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Better Understanding It to Better Face It

HUMAN PAPILLOMAVIRUS (HPV) INFECTION AS A RISK FACTOR FOR PENILE CANCER: A POPULATION-BASED STUDY IN THE NORTHERN REGION, BRAZIL

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Introduction: Penile cancer (PC) is a rare malignancy in developed countries but presents significantly higher incidence rates in developing regions such as Northern and Northeastern Brazil, where it accounts for approximately 2.1% of malignant neoplasms in men. This distribution reflects regional disparities in access to healthcare services, socioeconomic conditions, and the effectiveness of public prevention policies. The predominant histopathological subtype is squamous cell carcinoma (SCC), whose etiopathogenesis is frequently associated with human papillomavirus (HPV) infection, especially genotype 16, known for its high oncogenic potential. Viral carcinogenesis occurs through the action of the E6 and E7 oncoproteins, which inactivate the tumor suppressor genes ***p53*** and ***Rb***, leading to the overexpression of the ***p16***^{INK4a} protein, a molecular marker widely used in HPV-induced tumors. Although the molecular mechanisms involved are well understood, prevention strategies targeting the male population, such as vaccination and viral screening, remain limited. Moreover, factors such as phimosis, inadequate genital hygiene, smoking, and coinfections contribute to viral persistence and increase the risk of neoplastic transformation, particularly in the context of structural and social vulnerabilities observed in Northern Brazil. **Objectives:** To analyze the main risk factors associated with the development of penile cancer in Northern Brazil, with emphasis on HPV infection and its correlation with tumor aggressiveness and clinical-epidemiological characteristics. **Methods:** This is a retrospective, cross-sectional, observational study based on secondary data extracted from the Oncology Panel of DATASUS, covering the period from January 2020 to December 2024. All records coded under ICD-10 C60 (malignant neoplasm of the penis) from the Northern region were included. The variables analyzed included age group, histological grade, clinical staging, and HPV status (when available). The data were organized in spreadsheets and analyzed using descriptive statistics, considering absolute and relative frequencies. The absence of data in key variables was documented as an indicator of the dataset's quality. **Results:** During the study period, 1,954 cases of penile

cancer were identified in Northern Brazil. Among these, 193 tumors classified as histological grade 4 were associated with HPV infection, suggesting a correlation between viral presence and greater tumor aggressiveness. Furthermore, HPV infection was frequently related to predisposing factors such as phimosis and chronic inflammation. A high rate of incomplete data was observed: 637 records lacked information on staging, and 945 were categorized as “not applicable,” limiting the precision of the clinical progression assessment. **Conclusion:** The analysis of 1,954 penile cancer cases in Northern Brazil from 2020 to 2024 revealed a significant association between HPV infection and higher tumor aggressiveness, particularly in 193 cases classified as histological grade 4. Clinical factors such as phimosis and persistent inflammation were also recurrent among HPV-positive individuals. The substantial proportion of incomplete data regarding staging highlights the urgent need to improve oncological data recording systems. These findings underscore HPV’s role as a key determinant in the severity of penile cancer and reinforce the need for more effective preventive and surveillance strategies in this vulnerable population.

Keywords: Penile cancer; risk factors; Brazil.