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EPIDEMIOLOGICAL ANALYSIS OF MALIGNANT NEOPLASM OF THE PROSTATE IN THE SOUTHEAST REGION BETWEEN THE YEARS 2017 AND 2023

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ABSTRACT

This article proposes a comprehensive and in-depth approach to prostate cancer in the Southeast region of Brazil, standing out for its emphasis on the integration of epidemiological data, socioeconomic factors, and social determinants. The longitudinal analysis will allow a dynamic and evolutionary understanding of the incidence of the disease, contributing to the development of more effective prevention, diagnosis and treatment strategies. The research will seek to identify patterns and trends through the triangulation of data from different sources, such as hospital records, health information systems, and population surveys. In addition, it will deepen the investigation of factors that may influence the incidence rates and outcomes of prostate cancer, with emphasis on the analysis of socioeconomic aspects, access to health information and the influence of determinants such as education and income. An innovative aspect of the article is its concern not to be restricted to the purely clinical aspect, seeking to understand the complex interactions between health and social conditions. In this sense, the research will address the living conditions of the population, taking into account not only access to health services, but also factors that shape the social context, such as educational levels and income distribution. By establishing a connection between epidemiological data and social contexts, the research intends to offer fundamental subsidies for the development of more effective and inclusive health policies, providing a holistic view of prostate cancer in the Southeast region. This prospective approach not only sheds light on the present, but aims to establish solid foundations for understanding and coping with the disease in the future.

Keywords: Neoplasm. Community of Hospitals. Study Guide.

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INTRODUCTION

In Brazil, according to the National Cancer Institute, prostate cancer is the second most common type of cancer among the male population, being a significant factor that leads to death when it is diagnosed late. (INCA,[1] 2020). The tumor may grow slowly, as well as that its growth occurs in an accelerated manner, making it necessary to carry out screening tests to identify the disease early and have more satisfactory treatment results. (PEREIRA et al.[2], 2021).

Individuals only seek services when a certain weakness is already observed and there is a need to seek specialized help, which causes damage not only to physical health, but also to emotional and financial health (VERAS et al [3], 2017). In addition, there are predisposing factors that increase an individual's risk of having prostate cancer. The main factors are age (> 65 years), Afro-descent and genetic predisposition, however, chronic inflammation, exposure to ultraviolet radiation, being a smoker, alcoholic, having already had a vasectomy and having a diet with abundant animal fat, red meat, calcium and milk, are also predisposing factors (SANTOS et al, [4] 2017).

Initially, the clinical manifestations of this cancer are usually absent at the time of diagnosis. The tumor can consist of both asymptomatic, microscopic and well-differentiated cancer detected by screening, as well as clinically symptomatic, aggressive high-grade cancer that causes metastases, morbidity and death. The vast majority are detected in the local stage and are asymptomatic. As for the clinical picture, complaints such as nonspecific urinary symptoms, hematuria or hematospermia may arise. (TAPLIN, Mary-Ellen; SMITH, Joseph A, [5] (2022). Cancer is one of the most complex public health problems that the Brazilian health system faces, given its epidemiological, social and economic magnitude, thus, prostate cancer is a concern for men's health, thus requiring investments in prevention and health promotion.

Prostate cancer has a high incidence among men in Brazil, compromising 29.79% of cases. It is estimated that 65,840 cases of prostate cancer will be diagnosed in the country annually between the years 2020 and 2022, equivalent to 62.95 new cases/100 thousand men (PELOSO-CARVALHO et al.,[6] 2021). This high risk, in part, can be attributed to the low demand of men for the services offered by the Unified Health System (SUS), especially those of the Basic Health Units (UBS). (VERAS et al., [3] 2017).

Patients with localized disease at low to intermediate risk of recurrence usually have a favorable outcome of 99% overall survival for 10 years if the disease is detected and

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treated at an early stage. Major genetic alterations include TMPRSS2 fusions with ETS family genes, amplification of the MYC oncogene, deletion and/or mutation of PTEN and TP53, and, in advanced disease, amplification and/or mutation of the androgen receptor (AR). (Rebello et al, [7] 2021).

