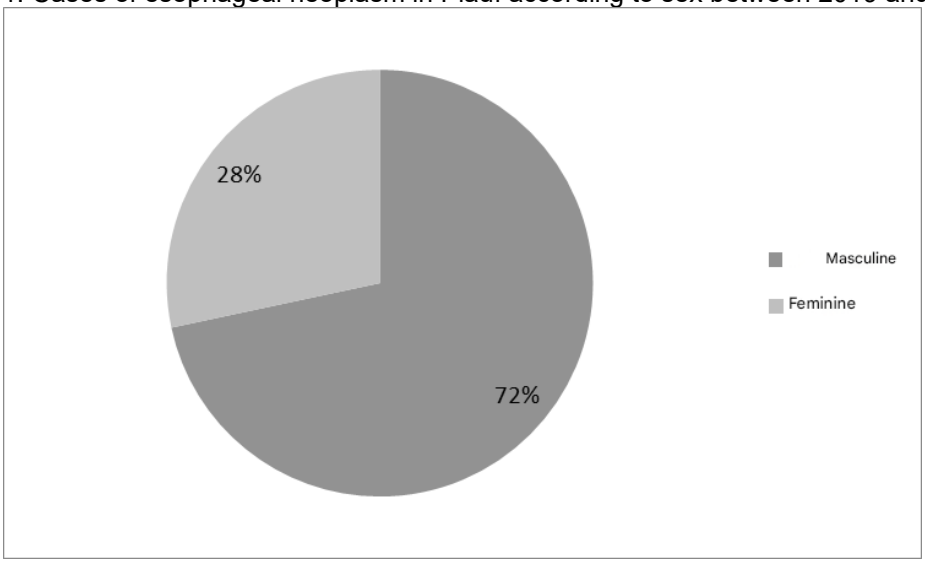
One of the main factors is alcohol and tobacco consumption, the association of which is well documented. The combined use of these substances has a synergistic

carcinogenic effect, significantly increasing the risk of esophageal cancer (Dantas et al., 2020; Lima et al., 2022).

In addition, pre-existing diseases of the esophagus, such as reflux esophagitis and Barrett's esophagus, are recognized as conditions that increase the likelihood of cancer. Barrett's esophagus, for example, results from prolonged exposure of the esophagus to gastric acid and is considered a precursor to cancer (Almeida et al., 2021). Obesity also contributes to increased intra-abdominal pressure and, consequently, gastroesophageal reflux, increasing the risk of developing cancer (Gonçalves et al., 2019).

Diet also plays a crucial role in the incidence of esophageal cancer. Studies show that diets high in processed foods and red meats, and low in fruits and vegetables, are associated with a higher risk (Santos et al., 2023).

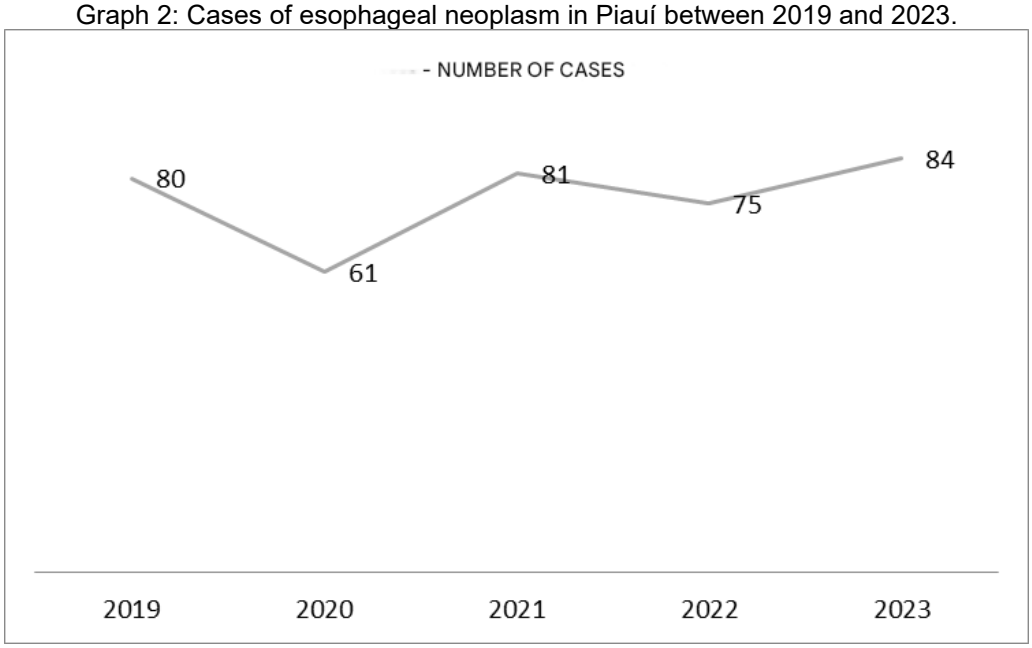
Graph 1: Cases of esophageal neoplasm in Piauí according to sex between 2019 and 2023.




