(A) Clinical Research

Title: The Impact of STDs on Basal Cell Carcinoma Risk: A Case-Control Investigation

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Abstract

Background: Basal cell carcinoma (BCC) is the most common form of skin cancer worldwide, accounting for 80-90% of all skin cancers [1]. BCC's typically arise from the basal layer of the epidermis, with high exposure to ultraviolet radiation being the leading cause in most individuals, particularly in those with fair skin. Immunosuppression increases the risk of BCC due to impaired repair of UV-induced DNA damage [2]. Individuals with compromised immune systems– such as patients with HIV have been found to have elevated rates of BCC development at a significantly younger age compared to the general population [2].

Methods: The National Institutes of Health's (NIH) All of Us (AoU) program—a nationwide initiative aimed at engaging underrepresented populations in biomedical research—provides a comprehensive framework for exploring the relationship between BCC and sexually transmitted diseases (STDs). This study investigated the association between BCC (SNOMED: 254701007, ICD-10: C44.91) and a spectrum of STDs [3]. Participants diagnosed with BCC were matched to four control subjects using nearest-neighbor propensity-score matching, adjusted for age, sex, race/ethnicity, income, and education. Fisher's exact test was used for categorical variables, while an unpaired t-test was applied for continuous variables. Logistic regression models were developed to calculate the odds ratios (ORs) for the associations between BCC and STDs.

Results: Univariate analysis revealed that chlamydia (OR: 0.24, 95% CI: [0.16, 0.37], $p < 0.01$), gonorrhea (0.43 [0.29, 0.64], $p < 0.01$), and HPV (0.60 [0.49, 0.73], $p < 0.01$) were inversely associated with BCC, while HIV (0.74 [0.62, 0.89], $p < 0.01$) showed a modest inverse association. Genital herpes (1.14 [0.96, 1.35], $p = 0.15$) and syphilis (0.91 [0.70, 1.18], $p = 0.52$) were not significantly associated with BCC in univariate analyses. After adjusting for smoking, education, income, race/ethnicity, and sex, multivariate analysis demonstrated significant positive associations between BCC and chlamydia (1.71 [1.03, 2.76], $p = 0.03$), gonorrhea (2.60 [1.58, 4.19], $p < 0.01$), genital herpes (1.95 [1.61, 2.34], $p < 0.01$), HIV (2.00 [1.63, 2.45], $p < 0.01$), HPV (1.48 [1.17, 1.86], $p < 0.01$), and syphilis (2.31 [1.71, 3.08], $p < 0.01$).

Conclusion: These findings emphasize the importance of comprehensive dermatological care in individuals who are at risk for STDs, as these comorbidities may increase the risk of BCC through weakening of the immune system. In a Danish cohort study that examined the risk of skin cancer in HIV-patients, it was found that HIV-infected patients living in the US exhibited a two-fold increased risk of developing BCC. A significantly increased incidence rate ratio (IRR) of 1.79 (95% Cl: 1.44-2.22) for BCC in HIV-infected patients was reported compared to the general population [4]. Tailoring dermatologic care for at-risk populations is imperative for reducing the burden of these comorbidities on cancer progression and outcomes.

References

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