

# EPIDEMIOLOGICAL ANALYSIS OF PATIENTS WITH PENILE CANCER IN A CITY IN NORTHERN MINAS GERAIS

Ygor Kauan Cruz Silva Lopes<sup>1</sup>, Maria Rafaela Alves Nascimento<sup>2</sup>, Yasmin Maria Marques de Souza<sup>3</sup>, Maria Eduarda Silva Rodrigues<sup>4</sup>, Amanda Souto Machado<sup>4</sup>, Leandro de Jesus Bandeira<sup>4</sup>, Gabriela Boaventura Silva<sup>4</sup>, Priscilla Miranda dos Santos<sup>5</sup>, Maria Luisa de Moraes Prates<sup>4</sup>, Karoline de Souza Oliveira<sup>1</sup>, Naftali Janaina Carvalho Soares Costa<sup>4</sup>, Luciano Soares Diniz<sup>4</sup>

<sup>1</sup>Centro Universitário do Norte de Minas Gerais. <sup>2</sup>Centro Universitário Afya. <sup>3</sup>Universidade do Sul de Santa Catarina. <sup>4</sup>Universidade Estadual de Montes Claros. <sup>5</sup>Faculdade Santo Agostinho.

**Abstract:** Objective: to analyze the profile of patients with penile cancer between 2019 and 2025 in Montes Claros, Minas Gerais State, Brazil. Methods: a descriptive study with a quantitative approach was carried out using data from men diagnosed with penile neoplasia registered in the hospital records of the José Alencar Gomes da Silva National Cancer Institute. Results: in the period between 2019 and 2025, 32 cases of patients with penile cancer were registered in the information system. Conclusion: the men who were diagnosed with penile neoplasia were in the age group of young and elderly adults, brown, with low education, married, with an important history of alcoholism and smoking and cancer in the family, the clinical cancer was advanced in the degree of carcinogenesis, squamous cell carcinoma was the most prevalent histological type, surgery was the most used therapeutic modality, and there was a lack of data on the status of the final disease after one year of treatment.

**Keywords:** Cancer. Penile Neoplasms. Cancer Institutes.

## INTRODUCTION

Penile carcinoma is rare and manifests as lesions and changes in the color of the glans, or as a persistent wound or ulcer, or as a tumor located on the glans, foreskin, or shaft of the penis, as well as in the inguinal lymph nodes. Foreskin narrowing is a predisposing factor for this condition. Although it is a poorly discussed problem, receiving less attention than prostate cancer, which is a priority in men's health policy, penile cancer causes serious problems due to late diagnosis, and studies have established its association with human papillomavirus (HPV) infection, which is a sexually transmitted disease (INCA, 2011).

Penile cancer is more prevalent among men aged 50 years and older, with the peak incidence occurring during the sixth decade of life, although it may also affect younger individuals. In Brazil, this type of tumor accounts for 0.4% of all types of cancer affecting men and is more frequent in the North and Northeast regions (INCA, 2011).

In the United States, this type of cancer has an incidence of 0.4 to 1 per 100,000 inhabitants and accounts for 0.4% to 6% of all malignant diseases<sup>5</sup>. In developing countries, it represents an important health problem because, in some regions of Africa, Asia, and South America, it may account for up to 10% of malignant neoplasms in men (Salvioni et al., 2009).

The highest incidence of this neoplasm worldwide occurs in the regions of Barshi, Paranda, and Bhum, India (3.32/100,000 inhabitants), while the lowest rates are found among Jews born in Israel and the United States (0/100,000 and 0.07/100,000, respectively) (Gloeckler-Reis et al., 2003). In a study conducted using penile cancer registries in Denmark between 1943 and 1990, involving 1,523 men with squamous cell carcinoma, aged 22 to 95 years at the time of diagnosis, a 0.5% annual decrease in the number of new cases was observed, as well as a significant association among single men. Among Jews who underwent circumcision at birth, the incidence of penile cancer is null. In men in general, there is an increase in incidence from the sixth decade of life onward (Salvioni et al., 2009; Gloeckler-Reis et al., 2003; Ficarra et al., 2002; Frisch et al., 1995; Guimarães et al., 2011; Tsen

et al., 2011).

