

Insomnia, Trouble Sleeping, and Complementary and Alternative Medicine

Analysis of the 2002 National Health Interview Survey Data

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Background: Insomnia and other disorders that result in trouble sleeping are common in the United States and are often associated with chronic health conditions. Some individuals with insomnia or trouble sleeping use complementary and alternative medicine (CAM) therapies to treat their condition, but the prevalence of such use and the most common types of CAM therapies selected are not known.

Methods: Prevalence of insomnia or trouble sleeping and of CAM use for treating such conditions was examined using the 2002 National Health Interview Survey. Logistic regression was used to examine associations between insomnia or trouble sleeping, comorbid conditions, and use of CAM treatments.

Results: The 12-month prevalence rate of insomnia or trouble sleeping was 17.4%. There was a strong positive association between adults who reported having insom-

nia or trouble sleeping and adults who reported 4 of 5 common conditions: obesity (adjusted odds ratio [OR], 1.15; 99% confidence interval [CI], 1.01-1.31), hypertension (OR, 1.32; 99% CI, 1.16-1.51), congestive heart failure (OR, 2.24; 99% CI, 1.60-3.14), and anxiety or depression (OR, 5.64; 99% CI, 5.07-6.29). Of those with insomnia or trouble sleeping, 4.5% used some form of CAM therapy to treat their condition.

Conclusions: According to the National Health Interview Survey analysis, over 1.6 million civilian, noninstitutionalized adult US citizens use CAM to treat insomnia or trouble sleeping. The details of this analysis will serve as a guide for future research on CAM therapies for sleep disorders.

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INSOMNIA IS A COMPLEX AND COMMON disorder. According to previous studies,¹⁻³ it affects anywhere from 10% to 34% of the US population. The recent State of the Science Conference on Manifestations and Management of Chronic Insomnia defined insomnia as "complaints of disturbed sleep in the presence of adequate opportunity and circumstance for sleep."^{2(p1)} Several similar, but not identical, definitions of insomnia exist.^{2,4,5} Primary insomnia can be defined as insomnia not associated with another identifiable disease. Secondary insomnia is defined as insomnia associated with another disease or disorder. The State of the Science Conference also suggested that secondary insomnia should be renamed *comorbid insomnia* because it is often not clear that a cause-and-effect relationship exists between the associated condition and insomnia or whether insomnia is the primary or secondary condition in such a relationship. In this regard, recent studies⁶⁻¹² suggest that insomnia and other sleep

disorders may have more complex relationships with several comorbid diseases than once thought. In some cases, insomnia and other sleep disorders may exacerbate or even be part of the cause of the comorbid condition.⁶⁻¹² For example, Suka et al¹² have shown that chronic insomnia is a good predictor of future hypertension in Japanese workers. In addition, Stepanski and Rybarczyk¹⁰ summarized several studies that indicate that insomnia may predict psychiatric disorders, including depression. How these comorbid conditions are related to insomnia on a physiological level is not completely understood.

Common therapies for both primary and secondary insomnia include benzodiazepine and nonbenzodiazepine prescription drugs, antidepressants, over-the-counter medications, and cognitive behavioral therapy.¹³⁻¹⁵ Complementary and alternative medicine (CAM) therapies, such as herbal medicine and relaxation therapies, may also be in use, but much less is known about the prevalence of their use and the effectiveness of such

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therapies¹⁶; CAM therapies can be defined as “medical practices that are unproven by science and not presently considered an integral part of conventional medicine.”^{17(p2)} In many cases, individuals can obtain CAM treatments without seeing a health care provider, thus making an estimate of the prevalence of CAM treatment for insomnia more challenging.

The overall goals of this analysis were to estimate the prevalence of insomnia or trouble sleeping in the United States, to determine the frequency of its association with 5 common comorbid conditions, and to analyze the use of CAM therapies for insomnia or trouble sleeping.

For our analysis, we used the most recent (2002) National Health Interview Survey (NHIS).¹⁸ We used the NHIS to investigate the prevalence of insomnia or trouble sleeping and the use of CAM to treat such disorders by analyzing the self-reported responses to the survey question, “During the past 12 months, have you regularly had insomnia or trouble sleeping?” Because “trouble sleeping” could be interpreted as sleep problems other than insomnia, we have referred to the subject of this question throughout this article as *insomnia or trouble sleeping* rather than simply as insomnia. The NHIS lists over 50 health conditions that may be associated with insomnia or related sleep disorders. We selected 5 major health conditions as examples for this analysis: anxiety or depression, congestive heart failure (CHF), diabetes, hypertension, and obesity.

