IMPACT OF THE COVID-19 PANDEMIC ON THE DIAGNOSIS AND TREATMENT OF CANCER PATIENTS IN THE STATE OF SERGIPE

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ABSTRACT

Objective: This study conducted in Sergipe aimed to investigate the impacts of the COVID-19 pandemic on the diagnosis and treatment of cancer patients. Methods: A quantitative cross-sectional study of an observational-analytical nature was carried out, involving a sample of the oncology population exposed to the public emergency of COVID-19. Data collection initially took place through an electronic questionnaire disseminated by WhatsApp, later carried out in person in the waiting rooms of two public hospitals in Sergipe, due to low electronic adherence. The questionnaire included 22 objective multiple-choice questions about oncological disease and COVID-19. Results: A total of 103 individuals participated in the study, with a mean age of 56.2 years. Men were older than women (p=0.049). Breast cancer was the most prevalent, followed by head and neck cancer. The reported feelings included sadness, fear, anxiety and nervousness when they received the cancer diagnosis. Positive testing for COVID-19 was reported by 42.7% of the participants. Conclusion: No significant impacts were observed on the diagnosis and treatment of neoplasms during the COVID-19 pandemic, despite changes in health services. Participants reported no absences or interruptions in cancer treatment, maintaining medical appointments and performing exams as needed.

Keywords: Cancer. COVID-19. Quality of Life.

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INTRODUCTION

The global COVID-19 pandemic, triggered by the SARS-CoV-2 coronavirus, has brought a number of significant challenges and transformations to society since 2019. To mitigate the spread of the virus, control and prevention measures were implemented, such as social distancing, the use of masks, and the suspension of non-essential services (1). While these policies have been essential, they have generated significant impacts on society, with particularly adverse effects for individuals with cancer.

Before the pandemic, cancer was already one of the leading causes of global morbidity and mortality, responsible for 9.6 million deaths in 2018, consolidating itself as the second leading cause of death worldwide (2). However, COVID-19 has added a new layer of complexity and concern for cancer patients, healthcare professionals, and healthcare systems at large. Access to health services has been hampered by the reallocation of resources and teams to address the health emergency, resulting in the cancellation of consultations, exams, and surgeries. This scenario may have worsened the prognosis of several diseases (3).

The oncology sector, in particular, has faced and continues to face significant repercussions due to the complex interplay between cancer and the COVID-19 pandemic. It is believed that there have been delays in screening and intervention schedules (4). The pandemic has exposed a critical dilemma between maintaining screening services and the risk of spreading the virus, even as advances in immunization have improved the epidemiological landscape of COVID-19-related cases and deaths (5).

In the current global epidemiological scenario, it is essential to investigate the impacts of the COVID-19 pandemic on the diagnosis and treatment of cancer patients. There are indications of a possible reduction in medical procedures and follow-up appointments, which may result in a significant increase in late cancer diagnoses and, consequently, a higher mortality rate in the coming years. Analyzing these repercussions allows us to identify effective approaches to mitigate the adverse consequences of the pandemic on the health and well-being of these patients, in addition to contributing to the improvement of public health guidelines and clinical procedures aimed at combating cancer during health crises. Therefore, this study aims to investigate the impact of COVID-19 on cancer diagnosis and treatment.

MATERIAL AND METHOD

This is a cross-sectional study, with a quantitative approach and observational-analytical character, conducted with a sample of the oncological population exposed to the

public emergency of COVID-19. The research was approved by the Research Ethics Committee (CEP), under registration protocol 57272922.0.0000.5546 and opinion No. 5.635.258. All participants were duly informed about the scope and objectives of the study and, after detailed explanation, provided consent for participation. The ethical procedures adopted followed resolutions 466/2012 and 510/2016 of the National Health Council, in addition to the provisions related to the protection of personal data established in the General Data Protection Law (LGPD) - Law No. 13,709, of August 14, 2018.

Data collection was carried out through an electronic questionnaire hosted on Google Forms, chosen to optimize the efficiency in information collection (6). The questionnaire was answered by participants diagnosed with cancer between the years 2019 and 2021, after the beginning of the COVID-19 pandemic.

Data collection took place during the relaxation phase of social distancing measures, between 2022 and 2023. During this period, the establishments were operating normally, and the population had resumed face-to-face activities (7). In addition, the immunization campaign against COVID-19 was already at an advanced stage.