Brazil is one of the countries with the highest incidence of penile cancer worldwide<sup>5,6</sup>, which may account for 2.1% of all neoplasms in men, being five times more prevalent in the North and Northeast regions (Favorito et al., 2008), where most penile amputations occur (Coelho et al., 2018).

Penile cancer is an aggressive and mutilating disease that affects self-esteem, with psychological and functional repercussions that hinder rehabilitation and social reintegration (Coelho et al., 2018). Despite being a complex surgical procedure, studies have shown that penile reconstruction (phalloplasty) is possible after penectomy when the functional length of the penis is inadequate for the man to urinate while standing or engage in sexual intercourse (Maddineni; Lau; Sangar, 2009; Lee; Christopher; Ralph, 2022; Whyte et al., 2022).

Prospective epidemiological studies on penile cancer are scarce and small in scale. Despite its high incidence, Brazil has few studies on this subject. Therefore, the present study aims to analyze the clinical and epidemiological profile of patients with penile cancer between 2018 and 2025 in Montes Claros, Minas Gerais, Brazil.

## METHODS

A descriptive study with a quantitative approach was conducted using secondary data from patients residing in Montes Claros, Minas Gerais, Brazil, registered in the Integrator System of Hospital-Based Cancer Registries of the Brazilian National Cancer Institute (INCA).

The data are consolidated in the Cancer Registry System (SisRHC), a computerized application developed by the Ministry of Health, through INCA, to further strengthen and expand this integrated cancer information system. From this perspective, INCA developed a set of actions to standardize the data, provide technical support, and disseminate information based on the Integrator System of Hospital-Based Cancer Registries (IRHC), a web-based computerized system designed for the submission, consolidation, monitoring, and analysis of national data from Brazilian Hospital-

Based Cancer Registries (INCA, 2017).

Secondary data from a public domain were used, obtained through consultation of the “hospital tabulator,” an RHC integrator of the Hospital-Based Cancer Registry Information System of the José Alencar Gomes da Silva National Cancer Institute (INCA, 2017). The study population consisted of penile cancer cases treated between 2019 and 2025, corresponding to the most recent data available in the information system.

The variables analyzed were age group, self-reported race/skin color, educational level, marital status, history of alcohol consumption and smoking, family history of cancer, histological type, TNM staging, and treatment received. Descriptive data analysis was performed using the statistical software Statistical Package for the Social Sciences (SPSS), version 25 (SPSS Inc., Chicago, United States), and a double-checking procedure was performed for the entered data.

As established by Resolution No. 466, dated December 12, 2012, it should be noted that, because this study used secondary data from a public domain, with unrestricted access and without personal identification, review by a Research Ethics Committee was not required (BRASIL, 2012).

## RESULTS

In the historical series evaluated in the hospital-based cancer registry database of the José Alencar Gomes da Silva National Cancer Institute (INCA), 32 patients diagnosed with penile neoplasia were identified. Regarding the sociodemographic profile, most patients were aged between 30 and 69 years (56.2%), were of mixed race/skin color (78.1%), had incomplete elementary education (62.5%), and were married (68.7%). Regarding their health history, most patients were former consumers of alcoholic beverages (68.7%) and former users of tobacco or tobacco products (68.7%), while a positive family history of cancer was recorded in 65.2% of the cases.

In the analysis of clinical variables, squamous cell carcinoma was the most prevalent histological type, accounting for 100.0% of cases. Regarding TNM staging, stage 1 was the most

frequently recorded classification (40.6%). The most commonly employed treatment was surgery (59.3%), and data on the final disease status one year after treatment were unavailable in 31.2% of cases (Table 1).

Table 1. Descriptive analysis of the clinical and epidemiological characteristics of patients with penile neoplasia, Montes Claros, Minas Gerais, Brazil (n=32).

