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Obesity, body composition, and risk of renal cell cancer: a population-based case-control study

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ABSTRACT

Aim of the study

This study assesses the role of body composition on renal cell carcinoma (RCC) among 335 cases and 337 controls in Florida and Georgia, 2003-2006.

Subjects and Methods

Cases were selected from participating hospitals and the Florida Cancer Data Registry. Controls were selected from the population using random-digit dialing, frequency-matched to cases by age, sex, and race. Cases and controls were assessed for body mass index (BMI), body fat percentage, and body fat distribution. Odds ratios (OR) and 95% confidence intervals (CI) were calculated using logistic regression.

Results

Among men, significant associations were observed between RCC and BMI > 40 (OR = 3.5; 95% CI: 1.2, 10.4), upper quartile waist-to-hip ratio (OR = 2.0; 95% CI: 1.0, 3.9), and upper quartile suprailiac skinfold thickness (OR = 2.1; 95% CI: 1.1, 3.9). Significant linear trends between RCC and body fat percentage were observed for men (p = 0.042) and women (p = 0.032). Among women, associations were stronger for upper quartile caloric intake (OR = 2.3; 95% CI: 1.2, 4.6) and upper quartile fat intake (OR = 2.7; 95% CI: 1.4, 5.2).

Conclusion

These findings confirm known associations between BMI and RCC and implicate the role of body fat percentage, central obesity, and diet in RCC etiology.

Keywords: body mass index, renal cell carcinoma, kidney cancer, obesity, skinfold thickness.

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INTRODUCTION

Kidney and renal pelvis cancers account for nearly 4 percent of all new cancer cases in the United States, with 54,390 cases projected for the year 2008.[1,2] Over the past thirty years, kidney cancer incidence rates have nearly doubled - from 7.1 per 100,000 in 1975 to 13.3 per 100,000 in 2005.[1] Renal cell carcinoma (RCC) accounts for approximately 85 percent of all renal tumors.[3] Because genetic predispositions explain only 2 percent of RCC cases[3], incidence trends are likely due to environmental or lifestyle factors. The prevalence of obesity in particular has risen at a corresponding rate in the United States, from 13 percent of the population in 1960-1962 to 32 percent in 2001-2004[4], implicating the role of population-level changes in body composition on trends in RCC incidence.

The positive association between obesity and risk of RCC has been established in the literature and recognized by the International Agency for Research on Cancer.[5,6] Initially, increased risks were observed only among women in studies using body mass index (BMI) as an obesity indicator.[7-10] A quantitative review of 22 cohort and case-control studies subsequently found equally strong associations between men and women, with a summary relative risk of 1.07 (95 percent CI: 1.05 - 1.09) per unit increase in BMI.[5]

Most studies of RCC and body composition have used BMI as an obesity indicator.[5] While BMI functions as an efficient measure of body composition in population samples, it remains an indirect indicator of body fat, which is presumably the etiologic factor in cancer development. To date, measures of body fat distribution in studies of RCC have been limited to waist circumference and waist-to-hip ratio (WHR).[11,12] We are not aware of any RCC studies using skinfold thickness as an adjunct measure of body fat distribution, nor of studies that assess body fat composition. Skinfold measurement is considered reliable for estimating peripheral adiposity[13], the influence of which can be compared against measures of central adiposity. Body fat composition as determined by bioelectrical impedance analysis (BIA) can complement BMI and body fat distribution measures. Recent studies using BIA have found increased risk of cancers of the breast[14,15], esophagus[16], and rectum[17] with increasing body fat.