The research was disseminated through online platforms, including WhatsApp groups of the responsible researchers and emails sent to members of the scientific community. Initial adherence was limited, which led to the formation of partnerships with the oncology sectors of two public hospitals in Sergipe to expand dissemination. With the authorization of these hospitals, the disclosure was carried out in person in the waiting rooms of the oncology sector, where interested parties received the link to the questionnaire by email or phone.

The study protocol included a questionnaire with 22 objective multiple-choice questions, prepared by the researchers, and structured as follows:

- Identification of participants: Gender, age and state of residence in Brazil.
- Aspects related to oncological health: Medical diagnosis of neoplasia, emotional aspects associated with the discovery of cancer, type of cancer diagnosed, type of cancer treatment performed, and presence of metastasis.
- General health-related information: Positive test for COVID-19, protective mask wearing practices, continuity of cancer treatment during the pandemic, history of immunization against COVID-19, and comorbidities considered risk factors for COVID-19, such as obesity, diabetes mellitus, heart disease, respiratory diseases, hypertension, and other chronic diseases.

- Quality of life: Level of satisfaction with the quality of life related to cancer treatment during the pandemic, measured by the Likert scale, from 1 (very poor) to 10 (very good).

Eligibility criteria included:

- Age 18 years or older.
- Residence and domicile in the state of Sergipe.
- Ability to access the questionnaire through Google Forms.
- Self-report of medical diagnosis of cancer.
- Oncological treatment between 2019 and 2021.

Participants who did not complete all the questions on the questionnaire, who did not report a history of oncological disease, who did not self-report antineoplastic treatment between 2019 and 2021, or who were not residents and domiciled in the state of Sergipe were excluded.

For the statistical analysis of the collected data, the Statistical Package for Social Sciences (SPSS) software, version 20, was used. The level of statistical significance was set at 5% ($P<0.05$) to determine the means, and the data were presented as values with standard deviation. Statistical analyses included Student's t-test and two-way Analysis of Variance (ANOVA). The dependent variable considered was testing positive for COVID-19, while the independent variables included gender, age, type of cancer treatment, mask use practices, history of immunization against influenza and COVID-19, and presence of comorbidities.

RESULTS

A total of 110 individuals were interviewed, 49 in virtual format and 61 approached in person in the waiting room of the oncology sector of two public hospitals in Sergipe. In the face-to-face approach, after accepting to participate in the research, the researchers sent the virtual questionnaire to WhatsApp or via the participant's email to be filled out.

In the analysis of the responses, 103 participants were considered eligible. The mean age of the participants was 56.2 years (±16.80), and 55.3% were female. There was a statistically significant difference in age between men and women, with males presenting a more advanced mean age (61.18 years) when compared to females (49.52 years), with a p value of 0.049 (Student's T).

Regarding the types of cancer, the most prevalent was breast cancer, followed by head and neck cancer, with a statistically significant difference for these cancers related to

the others (p<0.001). In addition, the type of treatment most commonly indicated by the medical team was chemotherapy concomitant with radiotherapy (p<0.001) (Student's T).

Among the self-reported feelings of the interviewees when receiving the diagnosis of cancer were sadness, fear, anxiety and nervousness. However, a major effect of these emotional feelings on cancer diagnosis was not identified [F(4, 1.030) = 1.027, p=0.396], according to the results of analysis of variance (ANOVA). Data elucidated in Table 1.

Table 1. Distribution of participants with self-reported cancer related to gender, oncological diagnosis, type of cancer and treatment performed (n=103).

Variables	n (%)	p (value)
Sex		0,278
Female	57 (55,3)	
Male	46 (44,7)	
Type of cancer		0,000*
Breast	25(24,3)	
Head and neck	24 (23,3)	
Prostate	13 (12,6)	
Marrow	11(10,7)	
Lung	6(5,8)	
Intestine	4(3,9)	
Stomach	3(2,9)	
Liver	3(2,9)	
Leukaemia	3(2,9)	
Skin	3(2,9)	
Uterus	3 (2,9)	
Thyroid	2(1,9)	
Esophagus	1(1,0)	
Ovary	1(1,0)	
Pancreas	1 (1,0)	
Type of antineoplastic treatment performed		0,000*
Exclusive chemotherapy	39 (37,9)	
Exclusive radiation therapy	10 (9,7)	
Quimiotherapy and concomitant radiotherapy	54 (52,4)	
Emotional aspects related to the discovery of cancer		0,396
Sadness	21 (20,4)	
Nervousness	13 (12,6)	
Anxiety	15 (14,6)	
Indifferent	24 (23,3)	

Self-reported positive testing for COVID-19 was recorded in 42.7% (n=44) of the participants and no statistically significant difference in ages was observed between the groups of participants with positive tests {54.02 years (±18.33)}, and negative tests {57.85 years (±15.53)}.