| Variable                            | N  | % total |
|-------------------------------------|----|---------|
| Age group                           |    |         |
| 30-69                               | 18 | 56,2    |
| 70-85                               | 14 | 43,7    |
| Breed mentioned                     |    |         |
| White                               | 6  | 18,7    |
| Brown                               | 25 | 78,1    |
| Black woman                         | 1  | 3,1     |
| Education                           |    |         |
| Completed elementary/middle school  | 5  | 15,6    |
| Incomplete elementary/middle school | 20 | 62,5    |
| None                                | 5  | 15,6    |
| No information                      | 2  | 6,2     |
| Marital status                      |    |         |
| Married                             | 22 | 68,7    |
| Single                              | 7  | 21,8    |
| Widower                             | 3  | 9,3     |
| History of alcohol use              |    |         |
| Former consumer                     | 22 | 68,7    |
| Never                               | 5  | 15,6    |
| Current                             | 4  | 12,5    |
| No information                      | 1  | 3,1     |
| Smoking history                     |    |         |
| Former consumer                     | 22 | 68,7    |
| No information                      | 1  | 3,1     |
| Never                               | 7  | 21,8    |
| Yes                                 | 2  | 6,25    |
| Family history of cancer            |    |         |
| Não                                 | 10 | 31,2    |
| Yes                                 | 21 | 65,2    |

|                                                    |    |       |
|----------------------------------------------------|----|-------|
| Sem informação                                     | 1  | 3,1   |
| Histological type                                  |    |       |
| Squamous Cell Carcinoma, SOE                       | 32 | 100,0 |
| TNM Staging                                        |    |       |
| 1                                                  | 13 | 40,6  |
| 2                                                  | 4  | 12,5  |
| 3                                                  | 3  | 9,3   |
| 3A                                                 | 1  | 3,1   |
| 4                                                  | 5  | 15,6  |
| 99                                                 | 4  | 12,5  |
| Others                                             | 2  | 6,2   |
| Treatment received                                 |    |       |
| Sur                                                | 19 | 59,3  |
| Sur + Ch                                           | 2  | 6,2   |
| Sur + Ch + Rad                                     | 2  | 6,2   |
| Sur + Rad                                          | 3  | 9,3   |
| Ch                                                 | 3  | 9,3   |
| Rad                                                | 3  | 9,3   |
| Disease status at the end of one year of treatment |    |       |
| Partial remission                                  | 8  | 25,0  |
| Complete remission                                 | 7  | 21,8  |
| Death                                              | 2  | 6,2   |
| Progressive disease                                | 1  | 3,1   |
| Stable disease                                     | 4  | 12,5  |
| No information                                     | 10 | 31,2  |

Legend: Surg: surgery, Chemo: chemotherapy, Rad: Radiotherapy

## DISCUSSION

This study describes the clinical and epidemiological profile of patients diagnosed with penile neoplasia in Montes Claros, Minas Gerais, Brazil, between 2018 and 2025. In this regard, its risk factors are multiple, but its carcinogenesis has not yet been fully elucidated (Lee; Christopher; Ralph, 2022; Favorito et al., 2008). Age over 60 years, phimosis, poor personal hygiene, smoking, and a history of sexually transmitted diseases, particularly human papillomavirus (HPV) infection, are

the factors most frequently described in the literature, in addition to low educational attainment and limited access to healthcare services (Favorito et al., 2008; Oliveira et al., 2020; Soares et al., 2020).

Smegma has been mentioned in some studies, according to which this substance, produced by lubricating secretions and desquamation of epithelial cells from the inner surface of the foreskin and accumulating in men with poor intimate hygiene, particularly those with phimosis, would act as a carcinogenic agent through the conversion of smegma sterols into carcinogenic sterols by *Mycobacterium smegmatis*. However, there is still no scientific consensus regarding this causal association (Elst; Albersen, 2022).

A history of venereal diseases, human papillomavirus (HPV) infection, tobacco use, ultraviolet radiation exposure, chronic lichen, and balanitis xerotica obliterans associated with HPV have been associated with the disease. Direct complications also include enlargement of the lymph nodes in the groin, which may indicate metastases with serious consequences (Lee; Christopher; Ralph, 2022).

Therefore, the Brazilian Consensus on Penile Cancer advocates that reducing the incidence of this cancer is possible by promoting education on intimate hygiene, neonatal circumcision, smoking cessation, HPV vaccination among young people, and condom use (Soares et al., 2020).

Late diagnoses are associated with a machismo-based culture in which self-care regarding men's health is perceived as a role of passivity, dependence, and male vulnerability, particularly when related to the genital organ. Unlike women, social stigma generally causes men to seek healthcare services less frequently or to do so only in situations involving illness, accidents, or already-established lesions, which contributes to underreporting of cases. In addition, there is a fear of being diagnosed with cancer, which is commonly associated with death, painful treatments, and mutilation (Oliveira et al., 2020; Nogueira et al., 2021).