Taking this into account, in recent decades the stimulus for screening for prostatic neoplasia has increased considerably, suggesting digital rectal examination together with serum prostatic specific antigen (PSA) measurement as a source of early detection and, thus, preventing the patient from only reaching the health professional in advanced stages of the disease. Such measures are guides, since they are recommended for age groups where there is a prevalence of prostatic neoplasms, with or without the presence of symptoms (STEFFAN et al., [82018).]

When analyzing articles that address the epidemiological profile of patients with prostate neoplasms, it was found that the literature presents a lack of the epidemiological profile of patients from the year 2017 onwards. Thus, the present study aims to analyze the epidemiological profile of hospitalizations for malignant prostatic neoplasm in Brazil from 2017 to 2023.

METHODOLOGY

This is an ecological, descriptive, longitudinal, retrospective and analytical study on hospitalizations due to malignant neoplasm of the prostate, elaborated through secondary data obtained from the Hospital Information System of the Unified Health System (SIH/SUS), made available by the Department of Informatics of the SUS (DATASUS), in people between 60 and 79 years old, from January 2017 to December 2023, in the southeastern region of Brazil.

The variables used in the extraction and tabulation of the data were: age group, ethnicity, and mortality rate. The variables used in the extraction and tabulation of the data were: the number of hospitalizations and male gender, correlating with characteristics such as year of processing, region, age, ethnicity, average length of stay, and mortality rate. The data were gathered in a Microsoft Office Excel spreadsheet, and data analysis was carried out using simple descriptive statistics, from March to April 2024. The results were presented in tables containing absolute numbers and percentages.

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Finally, according to the National Health Council, Resolution No. 510, of April 7, 2016, submission to the Research Ethics Committee is waived, considering that it is an analysis based on a secondary and freely accessible database.

RESULTS

In the period analyzed, 166,533 hospitalizations for prostate cancer were recorded, in people between 60 and 79 years old, in all regions of Brazil. It is noteworthy that, between the years 2020 and 2021, there was a considerable drop in the number of patients with prostate cancer, with an average of 3000 thousand fewer cases compared to the previous year (2019), (Table 1).

Table 1 - Distribution of the number of hospitalizations for prostate cancer, in people aged 60-79 years, according to the year of processing, in the period from 2017 to 2023.

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
North Region	590	591	675	572	661	710	852	4651
Northeast Region	5454	5710	5878	5167	5881	6861	7476	42427
Southeast Region	11608	11787	13005	10979	10849	12548	13592	84368
South Region	3399	3687	3898	3244	3100	3839	4480	25647
Midwest Region	1338	1248	1332	1247	1189	1419	1667	9440
Total	22389	23023	24788	21209	21680	25377	28067	166533

Source: Data extracted from the Department of Informatics of the Brazilian Unified Health System (DATASUS), framed in the Hospital Information System of the SUS (SIH/SUS).

In the period covering the geographic regions studied, the largest number is concentrated in the Southeast region with 84,368 cases (50.66% of the total), followed by the Northeast region, responsible for 42,427 (25.47% of the total) of hospitalizations. The third place is represented by the South region, with 25,647 (15.40% of the total) men hospitalized.

By way of comparison, the least affected regions are the Central-West region, with 9,440 (5.66% of the total) hospitalizations, and, finally, the North region, with 4,651 cases (2.79% of the total).

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Table 2 - Distribution of the number of hospitalizations for prostate cancer, in people between 60 and 69 and 70 to 70 years old, respectively, according to age group, in the Southeast region, in the 2017-2023 interval.