It was observed that fear of contracting COVID-19 was present among those who self-reported testing positive for SARS-COV 2. However, despite this fear, the majority (63.1%) did not fail to attend medical appointments (Table 2).

Table 2. Comparison of participants with self-reported positive (n=44) and negative tests for COVID-19 (n=59) related to the variables: gender and cancer treatment

Variables	Positive test for COVID-19 n(%)	Negative Test for COVID-19 n(%)	p (value)
Gender			0,321
Female	27 (61,4)	30 (50,8)	
Male	17 (38,6)	29 (49,2)	
Self-report of metastasis			0,155
Yes	13(29,5)	10(16,9)	
No	31 (70,5)	49 (83,1)	
Cancer discovery			0,283
Before the pandemic (January and February 2019)	6(13,6)	15(25,4)	
During the pandemic (March 2019 to 2021)	34(77,3)	41(69,5)	
In the year 2022	4(9,1)	3(5,1)	
During the pandemic, did you carry out medical exams and consultations?			0,174
Yes, without fear of contracting COVID-19	9(20,5)	22(37,3)	
Yes, afraid of contracting COVID-19	32(72,7)	33(55,9)	
No, afraid of contracting COVID-19	3(6,8)	4(6,8)	
During the pandemic, did you undergo chemotherapy/radiotherapy?			0,459
Yes, without fear of contracting COVID-19	12(27,3)	23(39,0)	
Yes, afraid of contracting COVID-19	30(68,2)	34(57,6)	
No, afraid of contracting COVID-19	2(4,5)	2(3,4)	
In the pandemic, did you miss chemotherapy/radiotherapy sessions?			0,440
There was never a lack of	34(77,3)	50(84,7)	
He was absent because he felt sick as a result of the treatment	4(9,1)	2(3,4)	
He was absent for fear of contracting COVID-19	6(13,6)	7(11,9)	
During the pandemic, did you carry out medical exams and consultations?			0,174
Yes, without fear of contracting COVID-19	9(20,5)	22(37,3)	
Yes, afraid of contracting COVID-19	32(72,7)	33(55,9)	

Among the participants who tested positive for COVID-19, 22.7% reported needing to be hospitalized ($p<0.001$). In addition, many participants indicated that they contracted the disease while attending closed environments, as shown in Table 3.

Regarding the general health status of the participants, assessed using a Likert scale, the average was 7.88 (±1.43) for the group that tested positive for COVID-19. These results suggest a positive assessment of the participants' general health status.

Table 3. Comparison of participants with self-reported positive (n=44) and negative COVID-19 (n=59) tests related to contamination, COVID-19 care, as well as immunization

Variables	Positive test for COVID -19 n(%)	Negative test for COVID-19 n(%)	p (value)
Do you think you contracted COVID-19 in			0,000*
Hospital for cancer treatment	6(13,6)	------	
Indoor environments such as markets, shops, etc	22(50,0)	-----	
Family member who visited the participant	16(36,4)	------	
He wore a protective mask			0,562
Yes, in all locations	16(36,4)	27(45,8)	
Yes, indoors only	20(45,5)	21(35,6)	
No	8(18,2)	11(18,6)	
COVID-19 Immunization			0,467
Two doses	6(13,6)	8(13,6)	
Booster dose	38(86,4)	49(83,1)	
Not immunized	0	2(3,4)	
After immunization, did the fear of contracting COVID-19 persist?			0,218
Yes	15(34,1)	20(33,9)	
Yes, but safer with the vaccine	15(34,1)	12(20,3)	
No	14(31,8)	27(45,8)	

DISCUSSION

The present research reflects the reality of the state of Sergipe, located in the northeast of Brazil. Sergipe is the smallest state in territorial extension in the country, covering approximately 0.26% of the national territory, with an estimated population of about 2,210,004 inhabitants. This geographic and demographic contextualization is crucial to understand the applicability of the results obtained in the regional context of Sergipe (8).

The mean age of the participants diagnosed with cancer was 56.2 years, which is similar to the findings of national studies that indicate a predominant incidence in the population over 50 years of age (9,10). Data from the Individualized Production Bulletin (BPA-I) system revealed an age group of 55 to 59 years during the three-year period from 2020 to 2022 (11). In contrast, the literature documents that most cancers arise in individuals over 60 years of age, due to biophysical changes in the cell matrix in this age group, which contribute significantly to tumor development (12). However, it is crucial to consider the contemporary factors that impact the general population, such as tobacco use, obesity, lack of physical activity, excessive alcohol consumption, a diet low in fruits and vegetables, exposure to infectious agents, and excessive sun exposure, all of which are predisposing to the development of malignant tumors. These data elucidate the findings related to the incidence of cancer in the population under 60 years of age (13).