METHODS

SURVEY

The NHIS¹⁸ is an in-person annual survey of the health of the US civilian, noninstitutionalized population conducted by the National Center for Health Statistics, Centers for Disease Control and Prevention. The NHIS collects self-reported basic health and sociodemographic information on each member of the family surveyed and additional information on 1 randomly selected adult and from the parent or guardian of 1 randomly selected child. The survey uses a multistage clustered sample design. Individual counties or groups of counties comprise primary sampling units. Non-Hispanic black and Hispanic populations are oversampled to allow for more accurate national estimates of health for these increasing minority populations. For the 2002 interview sample, there were 36 161 households consisting of 93 386 persons in 36 831 families. The total household response rate was 89.6%. To create the NHIS adult core of 31 044 individuals, 1 adult was randomly chosen from each family surveyed, resulting in an overall sample adult response rate of 74.3%.

In some years, the NHIS also contains supplemental modules on current health topics. In 2002, the NHIS included a 10-minute NHIS supplement on CAM. Administered to sample adults 18 years or older, the supplement asked about the use of 27 types of CAM therapies within the past 12 months.

DEPENDENT VARIABLES

The primary dependent variable for this study was the presence of insomnia or trouble sleeping, based on the interview question “During the past 12 months, have you regularly had insomnia or trouble sleeping?” The secondary dependent variable was the use of CAM to treat insomnia or trouble sleeping. Information on both dependent variables was self-reported. The use of

CAM was defined as use in the past 12 months of any of the following modalities grouped into 5 broad domains based on taxonomy developed by the National Center for Complementary and Alternative Medicine¹⁹: alternative medical systems (acupuncture, ayurveda, naturopathy, and homeopathic treatment), biologically based therapies (chelation therapy, folk medicine, natural herbs, diet-based therapies, and high-dose or megavitamin therapy), manipulative and body-based therapies (chiropractic care and massage therapy), mind-body therapies (biofeedback, hypnosis, yoga, tai chi, qi gong, meditation, and other relaxation techniques), and energy medicine (energy healing therapy and reiki). Dependent variables were dichotomous.

INDEPENDENT VARIABLES

Independent variables included 5 sociodemographic variables associated with CAM use: sex, age (by decades), race, ethnicity, and educational attainment.²⁰ We explored the association among the dependent variables with 5 comorbidities: anxiety or depression (within last 12 months), CHF (within the last 12 months), diabetes (ever), hypertension (within last 12 months), and current obesity based on body mass index (calculated as weight in kilograms divided by height in meters squared). We also examined the frequency with which insomnia or trouble sleeping occurred in the absence of any 1 of approximately 50 health conditions listed in the NHIS sample adult core. These include conditions of the cardiopulmonary, respiratory, musculoskeletal, gastrointestinal, neurological, and endocrine systems. The complete coding for this variable, as well as for the other sociodemographic variables and health status variables, are presented in **Tables 1, 2, and 3**. **Table 4** uses these variables, and **Table 5** lists additional independent variables related to behavior and motivation for using CAM therapies. They are based on 4 survey questions:

1. Did you find that the therapy helped for insomnia or trouble sleeping?
2. Did you tell your conventional medical practitioner about the use of CAM?
3. How important was the therapy in maintaining health and well-being?
4. Why did you choose to use this CAM therapy?

STATISTICAL ANALYSIS

Analyses were conducted using survey estimation options to account for complex sample designs with Stata statistical software (version 8; Stata Corp, College Station, Tex) following the 2002 NHIS¹⁸ description documentation. All estimates were weighted using the 2002 NHIS sample adult record weight to ensure representation of the population and to avoid biased estimators; $P < .01$ was considered statistically significant.

Demographics for the population with and without insomnia or trouble sleeping and the population who used CAM for insomnia or trouble sleeping within the past 12 months were tabulated. For those who did use CAM for insomnia or trouble sleeping within the past 12 months, additional queries were made as to which CAM therapy was used and about the experience itself. Frequencies and percentages are presented for each variable. We performed χ^2 analyses and unadjusted and adjusted logistic regressions. Table 2 and Table 3 present odds ratios, 99% confidence intervals, and P values from logistic regressions for each variable. Because ethnicity and insomnia or trouble sleeping without other comorbidities are of interest, they were included in the adjusted model. There was no evidence of multicollinearity. Trend tests included body mass index, age and age² as continuous variables, and education as an ordinal variable, excluding respondents with unknown body mass indices.