Region/Unit and the Federation	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	6652	6651	7523	6210	5979	6737	7336	47088
Minas Gerais	1862	1821	2098	1896	1756	2173	2293	13899
Holy Spirit	365	327	368	317	329	374	443	2523
Rio de Janeiro	946	1156	1439	1030	1065	1170	1318	8124
São Paulo	3479	3347	3618	2967	2829	3020	3282	22542

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	11608	11787	13005	10979	10849	12548	13592	84368
.. Minas Gerais	3416	3350	3793	3386	3274	4255	4513	25987
.. Holy Spirit	674	642	640	603	611	686	809	4665
.. Rio de Janeiro	1674	2003	2330	1739	1847	2165	2307	14065
.. São Paulo	5844	5792	6242	5251	5117	5442	5963	39651

As shown in Table ~~2~~, it is possible to observe high percentiles of hospitalization for prostate cancer in the Southeast. In this period, the southeast region had 84,368 cases of malignant neoplasm of the prostate in the elderly. Regarding the age group, it is a disease that is present mainly in the elderly, more prevalent from the age of 60. Among the states, São Paulo had the highest number of cases (39,651), being the year 2019 with the highest record (6,242), followed by Minas Gerais (25,987), Rio de Janeiro (14,065) and Espírito Santo (4665).

Analyzing the age profile of hospitalizations for prostate cancer from 2017 to 2023, it can be seen that the age groups of 60 to 69 years were responsible for 28.2% of the total number of hospitalizations, with a higher prevalence in the age group between 70 and 79 years equivalent to 50%. Thus, a comparison between the aforementioned tables 3 is evidenced, in which the prevalence of prostate cancer becomes more evident in individuals aged 70 to 79 years.

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Table 3 - Distribution of the number of hospitalizations for prostate cancer, in people between 60 and 79, according to white, black, brown, yellow, ingiena ethnicity, respectively, in the Southeast region, in the period from 2017 to 2023.

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	5071	5042	5571	4546	4380	5067	5715	35392
Minas Gerais	911	803	1064	876	883	1159	1228	6924
Holy Spirit	208	188	182	119	157	188	171	1213
Rio de Janeiro	546	666	688	542	564	641	743	4390
São Paulo	3406	3385	3637	3009	2776	3079	3573	22865

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	1147	1147	1459	1219	1271	1458	1768	9469
Minas Gerais	340	317	395	372	400	477	575	2876
Holy Spirit	46	57	53	59	58	60	85	418
Rio de Janeiro	228	266	421	313	294	361	467	2350
São Paulo	533	507	590	475	519	560	641	3825

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	3815	3857	4307	3689	3557	4628	5735	29588
Minas Gerais	1791	1705	2069	1842	1730	2305	2579	14021
Holy Spirit	385	376	379	391	377	417	542	2867
Rio de Janeiro	509	583	598	472	468	663	931	4224
São Paulo	1130	1193	1261	984	982	1243	1683	8476

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	146	148	197	151	134	181	207	1164
Minas Gerais	15	16	16	33	23	54	71	228
Holy Spirit	1	0	1	4	1	2	8	17
Rio de Janeiro	40	66	124	85	61	64	75	515
São Paulo	90	66	56	29	49	61	53	404

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	0	1	2	0	0	0	2	5
Minas Gerais	0	1	1	0	0	0	0	2

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Holy Spirit	0	0	1	0	0	0	0	1
Rio de Janeiro	0	0	0	0	0	0	0	0
São Paulo	0	0	0	0	0	0	2	2

Source: Data extracted from the Department of Informatics of the Brazilian Unified Health System (DATASUS), framed in the Hospital Information System of the SUS (SIH/SUS).

Regarding the reported ethnicity of the hospitalized patients, the highest number of cases prevailed in hospitalized patients of white ethnicity, with a total of 35,392 (46.80% of the total of 75618). Next, the brown ethnicity was responsible for 29,588 (34.36%) cases. With lower quantities, the black ethnicity presented 12.52%, followed by the yellow ethnicity with 1,164 cases (1.53%) and finally, the indigenous ethnicity with 5 cases (0.006%), as illustrated in tables 3.

Table 4 – Distribution of hospital service values of the number of hospitalizations for prostate cancer, in people between 60 and 79 years old, in the Southeast region, in the period from 2017 to 2023 with their respective mortality rates in this period.