There was a disparity in the mean age between men (61.15 years) and women (49.52 years). The literature reports that the incidence of cancer in the male population

often occurs in those over 65 years of age (14). On the other hand, in the female population, 43% of cancer diagnoses occur in individuals under 50 years of age. This data highlights a significant age difference at the time of diagnosis between genders (15). Studies indicate that the prevalence of cancer is higher in the population over 60 years of age, regardless of gender. However, when looking at significant variations between genders, it is essential to consider that cancer incidence is influenced by several factors, such as genetic predisposition, exposure to carcinogens, lifestyle, and hormonal factors, which may differ between men and women (13).

In the population studied, breast cancer accounted for 24.2% of the cases, followed by head and neck cancer (23.3%) and prostate cancer (12.6%). These results are in line with the regional estimates of the Department of Informatics of the Unified Health System (DataSUS), which indicate that prostate cancer represents 38.1% of cancers in the male population of the Northeast region, while breast cancer corresponds to 28.1% of diagnoses in the female population of the same region (11). Annual estimates for 2023 also report that head and neck cancer in the Northeast ranks second in prevalence, with approximately 10,070 new cases (16)

It was observed that 52.4% of the patients interviewed underwent combined treatment. It is important to note that each therapeutic approach is individually selected by the medical team. The rationale for implementing combination therapies lies in the ability to employ different mechanisms of action, thereby reducing the likelihood of developing resistant cancer cells (2). In addition, cancer treatments vary considerably, depending on the type of cancer, the stage of the disease, and the individual needs of each patient. In many clinical situations, the use of multiple treatment modalities is necessary to maximize efficacy in the fight against cancer (17).

It is well documented that cancer has a comprehensive and significant impact on the physical and mental health of individuals, in addition to affecting their social conditions and quality of life(18). The disease is seen as a significant threat, triggering feelings of helplessness, hopelessness, fear and apprehension, often accompanied by depression due to the difficulty in accepting the diagnosis (19,20). In the present study, 29.1% of the participants reported fear, 20.4% sadness, 12.6% nervousness and 14.6% anxiety at the time of diagnosis, feelings involved in the process of discovering cancer. Studies in the field of psychology show that 80% of cancer patients report emotional changes that can culminate in depression during the clinical process (19).

These feelings tend to intensify in the face of the uncertainties of the COVID-19 pandemic, adding to the fear of contracting the virus. In the self-report of the participants in

this study, 69.9% expressed fear of contracting COVID-19. The literature also points to negative feelings, such as sadness, depression, and anxiety, in a large part of the population during the pandemic period (21,22). It is known that cancer patients belong to the risk group and are more susceptible to respiratory tract infections due to systemic immunosuppression caused by cancer treatment and by the disease itself (23)

The results showed that, despite the risk of contracting COVID-19, more than half of the patients regularly attended appointments and exams. It is believed that the fear of worsening the prognosis of the cancerous disease is the main factor for this impairment, since delays in the initiation of cancer treatment or its interruption significantly increase the risk of cancer failure and mortality (24). For example, a 60-day delay in starting procedures increases the risk of death by 26% (25).

To mitigate the effects of social distancing measures, public health actions related to the planning of new cancer diagnoses were developed by the Division of Early Detection and Support to the Network Organization of INCA (Didepre). Initially, it was proposed to postpone the performance of screening tests during the peak of contamination. However, with the update of the guidelines, the flexibility for carrying out elective procedures in general was published. Actions related to cancer diagnosis and screening significantly impacted the lives of the population during the first year of the pandemic and negatively affected cancer care, with potential long-term repercussions. (26,27).

The literature reports significant reductions in breast cancer diagnosis, as well as in medical consultations with mastologists, in the performance of ultrasound and mammography exams, in addition to biopsies and surgeries during the pandemic period. However, it was observed in 2020 that the supply of chemotherapy and radiotherapy was not affected. Despite delays in diagnosis and treatment due to cancellations of procedures considered non-essential, 77.3% of the patients in this survey were able to receive the diagnosis during the pandemic. This high percentage is remarkable, even with the decrease in screening and diagnosis by the SUS (28)

The survey also showed that despite the fear (63.1%) of contracting COVID-19, many (42.7%) tested positive at some point during treatment. It is observed that the fear of contamination was predominant in the population as a whole, and not only among those who were part of the risk group, all of whom were susceptible to contracting SARS-Cov2 (29).