Table 1. Characteristics of People With and Without Insomnia or Trouble Sleeping and People Who Used CAM for Insomnia or Trouble Sleeping*

| Independent Variable | No Insomnia or Trouble Sleeping (n = 169 975 932) | Insomnia or Trouble Sleeping (n = 35 849 163) | Used CAM for Insomnia or Trouble Sleeping in the Last 12 Months (n = 1 615 699) |
|---------------------------|------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------|
| Female | 85 240 (50.1) | 21 835 (60.9) | 1110 (68.7) |
| Age, y | | | |
| 18-24 | 24 245 (14.2) | 3107 (8.7) | 227 (14.0) |
| 25-34 | 32 080 (18.9) | 4750 (13.3) | 305 (18.9) |
| 35-44 | 36 214 (21.3) | 7716 (21.5) | 432 (26.7) |
| 45-54 | 30 811 (18.1) | 8185 (22.8) | 329 (20.3) |
| 55-64 | 19 992 (11.8) | 5661 (15.8) | 210 (13.0) |
| 65-74 | 14 501 (8.5) | 3308 (9.2) | 66 (4.1) |
| 75-84 | 9633 (5.7) | 2381 (6.6) | 42 (2.6) |
| ≥85 | 2498 (1.5) | 739 (2.1) | 5 (0.3) |
| Education† | | | |
| <HS | 26 741 (15.7) | 6976 (19.5) | 112 (6.9) |
| HS graduate or GED | 49 789 (29.3) | 11 019 (30.7) | 475 (29.4) |
| Some college or AA degree | 48 074 (28.3) | 11 001 (30.7) | 527 (32.6) |
| Bachelor degree | 28 697 (16.8) | 4491 (12.5) | 319 (19.8) |
| Advanced degree | 14 487 (8.5) | 2113 (5.9) | 182 (11.3) |
| Race | | | |
| White | 136 474 (80.3) | 29 889 (83.4) | 1407 (87.1) |
| Black | 19 871 (11.7) | 3628 (10.1) | 94 (5.8) |
| AIAN | 882 (0.5) | 268 (0.7) | 0 |
| Asian | 6711 (3.9) | 559 (1.6) | 12 (0.8) |
| Other‡ | 6038 (3.6) | 1505 (4.2) | 102 (6.3) |
| Hispanic | 19 270 (11.3) | 3422 (9.5) | 178 (11.0) |
| Comorbidities | | | |
| Hypertension | 28 132 (16.6) | 10 858 (30.3) | 291 (18.0) |
| CHF | 1216 (0.7) | 1078 (3.0) | 37 (2.3) |
| Diabetes | 9521 (5.6) | 3870 (10.8) | 66 (4.1) |
| Anxiety or depression | 15 866 (9.3) | 16 461 (45.9) | 841 (52.0) |
| None§ | 51 215 (30.1) | 1466 (4.1) | 79 (4.9) |
| BMI | | | |
| Underweight | 3173 (1.9) | 835 (2.3) | 77 (4.8) |
| Healthy | 65 360 (38.5) | 11 862 (33.1) | 702 (43.4) |
| Overweight | 58 534 (33.8) | 11 123 (31.0) | 436 (27.0) |
| Obese | 35 501 (20.9) | 10 522 (29.4) | 327 (20.2) |
| Unknown | 8408 (4.9) | 1507 (4.2) | 74 (4.6) |

Abbreviations: AA, associates degree in a technical, vocational, or academic program; AIAN, American Indian or Alaskan native; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); CAM, complementary and alternative medicine; CHF, congestive heart failure; GED, general equivalency diploma; HS, high school; NHIS, National Health Interview Survey.

*Data are given as number in thousands (percentage) of each group. All frequency estimates were weighted using the NHIS 2002 sample adult record weight to ensure representation of the US civilian, noninstitutionalized population and to avoid biased estimators.

†Approximately 1% of the general population did not answer the education question. All respondents who reported using CAM for insomnia or trouble sleeping did answer the question.

