



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

# IJDR

International Journal of Development Research

Vol. 12, Issue, 03, pp. 54819-54822, March, 2022

<https://doi.org/10.37118/ijdr.24198.03.2022>



RESEARCH ARTICLE

OPEN ACCESS

## MORTALITY FROM TESTICULAR CANCER: A PANORAMA IN A STATE IN NORTHEASTERN BRASIL

Gleydson Luis Silva de Sousa<sup>1</sup>, Kardene Pereira Rodrigues<sup>2</sup>, Camila Silva Aguiar<sup>2</sup>, Kallyne Bezerra Costa<sup>3</sup>, Maria Raimunda Santos Garcia<sup>2</sup>, Aline Sharlon Maciel Batista Ramos<sup>3</sup>, Consuelo Penha Castro Marques<sup>1</sup>, Sueli de Souza Costa<sup>1</sup> and Débora Luana Ribeiro Pessoa\*<sup>1</sup>

<sup>1</sup>Federal University of Maranhao, Pinheiro, Maranhão, Brazil

<sup>2</sup>Federal University of Maranhao, São Luís, Maranhão, Brazil

<sup>3</sup>Florence Institute, São Luís, Maranhão, Brazil

<sup>4</sup>Edufor, São Luís, Maranhão, Brazil

### ARTICLE INFO

#### Article History:

Received 01<sup>st</sup> January, 2022

Received in revised form

17<sup>th</sup> January, 2022

Accepted 22<sup>nd</sup> February, 2022

Published online 28<sup>th</sup> March, 2022

#### Key Words:

Cancer, Mortality,

Prevention,

Testicular Cancer.

#### \*Corresponding author:

**Débora Luana Ribeiro Pessoa**

### ABSTRACT

Testicular cancer has as important characteristics the involvement of young men and high cure rate, even in advanced cases. Its incidence has been increasing in recent decades, generating negative impacts at personal, family, and socioeconomic levels. This study aims to analyze the cases of testicular cancer in the State of Maranhão from 2008 to 2018 and is characterized by being quantitative descriptive, with data reported in the Mortality Information System (SIM), collected on the DATASUS platform. We recorded 56 deaths from testicular cancer, with higher occurrence in the age group of 35 to 44 years and blacks (black and brown). It can be inferred that, although young people are most of the victims of this tumor, the elderly presented a high rate of deaths. This evidence corroborates the need to implement health actions aimed at the male public, aiming at self-care through testicular self-examination, facilitating early diagnosis and greater chances of cure.

Copyright © 2022, Gleydson Luis Silva de Sousa et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Gleydson Luis Silva de Sousa, Kardene Pereira Rodrigues, Camila Silva Aguiar, Kallyne Bezerra Costa et al. "Mortality from Testicular Cancer: apanorama in astate in northeastern Brazil", *International Journal of Development Research*, 12, (03), 54819-54822.

## INTRODUCTION

Testicular cancer is considered a rare tumor that affects young men, most commonly in the age group of 15 to 39 years (FERLAY et al, 2019), representing 0.7% of all cancers (WANG, 2017). It constitutes 5% of all malignant tumors affecting men, with an incidence of 3 to 5 cases per group of 100,000 individuals (ALBERTS, P. et al, 2012). When compared to other tumors that affect men, testicular cancer has a low mortality rate, 0.23/100,000 men (SOARES et al, 2019; WORLD HEALTH ORGANIZATION, 2008). Didactically, it has the following classification: germ cell tumors of the testicles (GTTC) representing 90 to 95% of cases; non-germ cell testicular tumors (TTCNG), included here the tumors of the sex cords and gonadal stroma (Sertoli cell tumor, Leydig cell tumor, gonadoblastomas, among others) and nonspecific stromal tumors, the latter responsible for 5% of male gonad tumors (ALBERTS, P. et al, 2012).

