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Original Article

Trends in insomnia and excessive daytime sleepiness among US adults from 2002 to 2012

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ABSTRACT

Objective: Insomnia is a prevalent disorder in the United States and elsewhere. It has been associated with a range of somatic and psychiatric conditions, and adversely affects quality of life, productivity at work, and school performance. The objective of this study was to examine the trend in self-reported insomnia and excessive daytime sleepiness among US adults.

Methods: We used data of participants aged ≥18 years from the National Health Interview Survey for the years 2002 (30,970 participants), 2007 (23,344 participants), and 2012 (34,509 participants).

Results: The unadjusted prevalence of insomnia or trouble sleeping increased from 17.5% (representing 37.5 million adults) in 2002 to 19.2% (representing 46.2 million adults) in 2012 (relative increase: +8.0%) (P trend <0.001). The age-adjusted prevalence increased from 17.4% to 18.8%. Significant increases were present among participants aged 18–24, 25–34, 55–64, and 65–74 years, men, women, whites, Hispanics, participants with diabetes, and participants with joint pain. Large relative increases occurred among participants aged 18–24 years (+30.9%) and participants with diabetes (+27.0%). The age-adjusted percentage of participants who reported regularly having excessive daytime sleepiness increased from 9.8% to 12.7% (P trend <0.001). Significant increases were present in most demographic groups. The largest relative increase was among participants aged 25–34 years (+49%). Increases were also found among participants with hypertension, chronic obstructive pulmonary disease, asthma, and joint pain.

Conclusions: Given the deleterious effects of insomnia on health and performance, the increasing prevalence of insomnia and excessive daytime sleepiness among US adults is a potentially troubling development.

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1. Introduction

Inadequate sleep as a public health concern has awakened from a deep slumber in recent decades [1]. Sleep health is a multidimensional field of study, and insomnia constitutes a key component of sleep health. The 2006 Institute of Medicine (IOM) report defined insomnia as "having difficulty falling asleep, maintaining sleep, or by short sleep duration, despite adequate opportunity for a full night's sleep" [1]. Although several approaches to the nosology of insomnia exist (International Classification of Diseases-10, Diagnostic and Statistical Manual for Mental Disorders and the International Classification of Sleep Disorders) [2–4], national estimates of the prevalence of insomnia emanate from surveys that employ simple questions. Insomnia in the United States is common with reported population-based estimates ranging from about 15% to 24% [5,6].

Insomnia affects cognitive functioning [7], leads to depression [8], and may be comorbid with several psychiatric and medical conditions [9]. Furthermore, insomnia has been associated with heart disease in prospective and retrospective epidemiologic studies [10–13], and insomnia or symptoms thereof have been associated with increased mortality in some prospective studies [13–15] but not in others [16–18]. Among those who report to be suffering from insomnia, those who sleep fewer than six hours have been reported to be at increased risk for adverse health events [14]. Furthermore, insomnia increases the risk for automobile accidents and results in worse quality of life, increased disability, increased work absenteeism [19], and increased use of the health care system. The economic costs of insomnia are poorly understood but are nevertheless thought to be substantial: the direct economic costs attributed to insomnia were estimated to have been $13.9 billion in 1995 [20], and estimates of total costs have ranged from $30 billion to $107.5 billion [20,21].

Given the range of adverse impacts and the economic costs associated with this disorder, having current information about trends

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in the prevalence of insomnia is vital to describing the scope of the problem in part to provide guidance about allocation of resources for preventing and treating insomnia. Because little information about recent trends in insomnia is available, our objective was to examine the trend on self-reported insomnia and excessive daytime sleepiness among adults in the United States.

2. Methods

We used cross-sectional data about insomnia from the National Health Interview Survey, which was available for the years 2002, 2007, and 2012 [22]. Since 1957, the National Health Interview Survey, conducted by the National Center for Health Statistics, has selected a representative sample of the civilian noninstitutionalized population using a multistage area probability design. During the first stage, a sample was drawn from a universe of primary sampling units (single counties or groups of adjacent counties or equivalent jurisdictions and/or metropolitan areas) that were divided into self-representing and non-self-representing primary sampling units. During the second stage, substrata were created from Census blocks or combined blocks, and clusters of dwelling units were created within the substrata and were subsequently systematically sampled. From selected dwelling units, one adult was randomly sampled for the Sample Adult component. Interviewers employed by the U.S. Census Bureau received annual training in the procedures of the surveys and conducted the interviews using computer assisted personal interviewing with selected participants in their homes. Black and Hispanic persons were oversampled in all three surveys and Asians were oversampled in 2007 and 2012. A revised survey sampling design was introduced in 2006. The overall household response rates for the three years were 89.6%, 87.1%, and 77.6%, respectively. Household response rates were calculated as: interviewed households /(interviewed households + Type A non-response households). Reasons for being classified as a Type A non-response households include language problems, no one was at home after repeated contact attempts, family temporarily absent, refusal, household records rejected for insufficient data, household records rejected for other CAPI related problems, or other reasons for no interview. The final response rates for the Sample Adult component (final family response rate * [interviewed sample adults / eligible sample adults from Interviewed families]) were 74.3%, 67.8%, and 61.2%, respectively. Sampling weights were constructed based on probabilities of selection with adjustments for nonresponse and post-stratification. Because this study used publically available data, it was exempt from human subjects review.