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
Southeast Region	8,1	8,2	7,8	7,9	8,6	7,9	7,8	56,4
Minas Gerais	7,4	6,6	6,6	5,7	5,9	5,9	5,7	43,7
Holy Spirit	7,7	8,7	6,3	7	8,4	6,3	5,8	50,1
Rio de Janeiro	11,1	9,3	9	11,4	11,3	10	9,3	71,4
São Paulo	7,7	8,7	8,4	8,3	9,5	8,9	9,1	60,5

Region/Federation Unit	2017	2018	2019	2020	2021	2022	2023	Total
	R$	R$	R$	R$	R$	R$	R$	R$
Southeast Region	26.165.447	26.294.536	28.780.482	24.032.690	24.554.034	28.817.226	32.002.773	190.647.189
	R$	R$	R$	R$	R$	R$	R$	R$
. Minas Gerais	8.492.187	8.505.444	9.747.582	8.247.488	8.590.050	10.516.024	11.280.492	65.379.267
	R$	R$	R$	R$	R$	R$	R$	R$
Holy Spirit	1.373.737	1.207.636	1.402.396	1.309.508	1.375.637	1.637.758	1.984.206	10.290.879
	R$	R$	R$	R$	R$	R$	R$	R$
Rio de Janeiro	3.000.777	3.610.975	4.793.661	3.837.445	4.175.744	4.966.631	5.478.899	29.864.132
	R$	R$	R$	R$	R$	R$	R$	R$

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. São Paulo	13.298.747	12.970.480	12.836.842	10.638.250	10.412.603	11.696.814	13.259.175	85.112.911

Source: Data extracted from the Department of Informatics of the Brazilian Unified Health System (DATASUS), framed in the Hospital Information System of the SUS (SIH/SUS).

As for the number of mortality rates, the Brazilian scenario showed a pattern of decrease relative to the previous year in 2022 and 2023 and a pattern of increase in 2019 and 2020, both patterns present in the 5 regions of the country with a higher number of deaths in 2021. The differences between the regions during the last 5 years are notorious, with the Southeast region responsible for 56.4% of the mortality rate, the State of Rio de Janeiro representing 71.4%, São Paulo with 60.5%, Espirito Santo with 50.1% and Minas Gerais with 43.7%. However, mortality rates do not follow this pattern, with 2021 accounting for the highest mortality rate (13.7) and 2023 for the lowest rate (11.53), as shown in table 4.

The total amount funded by SUS in hospitalizations for malignant neoplasm of the prostate in Brazil, from 2017 to 2023, which was R$ 190,647,188.97, when divided by states, is by the proportion of hospitalizations, São Paulo (R$ 85,112,911.35), Minas Gerais (R$ 65,379,267.14), Rio de Janeiro (R$ 29,864,131.97), and finally Espírito Santo with a total of 10,290,878.51.

The year with the highest spending was 2023 with R$32,002,772.60 (16.78% of the total) and the year with the lowest spending was 2020 with R$24,032,690.46 (12.6%).

DISCUSSION

This study revealed a high prevalence of hospitalizations with malignant neoplasm of the prostate in the Brazilian population between 2017 and 2023, presenting high numbers among the white population with high notoriety among the age groups of 60 to 79 years. In addition, about the value of these hospitalizations, hospital services were mostly responsible for the costs, with a lower average hospitalization value in the state of Espírito Santo compared to others.

The number of hospitalizations for malignant prostatic neoplasm in Brazil increased when comparing the years 2017 and 2018, this finding may be related to population aging and change in the country's age pyramid, as well as the increase in risk factors that predispose to the disease, as reported in the literature.

The distribution of the number of hospitalizations by Brazilian regions reflects the population data of Brazil, with the highest proportion of hospitalizations in the Southeast

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region (50.6%), the most populous in the country. It is noteworthy that the periods in which there were declines are consistent with the period in which the country's health actions were directed and intensified to combat SARS Cov-2, the new coronavirus, generating a probable underreporting of cases (Brasil,9 2020). The observed increase in prostate cancer incidence rates can be partially justified by the evolution of diagnostic methods, the improvement in the quality of the country's information systems, and the increase in the life expectancy of Brazilians (INCA,10 2023).