The tumors of germinative cells of the testicles (GTTC) are still divided into seminomas and non-seminomas, each group representing on average 50% of the total (BRAZILIAN SOCIETY OF UROLOGY, 2008). Metastases correspond to 0.8 to 2.3% of testicular tumors, with prostate tumors (SHREVASKUMAR; Patel; RICHARDSON, 1989). The known risk factors for the development of testicular cancer are cryptorchidism, history of contralateral testicular tumor, family history, and infertility. The participation of other factors such as scrotal and/or testicular trauma, inguinal hernia, smoking, testicular microlithiasis, and vasectomy in the genesis of this tumor (ZERATI FILHO; NARDOZZA JUNIOR; KINGS, 2010). According to the National Cancer Institute (2018), the most common clinical manifestation is the emergence of a painless, hard nodule of the approximate size of a pea. However, other symptoms deserve attention such as increased or decreased testicles, inaccurate pain in the lower abdomen, hematuria, and gynecomastia or nipple

tenderness. Regarding the diagnosis, it is essential to make a good clinical history of the patient, paying attention to age and family history, because as already shown, are two risk factors for testicle tumor. (MORATINOS et al., 2013). Ultrasound of the scrotal strap has a sensitivity above 98% for the detection of testicular cancer (MARTINS et al., 2009). Chest X-ray, and computed tomography of the chest, abdomen and pelvis should be used in the investigation of metastatic lesions. (BRAZILIAN SOCIETY OF UROLOGY, 2008). Alpha-fetoprotein (AFP) and the beta fraction of human gonadotropin ( $\beta$ -Hcg) are oncofemotoc proteins associated with embryonic development that aid in the diagnosis of these tumors. Regarding non-seminomatous GCTs, approximately 70% of patients have high concentrations of  $\beta$ -Hcg and/or AFP. Hcg  $\beta$  be increased in both non-seminomatous and seminomas, but AFP will be increased only in non-seminomatous patients. Increased levels of lactic dehydrogenase (LDH) are less specific but are associated in 50% to 60% in metastatic non-seminomas tumors and up to 80% in advanced seminomas (GOLDMAN; SCHAFFER, 2016; LONGO et al, 2012.). Intraoperative biopsy after the inguinal surgical approach is part of the diagnostic of testicular tumors (RICHIE; STEELE, 2002). An exception to this rule is made in the presence of carcinoma in situ and extragonadal tumors (SCHMOLL, 2004).

The differential diagnostic of testicular cancer should be made with inflammatory processes such as orchiepididymitis, orchitis, hydrocele, testicular torsion, tuberculosis, and other specific diseases, and incarcerated hernia (WORLD HEALTH ORGANIZATION, 2008). To date, testicular cancer screening is not recommended, as there is no scientific evidence showing there are more benefits than risks. However, self-examination of the testicles contributes to the early diagnosis of testicular cancer, providing better results in treatment (BRASIL, 2018). There are several therapeutic options, combined or not, for the treatment of testicular tumors, such as radical orchectomy, partial orchectomy, chemotherapy, radiotherapy, and retroperitoneal lymphadenectomy (BRASIL, 2018b). In Brazil, between 2008 and 2018, despite the high cure rate, 3,575 deaths from testicular cancer were recorded (BRASIL, 2019). Despite the rare, this tumor affects men, especially in productive age, causing negative socioeconomic impacts. To offer subsidies for the implementation of health actions aimed at the male public in the State of Maranhão, the present study aimed to analyze the testicular cancer in the State of Maranhão reported in the Mortality Information System (SIM) in the period from 2008 to 2018.

## MATERIAL AND METHODS

This is a quantitative descriptive study with data from the Mortality Information System (SIM), obtained through DATASUS, fed by the Health Departments with information from death certificates collected in a registry office. The study site will be the state of Maranhão, located in the Northeast region of the country, with an area of 329,642,170 km<sup>2</sup> and an estimated population of 7,115,203 inhabitants, according to data from the Brazilian Institute of Geography and Statistics (IBGE, 2020a). All cases of deaths from testicular cancer in residents of the State of Maranhão, registered in the SIM, in the years 2008 to 2018 were analyzed in this study, considering the following variables:

- Deaths by residence (number of deaths occurred, counted according to the place of residence of the deceased);
- The age group of the deceased, in the Panamerican health organization standard, in the following categories: Lower 1 year; 1 to 4 years; 5 to 14 years; 15 to 24 years; 25 to 34 years; 35 to 44 years; 45 to 54 years; 55 to 64 years; 65 to 74 years; 75 years and older and age ignored.
- Location (health region (CIR)).
- Color/race of the born, according to the following categories: white, black, yellow, brown, indigenous, and ignored.

- Schooling/education level of the deceased, in the following categories: None; 1 to 3 years; 4 to 7 years; 8 to 11 years; 12 years and more; 1 to 8 years; 9 to 11 years and ignored.

The data are presented in descriptive form, in absolute and percentage values. This study dispenses with submission and subsequent analysis to the Research Ethics Committee because they are public and secondary data and follows the ethical aspects by Resolution 466/2012 CONEP.