Participants who responded affirmatively to the question "During the past 12 months, have you regularly had insomnia or trouble sleeping?" were defined as having insomnia. Participants who responded affirmatively to the question "During the past 12 months, have you regularly had excessive sleepiness during the day?" were deemed to have experienced excessive daytime sleepiness. Covariates included age, gender, and race or ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, other).

We also examined the trends in several factors that may be related to insomnia including heavy drinking, binge drinking, smoking status, obesity, and employment status. Heavy drinking was defined as men who had on average more than two alcoholic beverages per day and women who had on average more than one alcoholic beverage per day. Binge drinking was defined as adults who on at least one day during the past year had five or more drinks (In the past year, on how many days did you have five or more drinks of any alcoholic beverage?). Current smoking was defined as having smoked at least 100 cigarettes during one's life and still smoking at the time of the interview. Obesity was defined as a body mass index ≥30 kg/m^2 calculated from self-reported weight and height. Participants who were seeking work were identified from the question "Which of the following was person doing last week?"

We limited analyses to adults aged ≥18 years. Age-adjusted estimates were calculated using the direct method with the year 2000 projected US population as the standard. Analyses using sampling weights were performed in SAS and SUDAAN to account for the complex sampling design.

3. Results

The number of participants aged ≥18 years were 31,044 in 2002, 23,393 in 2007, and 34,525 in 2012. After excluding participants with missing values for the questions about insomnia and excessive daytime sleepiness, the sample sizes for this study were reduced to 30,970 (99.8%), 23,344 (99.8%), 34,509 (99.9%), respectively. Mean age increased significantly from 45.2 years in 2002 to 46.6 years in 2012 (P trend <0.001). The percentage of men remained stable (P trend = 0.799), and the percentage of white participants decreased significantly from 73.1% in 2002 to 67.2% in 2012 (P < 0.001).

The unadjusted prevalence of insomnia increased from 17.5% (an estimated 37.5 million adults) in 2002 to 19.2% (an estimated 46.2 million adults) in 2012. The age-adjusted prevalence of insomnia or trouble sleeping increased from 17.4% to 18.8% (relative increase: +8.0%, P trend <0.001). Significant increases were observed among participants aged 18–24 years, 25–34 years, 55–64 years, and 65–74 years, men, women, whites and Hispanics (Table 1). Among the demographic groups, the largest relative increase occurred among participants aged 18–24 years (+30.9%). The prevalence of insomnia tended to increase with age although the prevalence peaked among participants aged 55–64 years in 2002 and 2012. In all three years, the prevalence was higher in women than men and was highest among whites.

Among participants with a comorbid condition, the prevalence of insomnia increased only among participants with diabetes and among participants with joint pain (Table 1). The relative increase in the prevalence of insomnia was particularly large among participants with diabetes (+27.0%). In each year, people with a chronic condition had a significantly higher prevalence of insomnia than those without the condition.

The prevalence of insomnia increased significantly among adults who were current smokers and those who were not, among those who were heavy drinkers and those who were not, among those who reported binge drinking and those who did not, and among those with a body mass index <30 kg/m2(Table 1). Furthermore, participants who were smokers, heavy drinkers, binge drinkers (2012 only), and obese had a significantly higher prevalence of insomnia than their counterparts in each of the survey years.

We also examined trends in adults reporting excessive daytime sleepiness (Table 2). The age-adjusted percentage of participants who reported regularly having excessive daytime sleepiness increased from 9.8% in 2002 (21.0 million adults) to 12.7% (30.5 million adults) in 2012 (P trend <0.001). Significant increases were present in all demographic groups except among participants of described as being of another race or ethnicity not white, black, or Hispanic. The largest relative increase was among participants aged 25–34 years (+49%). Furthermore, significant increases were also found among participants with hypertension, chronic obstructive pulmonary disease, asthma, and joint pain. In each year, adults with a chronic condition had a significantly higher prevalence of excessive daytime sleepiness than those without a chronic condition.

Among persons reporting insomnia only about a third also reported excessive daytime sleepiness during each survey. Trends in combinations of insomnia and excessive daytime sleepiness are shown in Table 3.