Source: Ministry of Health/SVS - Notifiable Diseases Information System - Sinan Net.

The number of cases varied between the years analyzed, as shown in graph 2, with peaks in 2021 (n = 81) and 2023 (n = 84). In 2020, there was a reduction in the number of diagnoses (n = 61), possibly related to the COVID-19 pandemic, which negatively impacted access to health services and early diagnosis of various oncological diseases. The percentage analysis revealed a variation of 21.3% between the year with the lowest number of cases (2020) and the year with the highest number of cases (2023). These data suggest that the flow of diagnoses may have been affected by external events, but that the number of cases has stabilized in recent years.

Graph 2: Cases of esophageal neoplasm in Piauí between 2019 and 2023.




Source: Ministry of Health/SVS - Notifiable Diseases Information System - Sinan Net.

The distribution of cases by age group demonstrates that esophageal cancer is a disease predominantly of older adults (Chart 1). The incidence increases significantly from the age of 50 years, with the 60 to 64 years (16.8%, n = 64) and 65 to 69 years (14.4%, n = 55) groups presenting the highest frequencies of cases. The correlation between older age and increased incidence reflects the cumulative nature of risk factors associated with the disease, such as long-term exposure to gastroesophageal reflux and carcinogens such as tobacco and alcohol. Only 2.9% of the cases occurred in individuals under 40 years of age (n = 11), confirming the rarity of the disease in young age groups.

Table 1: Number of cases of esophageal neoplasm in Piauí, according to age group.

| Age group | Cases |
|---|---|
| 0 to 34 years old | 5 |
| 35 to 39 years old | 6 |
| 40 to 44 years old | 15 |
| 45 to 49 years old | 31 |
| 50 to 54 years old | 47 |
| 55 to 59 years old | 45 |
| 60 to 64 years old | 64 |
| 65 to 69 years old | 55 |
| 70 to 74 years old | 42 |
| 75 to 79 years old | 37 |
| 80 years and over | 34 |
| Total | 381 |

Source: Ministry of Health/SVS - Notifiable Diseases Information System - Sinan Net.

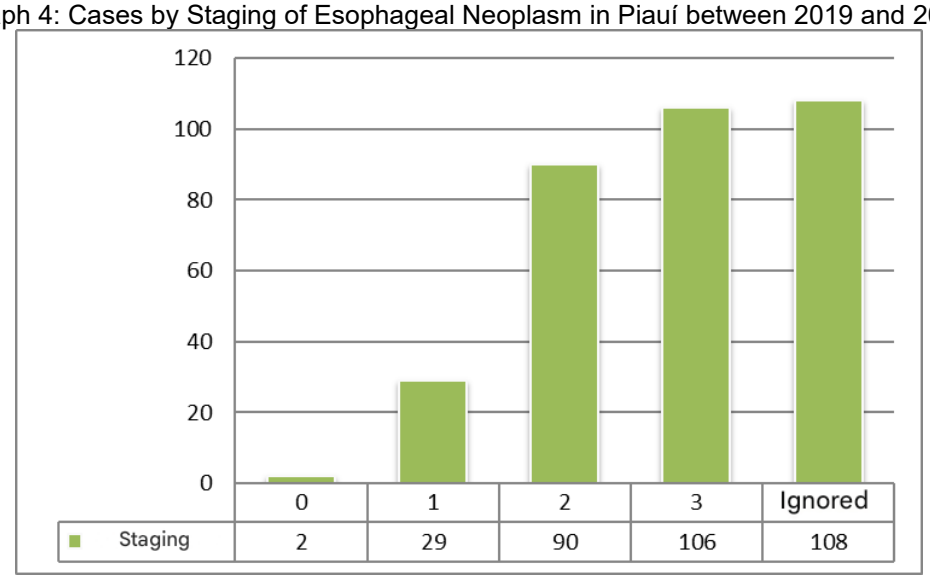
The analysis of the staging (graph 4) of the disease showed that 51.4% (n = 196) of the patients were diagnosed in stages 2 and 3, which indicates a delay in diagnosis. Only 0.5% (n = 2) of the cases were identified in stage 0, and 7.6% (n = 29) in stage 1, stages in

which the prognosis is more favorable and surgical treatment can be curative. A high percentage of 28.3% (n = 108) of the cases did not have the staging informed, which highlights a deficiency in data collection, impacting the accuracy of the analysis and clinical decision-making.

In this bias, there is a significant proportion of patients diagnosed in advanced stages: 106 cases in stage 3 and 90 in stage 2, representing more than 50% of cases. These data demonstrate that diagnosis is late in Brazil, which compromises curative treatment options and reduces survival. Studies have shown that when esophageal cancer is diagnosed in advanced stages, treatment response rates are lower, and protocols usually involve palliative therapies, such as chemotherapy and radiotherapy, as observed in the 218 patients who received chemotherapy in Piauí during this period (Furlan et al., 2007; Pinto, 2019).