## RESULTS

In the State of Maranhão, from 2008 to 2018, 56 deaths from testicular cancer were recorded, reflecting an annual average of 5.09 deaths. During this period, the crude mortality rate per 100,000 inhabitants was 0.15. Table 1 shows the distribution of deaths and their evolution in the study period:

**Table 1. Distribution of cases of deaths from testicular cancer, from 2008 to 2018, in the State of Maranhão, Brasil**

Year	Number of Deaths	%
2008	3	5.36%
2009	6	10.71%
2010	7	12.50%
2011	6	10.71%
2012	3	5.36%
2013	5	8.93%
2014	4	7.14%
2015	6	10.71%
2016	2	3.57%
2017	11	19.64%
2018	3	5.36%
Total	56	100%

Source: Prepared by the author (2020)

Regarding the occurrence of deaths by age group, the highest number of deaths occurred between 35 and 44 years (23.21%), followed by 25 to 34 years (19.64%) and 45 to 54 years (16.07%). There was one case between 5 and 14 years (2%) and no deaths were recorded in children younger than 1 year, according to Table 2.

**Table 2. Distribution of cases of deaths from testicular cancer, by age group, from 2008 to 2018, in the State of Maranhão, Brasil**

Age group	Number of Deaths	%
1 to 4 years	2	3.57%
5 to 14 years	1	1.79%
15 to 24 years	7	12.5%
25 to 34 years old	11	19.64%
35 to 44 years old	13	23.21%
45 to 54 years old	9	16.07%
55 to 64 years old	2	3.57%
65 to 74 years old	3	5.36%
75 years and older	8	14.29%
Total	56	100%

Source: Prepared by the author (2020)

When evaluating the variable color/race, it is seen that the highest frequency of deaths from testicular cancer is in the category of browns (62.50%), followed by white (21.43%), black (3.57%), indigenous (3.57%) and ignored (8.93%), according to Table 3:

**Table 3. Distribution of cases of deaths from testicular cancer, according to color/race, from 2008 to 2018, in the State of Maranhão, Brasil**

Color/race	Number of Deaths	%
White	12	21.43%
Black	2	3.57%
Brown	35	62.50%
Indigenous	2	3.57%
Ignored	5	8.93%
Total	56	100%

Source: Prepared by the author (2020)

When analyzing data on schooling, it was found that the lowest frequency of deaths occurred among those who had 12 or more years of formal education (4%) and the highest with those aged 4 to 7 years (23%), according to Table 4.

**Table 4. Distribution of cases of deaths from testicular cancer by schooling from 2008 to 2018 in the State of Maranhão, Brasil**

Age group	Number of Deaths	%
No	11	19.64%
1 to 3 years	9	16.07%
4 to 7 years	13	23.21%
8 to 11 years	12	21.43%
12 years and older	2	3.57%
Ignored	9	16.07%
Total	56	100%

Source: Prepared by the author (2020)

To health regions, São Luís accounted for 11 deaths, with the highest percentage (19.64%), followed by Imperatriz with 8 deaths (14.29%) and Barra do Corda with 6 deaths (10.71%). The regions of Chapadinha, Rosario, Viana and Zé Doca had 1 death (1.79%), each. These and the other regions with registered deaths can be seen in table 3:

**Table 5. Distribution of cases of deaths due to testicular cancer by health regions, from 2008 to 2018, in the State of Maranhão, Brasil**

Health Region	Number of Deaths	%
Açailândia	2	3.57%
Bacabal	3	5.36%
Barra do Corda	6	10.71%
Chapadinha	1	1.79%
Codó	3	5.36%
Imperatriz	8	14.29%
Itapecuru Mirim	2	3.57%
Pedreiras	3	5.36%
Pinheiro	2	3.57%
Presidente Dutra	2	3.57%
Rosário	1	1.79%
Santa Inês	4	7.14%
São João dos Patos	3	5.36%
São. Luís	11	19.64%
Timon	3	5.36%
Viana	1	1.79%
Zé Doca	1	1.79%
Total	56	100%

Source: prepared by the author (2020)

