Sleep Breath
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SHORT COMMUNICATION

Obesity and deranged sleep are independently associated with increased cancer mortality in 50 US states and the District of Columbia

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Abstract
Introduction Proper sleep is associated with reduced cancer risk. For example, multiple studies have found that habitual sleeping pill usage is related to death from cancer, suggesting that sleep derangement may increase cancer mortality. However, other studies have not found a definite connection between sleep and cancer deaths. For this reason, we analyzed US cancer mortality data and sleep quality data to see if there was relationship.
Methods Age-adjusted data on sleep disturbance in 50 US states and the District of Columbia are from *Perceived insufficient rest or sleep among adults—United States*, *2008*. Age-adjusted all-cancer mortality data are from *American Cancer Society Cancer Facts and Figures*. Obesity data are from *Vital signs*: *state-specific obesity prevalence among adults—United States*, *2009*. Data on race by state are from the 2010 US Census (http://www.census.gov).
Results There was a significant correlation between percentage of persons who reported insufficient sleep every day in the preceding 30 days versus all-cancer mortality in 50 US states and the District of Columbia ($p<0.001$). Because cancer survival is higher in whites than blacks and lower in obese individuals, multiple linear regression was performed. The association of insufficient sleep every day in the preceding 30 days with all-cancer mortality was significant ($p=0.017$), independent of the percentage obese ($p<0.001$), and unrelated to percentage white population ($p=0.847$).
Conclusion Alterations in endocrine function, perhaps abnormal cortisol metabolism resulting from deranged sleep, may be in part responsible for the increased all-cancer mortality we report here. Further studies would be worthwhile.

Keywords Cancer mortality · Obesity · Deranged sleep

Introduction

Proper sleep is associated with reduced cancer risk. For example, middle-aged Mormon high priests adhering to three health practices (never smoking cigarettes, engaging in regular physical activity, and getting proper sleep) had unusually low risk for cancer [1]. Moreover, multiple studies have found that habitual sleeping pill usage is related to death from cancer [2], suggesting that sleep derangement may increase cancer mortality.

However, other studies have not found a definite connection between sleep and cancer deaths [3]. For this reason, we analyzed US cancer mortality data and sleep quality data to see if there was relationship.

Methods

Age-adjusted data on sleep disturbance in 50 US states and the District of Columbia are from *Perceived insufficient rest or sleep among adults—United States*, *2008* [4]. Age-adjusted all-cancer mortality data are from *American Cancer Society Cancer Facts and Figures* [5]. Obesity data are

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from *Vital signs*: *state-specific obesity prevalence among adults—United States*, *2009* [6]. Data on race by state are from the 2010 US Census (http://www.census.gov).

Results

There was a significant correlation between percentage of persons who reported insufficient sleep every day in the preceding 30 days versus all-cancer mortality in 50 US states and the District of Columbia ($p<0.001$, Fig. 1). Because cancer survival is higher in whites than blacks [5] and lower in obese individuals [7], multiple linear regression was performed. The association of insufficient sleep every day in the preceding 30 days with all-cancer mortality was significant ($p=0.017$), independent of the percentage obese ($p<0.001$), and unrelated to the percentage white population ($p=0.847$).

Discussion

The reasons for the association of deranged sleep with cancer mortality are not entirely clear. Although inadequate sleep predisposes to obesity [8], our analysis indicates that obesity and poor sleep are independently related to cancer mortality.

Even though obesity is a risk factor for sleep apnea, the relationship between obesity and cancer may not be mediated by sleep apnea. Waist circumference and waist/hip ratio are related to all-cause mortality, cancer, and sleep apnea. However, neck circumference seems to be the strongest risk factor for sleep apnea. Waist/hip ratio is a weaker sleep apnea risk factor, especially in severe obstructive sleep apnea syndrome. Indeed, there is little evidence that waist circumference should replace body mass index as a cancer risk factor [9].

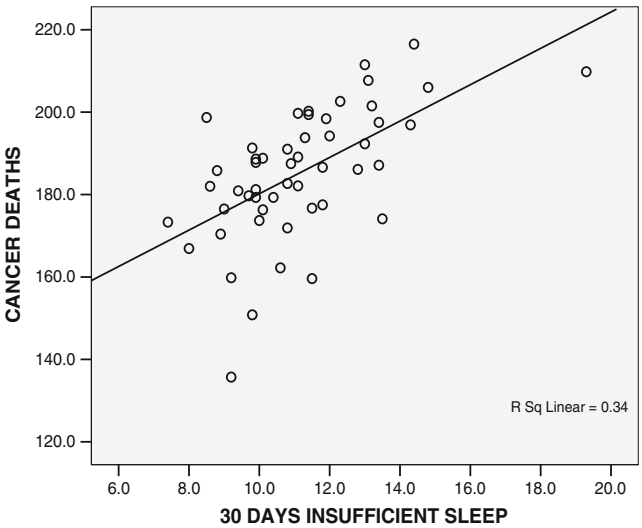

Fig. 1 Age-adjusted cancer deaths per 100,000 in 50 US states and the District of Columbia versus percentage of persons by state who reported insufficient sleep every day in the preceding 30 days

Short sleep duration is associated with hormonal dysregulation of glucose metabolism and appetite, which is different in men and women [10]. Levels of ghrelin, which stimulates hunger, are elevated in men but not women after short periods of sleep. In contrast, levels of glucagon like peptide-1, an appetite-suppressing hormone, are lower in women after short periods of sleep but unchanged in men.

Alterations in endocrine function in addition to those above, perhaps abnormal cortisol metabolism resulting from deranged sleep, may be in part responsible for the increased all-cancer mortality we report here. Further studies would be worthwhile.

Conflict of interest None

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