Most patients with esophageal cancer have the disease at an advanced stage at diagnosis, which requires more aggressive treatments, such as a combination of chemotherapy and radiotherapy. This late diagnosis can be explained by the difficulty of early detection, since the initial symptoms are often nonspecific and tumor progression is usually silent. In addition, accurate identification of staging, especially search for micrometastases, can improve therapeutic decisions and clinical outcomes, as pointed out by new approaches that use the sentinel lymph node (Furlan et al., 2007; Silva, 2022).

Graph 4: Cases by Staging of Esophageal Neoplasm in Piauí between 2019 and 2023.

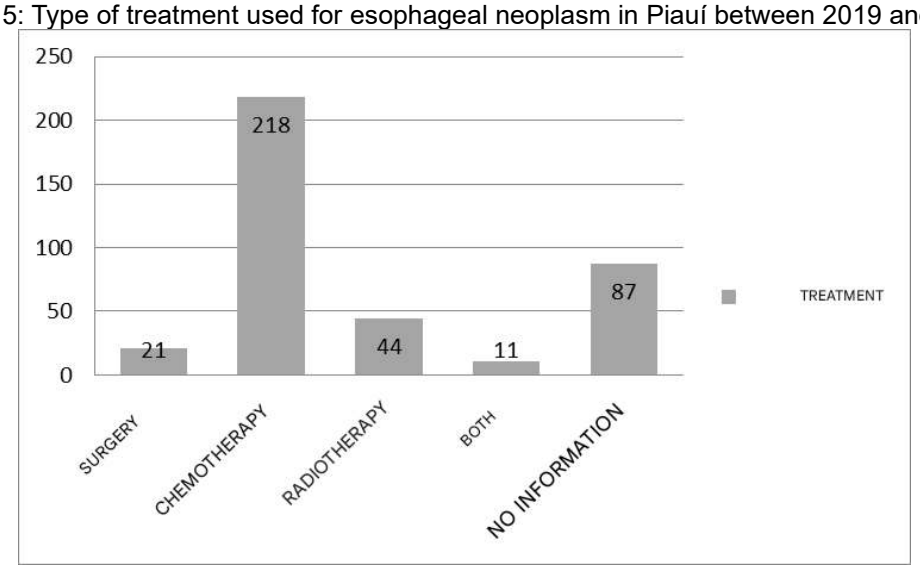



Source: Ministry of Health/SVS - Notifiable Diseases Information System - Sinan Net.

In terms of treatment, chemotherapy was the most used modality, corresponding to 57.2% (n = 218) of the cases. Radiotherapy was applied in 11.5% (n = 44) of the patients, and surgery, a curative modality in the early stages, was performed in only 5.5% (n = 21) of

the cases. In addition, 2.9% (n = 11) of the patients underwent both therapies (chemotherapy and radiotherapy). A significant 22.8% (n = 87) of the patients did not have information about the treatment recorded, which indicates an important gap in public health data that may compromise therapeutic planning and the analysis of clinical outcomes (Graph 5).

Graph 5: Type of treatment used for esophageal neoplasm in Piauí between 2019 and 2023.




Source: Ministry of Health/SVS - Notifiable Diseases Information System - Sinan Net.

The choice of treatments is usually related to the stage of the disease. Most cases of esophageal cancer are diagnosed in advanced stages, this is proven with staging data. Thus, curative treatment with surgery alone is often unfeasible. Esophagectomy remains a viable option for patients with resectable disease and no clinical contraindications. However, even when indicated, esophagectomy has high morbidity, with postoperative complications in about 61% of cases (CAMPOS et al., 2020).

In addition, patients in more advanced stages require esophageal prostheses to relieve dysphagia caused by tumor obstruction. The placement of endoscopic self-expanding prostheses has been shown to be an effective palliative approach to improve the quality of life of patients who are not candidates for curative treatments (OLIVEIRA et al., 2022). The combination of radiotherapy and chemotherapy is often used in patients with inoperable disease, and is considered a standard approach in many cases in Brazil (SILVA et al., 2021).

## FINAL CONSIDERATIONS

It is concluded that esophageal cancer data in Piauí between 2019 and 2023 show a predominance of cases in men and in individuals over 50 years of age, with most diagnoses

occurring in advanced stages of the disease. Chemotherapy was the main therapeutic modality used, reflecting the late staging of most cases. The variation in the number of cases over the years, with a drop in 2020, was possibly influenced by the COVID-19 pandemic.

In addition, the high percentage of cases without complete information on treatment and staging reinforces the need to improve the quality of records and data collection, which is essential for a better understanding of the epidemiological profile of the disease and for the optimization of treatment and prevention strategies.

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