## DISCUSSION

In recent decades, the incidence of testicular cancer has been increasing in industrialized countries. In Europe and the United States, germ cell tumors of the testicles (GTTC) corresponding to 95% of this type of cancer are the most common among young people aged 20 to 39 years (WANG, 2017). In the period described in this study, the mortality rate from this tumor per 100,000 inhabitants of the State of São Paulo (0.41), the most industrialized in the country, is almost three times the mortality rate in the State of Maranhão (0.15) (BRASIL, 2020). According to IBGE, in 2008, Maranhão ranked 18th in national GDP, with industry accounting for only 16.9% of the total. In 2017, it ranked 17th in the same ranking (IBGE, 2020b). This gap regarding industrialization in these 2 states corroborates the great difference in incidence and consequent mortality from testicular cancer between both. Testicular cancer has the peculiarity of committing young adults (BRASIL, 2018a), correlating with the results of this study, where 56% of deaths occur in the age group 15 to 44 years. In Brazil, this percentage was 73.54% in the same period (BRASIL, 2019). On the other hand, it was seen that the deaths of men aged 65 years showed a percentage of 19.65%, almost double that recorded in the country in the same period (10.71%), demonstrating that, in the State of Maranhão, this tumor is present in

advanced ages in a more pronounced way (BRASIL, 2019). According to Silva *et al* (2014), tumors that affect the genital region of men tend to be neglected, since sexual organs represent virility within a macho society and the fear or shame of undergoing invasive procedures results in delayed diagnoses and advanced-stage disease.

This fact may be related to the high percentage of deaths from testicular cancer in the elderly presented in this study because cultural factors interfere in men's access to health services. Thus, according to the National Policy of Integral Attention to Men's Health (2009), cultural variables hinder men's access to primary care, in addition to the belief in male invulnerability to diseases. Contrary to self-care and prevention measures, they usually enter the health system through specialized care, delaying health care and generating greater morbidity problems. According to the American Cancer Society (2012), white men have a 4.5 to 5 times higher risk of developing testicular tumors compared to black men. In the present study, only 21.43% of deaths from testicular cancer in Maranhão occurred in whites and 66.07% in black or brown. In the same period, in the State of Rio Grande do Sul, which has a mostly white population, 431 deaths from testicular cancer were recorded, 358 in whites (83.06%) and 53 in blacks and browns (12.29%) (BRASIL, 2019). Such disparity can be explained by the racial-ethnic formation of the State of Maranhão, since according to IBGE estimates, through the quarterly National Continuous Household Sample Survey (PNAD), 82.29% of the Maranhão population in the first quarter of 2020 would be black or brown. In 2005, this percentage was 74%, according to data from the same platform (IBGE, 2020c). Studies indicate that education and health are areas that influence each other reciprocally (Ribeiro *et al.* 2018). When assessing schooling, 21.43% of deaths occurred in men aged 8 years or more, located in the age group between 15 and 44 years, showing that not even formal education was able to break the barrier for men and seek health services, thus avoiding these outcomes.

The prevention of testicular cancer, as well as other types of cancer affecting the male population, such as penile cancer, is of paramount importance. About to the little tumor, survival is directly related to its early detection. In this context, health education programs for men that highlight the relevance of testicular self-examination, at least from adolescence, should be implemented, because it was seen that this strategy is the one that causes the greatest impact and efficiency in the prevention of this tumor (SOUZA *et al.*, 2011). Of the 19 health regions of the State of Maranhão, 17 had records of death from testicular cancer. Most deaths occurred in the regions of São Luís (19.64%) and Imperatriz (14.29%). No deaths were recorded in the Balsas and Caxias regions. The region of São Luís is composed of 5 municipalities, with 1,443,242 inhabitants (CONASS, 2020) and has 141 health facilities of the Unified Health System (SUS), promoting health care at the primary, secondary, and tertiary levels (IBGE, 2020). Imperatriz is formed by 15 municipalities, with a population of 511,735 inhabitants (CONASS, 2020), and has in its health network 204 SUS establishments (IBGE, 2020). The most populous health regions have the most structured health networks in the state, suggesting better access to the health system, providing a greater number of diagnosed cases. According to Bunker *et al.* (1982), in health services, there is a close relationship between scale and quality, that is, between quantity and quality. In this sense, a higher volume of services offered would imply better quality.

## CONCLUSION

Evaluating mortality from testicular cancer in Maranhão from 2008 to 2018, a high death rate was found in the elderly and black men (black and brown). Despite the rare, tumors of testicles affect individuals mainly in productive and reproductive age, causing negative socioeconomic impacts. The knowledge of the epidemiological characteristics of this disease in the State of Maranhão may provide the implementation of health actions aimed at the male public. Strengthening self-care through testicular self-examination facilitates early diagnosis, thus reducing the number of deaths. It is noteworthy

that this work does not end at this point, allowing further studies to be conducted, contributing to men's health policies.

