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REVIEW ARTICLE

Environmental non-occupational risk factors associated with bladder cancer☆

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Abstract

Context: Bladder carcinoma (BC), due its high morbidity and relapsing course, generates significant economic and health care costs. Accordingly, we reviewed the environmental nonoccupational risk factors (RF), more or less evidence-based, in the etiology and pathogenesis of BC, because the involvement of urologists is essential for prevention.

Acquisition of evidence: Review of the peer-reviewed literature (1987–2012) on nonoccupational environmental RF associated with BC retrieved from Medline, Embase and Science Citation Index. The search profiles have been ''Risk factors/Epidemiology/Tobacco-smoking/Diet-nutrition-water-liquids/Radiation/Infectious/Farmacological drugs'' and ''Bladder cancer''.

Synthesis of evidence: Smoking was associated with 50% of BC in both sexes. Smokers have a 2–5 times higher risk than nonsmokers, directly proportional to the amount and duration of addiction. Drinking water contaminated with arsenic and chromium chlorination byproducts increases the risk of BC. High consumption of red meat and saturated fat may increase the risk, while high intake of fruits and vegetables decreases it. Patients treated with cyclophosphamide, ifosfamide and ionizing radiation have an increased risk of BC. Frequent and prolonged use of hair dyes and Schistosoma haematobium infestation increases the risk of BC.

Conclusions: The reduction or the cessation of smoking decrease BC. The contaminant-free water consumption with the increase of vegetal foods favors BC prevention. Cancer survivors treated with cyclophosphamide, ifosfamide and radiation therapy should be monitored for early diagnosis of BC.

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PALABRAS CLAVE
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Subproductos cloración;
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Factores de riesgo ambientales no ocupacionales asociados al cáncer vesical

Resumen
Contexto: El carcinoma vesical (CV), por su elevada morbilidad y evolución recidivante, genera importantes costes asistenciales y económicos. Por ello revisaremos los factores de riesgo (FR) ambientales no ocupacionales implicados, con mayor o menor evidencia científica, en la etiopatogenia del CV, pues la implicación de los urológos es fundamental para su prevención.
Adquisición de evidencia: Revisión bibliográfica de los últimos 25 años de los mencionados FR asociados al CV, obtenida de MedLine, Science Citation Index y Embase. Los perfiles de búsqueda han sido *Risk Factors/Epidemiology/Tobacco-smoking/Diet-nutrition-water-liquids/Infectious/Radiation/Farmacological drugs* y *Bladder cancer*.
Síntesis de evidencia: El tabaquismo se asocia al 50% de los CV en ambos sexos. Los fumadores presentan riesgos 2–5 veces superiores, dependiendo de la intensidad y duración de la adicción. El agua potable contaminada con arsénico, subproductos de cloración y cromo, incrementa el riesgo de CV. Consumos altos de carne roja y grasa saturada posiblemente aumenten el riesgo, mientras la ingesta elevada de frutas y verduras lo disminuye. La administración de ciclofosfamida, ifosfamida y radioterapia incrementa el riesgo de CV. El uso frecuente y prolongado de tintes capilares y la infestación por Schistosoma haematobium se asocian a mayores riesgos.
Conclusiones: La reducción o eliminación del tabaquismo disminuirá la prevalencia del CV. El consumo de agua sin contaminantes, con el incremento de alimentos vegetales favorece la prevención del CV. Los supervivientes de cánceres tratados con ciclofosfamida, ifosfamida y radioterapia deben ser monitorizados para el diagnóstico precoz del CV.

Introduction

In Western countries, one in 26 men and one in 87 women will develop a bladder carcinoma (BC) over the course of their lifetime, especially in the last third.[1] This significant morbidity, which generates a great emotional, physical and economic, highlights the transcendent personal and professional involvement of urologists to recognize, reduce or eliminate environmental risk factors (RF) associated to its etiopathogenesis with more or less evidence.[2]

In this paper we review the major non-occupational environmental RF associated with BC (Table 1), completing our previous contribution.[3]

Smoking

Smoking is the main RF associated with the incidence and biological aggressiveness of BC. This factor has the largest scientific evidence.[4–14] Until recent times smoking was associated with 50–60% of the BC in men and 20–30% in women. This difference was due in part to the traditional differences of consumption and the long latency periods of bladder carcinogenesis (≥30 years). Today, the risks are similar in both sexes and it is associated to 50% of BC, as smoking rates between men and women in Western countries are equal.[6,7]

Numerous epidemiological case–control and cohort studies convincingly demonstrate the direct relationship between active smoking and BC.[4,12] Except for neoplasms of the respiratory tract and oral cavity, the BC is the best smoking-related neoplasia documented.[8,9] Overall, smokers have 2–3 times greater risk than non-smokers, being even up to 5 times for those consuming ≥1 pack daily.[4,8] Similarly, patients who smoke have more infiltrating

Table 1 Major non-occupational environmental RF associated with BC.

Smoking
Dietary factors
Water pollutants
Arsenic
By-products of water chlorination
Hexavalent chromium
Liquid intake
Intake of coffee, alcohol, tea and mate
Artificial Sweeteners
Fruits and vegetables
Other dietary factors
Medicines/drugs
Analgesics
Phenobarbital
Antineoplastic
Alkylating agents
Chlornaphazine
Other drugs
Ionizing radiation
Hair dyes
Urologic diseases
Urinary tract infections
Lithiasis
Neoplasias
Bladder stasis and urinary pH