Lesions identified as premalignant for the development of penile squamous cell carcinoma are classified as being associated with human papillomavirus (HPV) or with prolonged inflammatory processes (INCA, 2024).

Actions aimed at the early detection of this type of neoplasm include early diagnosis, such as the assessment of individuals presenting initial signs and/or symptoms of the disease, and screening, defined as performing a test or examination in a population without symptoms and apparently healthy, with the purpose of identifying lesions indicative of precancer or cancer and, based on the results, referring patients with abnormal findings for diagnostic investigation and treatment (WHO, 2007).

Treatment essentially consists of excision of the primary penile lesion, that is, partial or total penectomy, together with bilateral inguinal lymphadenectomy with curative intent. Cure remains possible even when inguinal metastasis occurs. There are still no clearly beneficial protocols for radiotherapy and chemotherapy; however, these treatments may be indicated in cases of recurrence or for palliative purposes when surgery is not indicated (INCA, 2024).

This type of cancer represents a public health problem, particularly in emerging countries. Its occurrence is rare and its incidence is declining in developed countries, which reduces research efforts and limits more comprehensive epidemiological investigations and studies aimed at understanding its risk factors (Favorito et al., 2008).

The lower incidence of this cancer in developed countries, in contrast to its high incidence in emerging countries, indicates a clear relationship between this type of cancer and the socioeconomic conditions of each country (Silva et al., 2010).

Early diagnosis initiatives contribute to reducing the stage at which cancer is diagnosed. In these initiatives, the importance of healthcare professionals and the general population being able to identify signs and symptoms suggestive of cancer development should be emphasized, as well as timely and barrier-free access to healthcare services (Silva et al., 2010).

This diagnosis should be established through investigation of the most frequent signs and symptoms, including the presence of a tumor or ulcer in the penile region in the absence of a sexually transmitted infection, or lesions that do not improve after treatment, as well as thickening or changes in the color of the skin of the penis or foreskin (NIHCE, 2015; WHO, 2017). Therefore, men's health should be incorporated into the routine practices of healthcare professionals and into the

implementation of public health policies.

## CONCLUSION

The clinical and epidemiological data available in the hospital-based cancer registry database of the José Alencar Gomes da Silva National Cancer Institute regarding patients diagnosed with penile neoplasia residing in Montes Claros, Minas Gerais, indicate that the patients were predominantly adult and older men, of mixed race/skin color, with low educational attainment, and married. Most patients were former consumers of alcoholic beverages and former users of tobacco or tobacco products, and a positive family history of cancer was reported in most cases. The clinical presentation of cancer was advanced in terms of carcinogenesis, squamous cell carcinoma was the most common histological type, surgery was the most frequently employed therapeutic modality, and data regarding the final disease status one year after treatment were unavailable. Finally, although penile neoplasia is not the most prevalent type of cancer, it is amenable to treatment and prevention through educational measures targeted at the male population.

## REFERENCES

BRASIL. Ministério da Saúde. Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012. Aprova diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Diário Oficial da União: Brasília, DF, 13 jun. 2013.

COELHO, R. et al. Penile cancer in Maranhão, Northeast Brazil: the highest incidence globally? BMC Urology, v. 18, n. 1, p. 50, 2018. DOI: <https://doi.org/10.1186/s12894-018-0365-0>.

ELST, L.; ALBERSEN, M. HPV vaccination: does it have a role in preventing penile cancer and other preneoplastic lesions? Seminars in Oncology Nursing, v. 38, n. 3, p. 151284, 2022.

FAVORITO, L. A. et al. Epidemiologic study on penile cancer in Brazil. International Brazilian

Journal of Urology, v. 34, n. 5, p. 587-593, 2008.

FICARRA, V. et al. Predictive pathological factors of lymph node involvement in the squamous cell carcinoma of the penis. International Urology and Nephrology, v. 32, p. 245-250, 2002.

FRISCH, M. et al. Falling incidence of penis cancer in an uncircumcised population. BMJ, v. 311, p. 1471, 1995.