## REFERENCES

- ALBERTS, P. *et al.* Guía clínica sobre el cáncer de testículo de la EAU: actualización de 2011. *Actas Urológicas Españolas*, Spain, v. 36, n. 3, p. 127-145, Mar. 2012. Available in: <https://www.sciencedirect.com/science/article/abs/pii/S0210480611002816>. Access: 04 Jun. 2020.
- AMERICAN CANCER SOCIETY. *Cancer Facts & Figures 2012*. Atlanta: American Cancer Society. Available in: <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-031941.pdf>. Access: 04 Jun. 2020.
- BRASIL. Ministry of Health. National Cancer Institute. Testicular cancer. *In: BRAZIL. Ministry of Health. National Cancer Institute. Types of cancer.* [Brasília], Nov. 23, 2018a. Available at: <https://www.inca.gov.br/tipos-de-cancer/cancer-de-testiculo>. Access: 04 Jun. 2020.
- BRASIL. Ministry of Health. National Cancer Institute. Testicular cancer. *In: BRAZIL. Ministry of Health. National Cancer Institute. Testicular cancer: version for Health Professionals.* [Brasília], Nov. 21, 2018b. Available in: <https://www.inca.gov.br/tipos-de-cancer/cancer-de-testiculo/profissional-de-saude>. Access: 04 Jun. 2020.
- BRASIL. Ministry of Health. National Cancer Institute. Testicular cancer. *In: BRAZIL. Ministry of Health. National Cancer Institute. Cancer Mortality Atlas.* 2020. Available in: <https://www.inca.gov.br/app/mortalidade>. Access: 04 Jun. 2020.
- BRASIL. Ministry of Health. Department of Health Care. Department of Programmatic and Strategic Actions. National Policy for Comprehensive Attention to Men's Health: principles and guidelines. Brasília: Ministry of Health, 2009.
- BRASIL. Ministry of Health. Mortality information system. *In: BRAZIL. Ministry of Health. Mortality information system. Datasus.* [Brasília], [2019]. Available in: <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sim/cnv/obt10uf.def>. Accessed: June 4, 2020.
- BUNKER, J.P.; LUFT, H.S.; ENTHOVEN, A. Should surgery be regionalised? *Surgical Clinics of North America*, United States, v. 62, n. 4, p. 657-668, Aug. 1982. Available in: <https://www.sciencedirect.com/science/article/abs/pii/S0039610916427854>. Accessed: 15 Nov. 2020
- FERLAY, J. *et al.* Estimating the global cancer incidence and mortality in 2018: GLOBOCAN sources and methods. *International journal of cancer*, United States, v.144, n. 8, p. 1941-1953, 15 Apr. 2019. Available in: <https://pubmed.ncbi.nlm.nih.gov/30350310/>. Accessed: 15 Nov. 2020
- GOLDMAN, L.; SCHAFFER, A. I. *Goldman-Cecil Medicine.* [s.l.]: Elsevier, 2016.
- BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS. Maranhão. *In: BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS. Cities and States.* Brasília, [2020a]. Available in: <https://www.ibge.gov.br/cidades-e-estados/ma/>.html. Accessed: July 7, 2020.
- BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS. Maranhão. *In: BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS. Cities and States.* Brasília, [2020b]. Available in: <https://www.ibge.gov.br/explica/pib.php>. Access: 20 Jul. 2020.
- BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS. Maranhão. *In: BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS. Cities and States.* Brasília, [2020c]. Available in: <https://sidra.ibge.gov.br/tabela/6403>. Accessed: July 15, 2020.
- LONG, [Dan. L.] *et al.* *Principles of Internal Medicine.* 18 ed. Merry Harbor: McGraw-Hill; Artmed, 2012.
- MARANHAO. Secretary of State for Health. Coordination of the State Policy of Permanent Health Education. State Plan for Permanent Health Education of the State of Maranhão 2019-2020: Guidelines for the implementation of the National Policy of Permanent Health Education in the State of Maranhão. St. Louis: [s.n.], 2019. Available in: <https://www.conass.org.br/planos-estaduais-educacao-permanente/PEEPS-MA.pdf> Access: 14 Nov.2020.