Hospitalizations, when analyzed by age group, corroborate the data in the literature related to malignant neoplasm of the prostate, which demonstrate that it is directly proportional to age, and this study demonstrated a higher number of cases between 70 and 79 years of age. Given the above, the increase in the elderly population related to the increase in life expectancy, the epidemiological profile of cancer has been demonstrating changes that significantly affect the scenario of neoplasms in the world (Carter et al., [11] 1990). In addition, it is estimated that one in ten men during their lifetime develops prostate carcinoma, which is clinically evident. Higher incidence occurs in older people (Dini & Koff, [12] 2006).

In this study, the proportions by color/race show more hospitalizations among whites (46.80%) and browns (34.36%), which together correspond to more than 80% of cases of malignant neoplasm of the prostate, which diverges from the literature, presented by DATASUS, according to the Brazilian Society of Urology (2018), prostate cancer (PCa) in black men has a higher incidence than in whites. This data can be justified by the lack of completion regarding color/race in most of the medical records in the public health system, which hinders an in-depth epidemiological evaluation. In the North American population, a considerable difference in the incidence and mortality of PCoC between black and white men is already well established, being 3 and 2.4 times higher in black men, respectively (PERNAR et al., [13] 2018). This discrepancy between races has been correlated with low socioeconomic status and diagnosis in advanced stages due to the difficulty of this population in accessing health services (BENJAMINS et al.,[14] 2016).

As for the indigenous people, they had a low rate of hospitalization for malignant neoplasm of the prostate, however, access to health for these peoples is more difficult due to geographic isolation, and it may be an underdiagnosed disease in this population and, according to the literature, the change in eating habits induced by greater contact with

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urbanization was responsible for increasing the prevalence of chronic kidney disease in this people (Gomes, [15] 2023).

When analyzing the mortality rate, the state of São Paulo found a positive increase in mortality from prostate cancer. Mortality rates are higher during the 6 years analyzed, which can be explained by inter-regional differences in income and access to health services for rapid diagnosis and decision-making. The best diagnosis of this disease is associated with the greater supply of care and resources to establish an effective diagnosis, which requires structural improvements and easy access to the population, especially in the public sector, so that the diagnosis and, therefore, the treatment can be carried out correctly and quickly (Berrington et al., [16] 2015).

Regarding the costs related to hospitalizations for malignant neoplasm of the prostate in Brazil, the distributions by the states follow a pattern according to higher numbers of hospitalizations, consequently presenting higher expenses. These numbers show the financial burden on the health system that prostate cancer causes in Brazil. This fact can be explained by the increase in the incidence rates of prostate neoplasia over the years, and the main factors for this are the increase in the life expectancy of the population and the improper screening performed, culminating in the overdiagnosis and unnecessary treatment of patients who would never have presented signs and symptoms of this neoplasm in the future (INCA, [17] 2017).

The most evident limitation of this study was the possibility of underreporting of hospitalizations and mortality due to malignant neoplasm of the prostate, since the results of this article originate from the analysis of information from a public domain health information system - DATASUS.

CONCLUSION

According to the data analyzed, it is possible to conclude that the numbers of prostate cancer are increasing in Brazil. It was confirmed based on data collected from both the literature and DATASUS. The profile of patients with malignant prostatic neoplasm are men, with a prevalence mainly over 60 years of age, most of whom are white. The predominance of these men is concentrated in the Southeast region and both the number of hospitalizations and the mortality rate increased over these 6 years analyzed. Clinically, it is necessary to emphasize the benefits of maintaining a healthy lifestyle and providing more equitable access to health facilities. This research

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demonstrates that prostate neoplasia in the male population is a public health problem, and is subject to preventive care, and there should be actions such as health education, aiming to minimize unnecessary expenses and improve people's quality of life. Due to the importance of the data demonstrated, it is suggested that new research on the subject be periodically made public to constantly update the surveys, favoring technical-scientific dissemination and public policy actions.

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