GLOECKLER-REIS, L. A. et al. Cancer survival and incidence from the Surveillance, Epidemiology, and End Results (SEER) program. The Oncologist, v. 8, n. 6, p. 541-552, 2003.

GUIMARÃES, G. C. et al. Penile cancer: epidemiology and treatment. Current Oncology Reports, v. 13, p. 231-239, 2011.

INSTITUTO NACIONAL DE CÂNCER JOSÉ ALENCAR GOMES DA SILVA (INCA). Estimativa 2025: incidência de câncer no Brasil. Coordenação Geral de Ações Estratégicas, Coordenação de Prevenção e Vigilância. Rio de Janeiro: INCA, 2011. 118 p.

INSTITUTO NACIONAL DE CÂNCER JOSÉ ALENCAR GOMES DA SILVA (INCA). Registro hospitalar de câncer: planejamento e gestão. Coordenação Geral de Prevenção e Vigilância. Rio de Janeiro: INCA, 2017.

INSTITUTO NACIONAL DE CÂNCER JOSÉ ALENCAR GOMES DA SILVA (INCA). Tipos de câncer: versão para profissionais de saúde. Rio de Janeiro: INCA, 2024. Disponível em: <https://www.inca.gov.br/tipos-de-cancer/cancer-de-penis/profissional-de-saude>. Acesso em: 11 set. 2026.

LEE, W. G.; CHRISTOPHER, A. N.; RALPH, D. J. Phalloplasty following penectomy for penile cancer. Asian Journal of Urology, v. 9, n. 4, p. 460-466, 2022.

MADDINENI, S. B.; LAU, M. M.; SANGAR, V. K. Identifying the needs of penile cancer sufferers: a systematic review of the quality of life, psychosexual and psychosocial literature in penile cancer. BMC Urology, v. 9, n.1, p. 8-16, 2009.

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE (NICE). Suspected cancer: recognition and referral. London: NICE, 2015. Disponível em: <https://www.nice.org.uk/guidance/>

ng12/resources/suspected-cancer-recognition-and-referral-pdf-1837268071621. Acesso em: 17 nov. 2024.

NATIONAL CANCER INSTITUTE. Penile cancer treatment – health professional version. Bethesda: National Cancer Institute. Disponível em: <https://www.cancer.gov/types/penile/hp/penile-treatment-pdq>. Acesso em: 17 nov. 2021.

NOGUEIRA, L. R. et al. O tamanho importa: narrativas de homens que foram amputados em decorrência de câncer de pênis. *Research, Society and Development*, v. 10, n. 13, e398101321454, 2021.

OLIVEIRA, M. V. B. et al. Risk factors associated with the development of penile neoplasms. *Research, Society and Development*, v. 9, n. 2, e37921937, 2020.

SALVIONI, R. et al. Penile cancer. *Urologic Oncology: Seminars and Original Investigations*, v. 27, p. 677-685, 2009.

SILVA, R. A. A. et al. Aspectos clínico-epidemiológicos associados ao câncer de pênis. *Ciência & Saúde Coletiva*, v. 15, n. 1, p. 1105-1111, 2010.

SOARES, A. et al. Penile cancer: a Brazilian consensus statement for low- and middle-income countries. *Journal of Cancer Research and Clinical Oncology*, v. 146, n. 12, p. 3281-3296, 2020.

TSEN, H. F. et al. Risk factors for penile cancer: results of a population based case-control study in Los Angeles County (United States). *Cancer Causes & Control*, v. 12, p. 267-277, 2001.

WORLD HEALTH ORGANIZATION (WHO). Early detection. Geneva: WHO, 2007. (Cancer control: knowledge into action: WHO guide for effective programmes, module 3). Disponível em: [https://apps.who.int/iris/bitstream/handle/10665/43743/9241547338\\_eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/43743/9241547338_eng.pdf). Acesso em: 17 ago. 2026.

WORLD HEALTH ORGANIZATION (WHO). Guide to cancer early diagnosis. Geneva: WHO, 2017. Disponível em: <https://apps.who.int/iris/handle/10665/254500>. Acesso em: 17 nov. 2024.

WHYTE, E. et al. Effects of partial penectomy for penile cancer on sexual function: a systematic review. *PLoS ONE*, v. 17, n. 9, e0274914, 2022.