Among cancer patients affected by COVID-19, 22% reported having been hospitalized and having undergone advanced clinical procedures to combat SARS-CoV-2. It is known that cancer patients are considered a risk group and have a greater predisposition

to develop severe forms of COVID-19 due to immunosuppression (23). They have a 3.5-fold increased risk of requiring mechanical ventilation and ICU stay, compared to patients without neoplastic disease (30). In addition, 41.7% of the participants reported having comorbidities, such as metabolic and heart diseases, factors that aggravate the clinical conditions of COVID-19. In addition, 26.2% of the participants were elderly.

In the post-pandemic period, 39.8% of participants reported using masks exclusively indoors as personal protective equipment. This data suggests a high adherence to the use of masks in these environments, even after the release of the use by government agencies, and this is one of the measures proven to be efficient to reduce contagion (31) .

Of the participants, 98.1% received at least two doses of immunization against COVID-19, corroborating the recommendations of the SUS on the importance of priority immunization of the risk group. Vaccination adherence was especially high in the onco-hematological population (32). However, 34.1% of the patients in the present study expressed fear after immunization, despite feeling safer. This fear can be attributed to the perception that the vaccine was developed quickly due to the global state of emergency, generating distrust as to its effectiveness with possible side effects

Of the total number of participants, 81.5% reported having undergone cancer treatment uninterruptedly, even during periods of social isolation. The hospitals ensured the continuity of treatment, despite the decrease in the number of patients, and used appropriate strategies to ensure the physical and mental integrity of the patients (24). This behavior demonstrates the resilience and commitment of health services, indicating the effectiveness of the strategies implemented to maintain the continuity of treatment in adverse conditions.

Since 1863, the importance of a safe hospital environment for the patient has been emphasized, highlighting aspects such as good lighting, cleanliness, ventilation, temperature, care with odors and noise, prioritization of isolation, and reduction of beds per ward (33). Such actions were rigorously carried out during the pandemic and contributed to the improvement of health conditions. Therefore, Florence Nightingale's environmentalist theory has never been as present as in this pandemic period, which helped in the continuity of care in treatment during the pandemic (34)

It is pertinent to note that cancer, a condition with no definitive cure, affects millions of people globally and is one of the leading causes of mortality. Despite the global emergency caused by the COVID-19 pandemic and the significant changes in the routine of health services, the fight against cancer has remained robust and efficient. Interestingly, patient testimonials suggest that the fear associated with cancer outweighs, in many cases, the

concern about COVID-19. This can be attributed to the long history of the oncological disease, which lacks a definitive cure, contrasting with the COVID-19 pandemic, which offers prospects for control through immunization. This insight highlights the complexity of cancer patients' emotions and priorities, pointing to the need for personalized and sensitive approaches in public health contexts.

Among the limitations of this research is the system used in data collection. Dissemination in digital media has not effectively reached the general population, especially the elderly, who often face difficulties in the functional use of digital media. Due to low adherence, data collection had to be carried out in person at hospitals, proving to be more effective in this context than the digital approach.

In addition, because it is a disease about which the population avoids talking or sharing their doubts and emotions, some participants did not complete the questionnaire. Therefore, it is essential that future research deepens the study of the impact of the COVID-19 pandemic on cancer patients, providing a more detailed analysis of this interaction.

CONCLUSION

Of the participants, 42.7% reported having tested positive for COVID-19. The vast majority wore masks and were immunized with the booster dose, demonstrating adherence to the recommended preventive measures.

The present research elucidates that no significant impacts were observed in the conduct of the diagnosis and treatment of neoplasms, even in the face of changes in the functioning and systematics of health services during the pandemic. It was found that the participants maintained regularity in medical consultations, exams and oncological treatments made available by the public health service, without significant interruptions.

COLLABORATORS

Oliveira, P. F. contributed with the conception and design or analysis and interpretation of the data; is responsible for all aspects of the work in ensuring the accuracy and completeness of any part of the work; responsible for the final approval of the version to be published. 4. Nascimento, F.C and Santos, M.E.A contributed to the writing of the article and Silva, N.S.G and Santana, J. O contributed to the relevant critical review of the intellectual content.

CONFLICT OF INTEREST

The authors inform that there is no potential conflict of interest, including political and/or financial interests associated with patents or ownership, provision of materials and/or inputs and equipment used in the study by the manufacturers.

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