- MARTINS, Milton de Arruda *et al.* *Medical Clinic.* Barueri: Manole, 2009.
- MORATINOS, B. ÁLVAREZ *et al.* Seminoma: puesta al día. *Sanidad Militar*, Madrid, v. 69, n. 1, p. 22-37, Jan./Mar. 2013. Available in: [http://scielo.isciii.es/pdf/sm/v69n1/04\\_revisión.pdf](http://scielo.isciii.es/pdf/sm/v69n1/04_revisión.pdf). Access: 04 Jun. 2020.
- RIBEIRO, Kelen Gomes *et al.* Education and health in a region in a situation of social vulnerability: advances and challenges for public policies. *Interface*, Botucatu, v. 22, supl. 1, p. 1387-1398, 2018. Available in: <https://www.scielo.br/pdf/icse/v22s1/1807-5762-icse-1807-576220170419.pdf>. Access: 04 Jun. 2020.
- RICHIE, J.P.; STEELE, G.S. Neoplasms of the testis. *In: WALSH, P.C et al. Campbell's urology.* 8 ed. Philadelphia: Saunders, 2002. p.2876-2919.
- SCHMOLL, H. J. *et al.* European Consensus on Diagnosis and Treatment of Germ Cell Cancer: A Report of the European Germ Cell Cancer Consensus Group (EGCCCG). *Annals of oncology*, Dordrecht, v.15, n.9, p.1377-1399, Sept. 2004. Available in: <https://pubmed.ncbi.nlm.nih.gov/15319245/>. Access: 08 Jun. 2020.
- SHREVASKUMAR, R; PATEL, Ronald L; RICHARDSON, Larry Kvals. Metastatic Cancer to the Testes: A Report of 20 Cases and Review of the Literature. *The Journal of Urology*, [s.l.], v.142, n.4, p.1003-1005, Oct. 1989. Available in: <https://www.sciencedirect.com/science/article/abs/pii/S0022534717389693>. Access at: 08 Jun. 2020.
- SILVA, Silvio Eder Dias da *et al.* Cancer – a psychosocial disease: cancer in man and the heritage of macho culture. *Electronic Journal Management and Health*, [s.l.], v.6, n.1, p.606-616, 2015. Available in: <https://periodicos.unb.br/index.php/rgs/article/view/2584/2307>. Accessed: 25 Oct. 2020.
- SOARES, Samara Carollyne Mafra *et al.* Testicular Cancer Mortality in Brazil: trends and predictions until 2030. *BMC urology*, United Kingdom, v. 19, n.59, p.1-8, 2019. Available in: <https://bmcurol.biomedcentral.com/track/pdf/10.1186/s12894-019-0487-z>. Accessed: June 10, 2020.
- BRAZILIAN SOCIETY OF UROLOGY. Germ Cell Carcinoma of the Testicle: Diagnosis and Staging. Project Guidelines. [S.l.]: AMB; CPM, Dec. 3, 2008. p. 1-10. Available in: [https://diretrizes.amb.org.br/\\_BibliotecaAntiga/carcinoma-de-celulas-germinativas-do-testiculo-diagnostico-e-estadiamento.pdf](https://diretrizes.amb.org.br/_BibliotecaAntiga/carcinoma-de-celulas-germinativas-do-testiculo-diagnostico-e-estadiamento.pdf). Access: 04 Jun. 2020.
- SOUZA, Kelly Wanessa de *et al.* Prevention strategies for testicular and penis cancer: integrative review. *Rev. esc. Enferm., São Paulo*, v.45, n. 1, p. 277-282, Mar. 2011. Available in: <https://www.scielo.br/pdf/reeusp/v45n1/39.pdf>. Access: 04 Jun. 2020.
- WANG, Z *et al.* Meta-analysis of Five Genome-Wide Association Studies Identifies Multiple New Loci Associated With Testicular Germ Cell Tumor. *Nature genetics*, United States, v. 49, n.7 p. 1141-1147, Jul. 2017. Available at: <https://pubmed.ncbi.nlm.nih.gov/28604732/>
- WORLD HEALTH ORGANIZATION. *Cancer mundial.* Lyon: International Agency for Research on Cancer, 2008. Available in: [http://www-dep.iarc.fr/WHO\\_frame.htm](http://www-dep.iarc.fr/WHO_frame.htm) Access: June 4, 2020.
- ZERATI FILHO, Miguel; NARDOZZA JUNIOR, Archimedes; REIS, Rodolfo Borges dos. *Fundamental urology.* São Paulo: Planmark, 2010.