‡Includes those listing primary multiple non-Asian or AIAN races, native Hawaiian/other Pacific Islander, and other races.

§Comorbidities used to define "none" or insomnia or trouble sleeping without comorbid conditions. Respondents with insomnia or trouble sleeping without comorbid conditions were defined as those reporting insomnia or trouble sleeping but none of the following: respondent has ever been told they have multiple sclerosis, Parkinson disease, neuropathy, seizures, cancer, diabetes; or in the last 12 months have had hypertension, coronary heart disease, angina, myocardial infarction, any kind of heart condition, stroke, emphysema, high cholesterol, poor circulation in the legs, irregular heartbeats, CHF, asthma, ulcer, inflammatory bowel, irritable bowel, constipation severe enough to require medication, thyroid problems (hypothyroidism or hyperthyroidism), urinary problems, recurring pain, frequently anxious or depressed, dental pain, skin problems, hay fever, sinusitis, chronic bronchitis, weak or failing kidneys, any kind of liver condition, arthritis, rheumatoid arthritis, gout, lupus, fibromyalgia, menstrual problems, menopause problems, gynecological problems, men's health problems (eg, impotence or prostate trouble), diabetic retinopathy, cataracts, glaucoma, macular degeneration; or in the past 3 months pain in the neck, leg, low back; facial ache or pain in the jaw, muscles, or the joint in front of the ear; or severe headache or migraine.

||BMI was calculated from self-reported height and weight: underweight (BMI < 18.5), normal weight (BMI, 18.5-24.9), overweight (BMI, 25.0-29.9), and obese (BMI ≥ 30.0).

RESULTS

Of the adult population interviewed in the 2002 NHIS,¹⁸ 17.4% reported that they had regularly had insomnia or trouble sleeping during the previous 12 months. This is within the wide range of earlier estimates (10%-34%) of the prevalence of insomnia in the United States.¹⁻³ Con-

sistent with previous studies on insomnia, we found that more women (60.9%) than men (39.1%) reported having insomnia or trouble sleeping.²¹

In addition, the odds of insomnia or trouble sleeping increased with age ($P < .001$), peaked in middle age (45-54 years), and then decreased slightly during old age (65-84 years), followed by an increase at very old ages (≥85 years)

Table 2. Logistic Regression Analysis of Insomnia or Trouble Sleeping in the US Population

| Independent Variable | Unadjusted OR (99% CI) | P Value | Adjusted* OR (99% CI) | P Value |
|----------------------------|------------------------|---------|-----------------------|---------|
| Female vs male | 1.55 (1.41-1.70) | <.001 | 1.28 (1.16-1.42) | <.001 |
| Age, y | 1.05 (1.04-1.07) | <.001† | 1.04 (1.02-1.06) | <.001† |
| 18-24 | 1.00 | | 1.00 | |
| 25-34 | 1.16 (0.93-1.43) | .08 | 1.18 (0.92-1.50) | .09 |
| 35-44 | 1.66 (1.37-2.01) | <.001 | 1.50 (1.20-1.87) | <.001 |
| 45-54 | 2.07 (1.71-2.52) | <.001 | 1.58 (1.26-1.99) | <.001 |
| 55-64 | 2.21 (1.81-2.70) | <.001 | 1.57 (1.23-2.00) | <.001 |
| 65-74 | 1.78 (1.44-2.20) | <.001 | 1.11 (0.85-1.46) | .29 |
| 75-84 | 1.93 (1.52-2.45) | <.001 | 1.15 (0.87-1.53) | .19 |
| ≥85 | 2.31 (1.67-3.20) | <.001 | 1.29 (0.87-1.92) | .10 |
| Education | 0.87 (0.84-0.90) | <.001† | 0.93 (0.89-0.97) | <.001† |
| <HS | 1.00 | | 1.00 | |
| HS graduate or GED | 0.85 (0.74-0.97) | .002 | 0.88 (0.75-1.04) | .04 |
| Some college or AA degree | 0.88 (0.77-0.997) | .008 | 1.00 (0.85-1.16) | .94 |
| Bachelor degree | 0.60 (0.51-0.71) | <.001 | 0.78 (0.65-0.95) | .001 |
| Advanced degree | 0.56 (0.46-0.68) | <.001 | 0.71 (0.57-0.89) | <.001 |
| Race (vs white) | | | | |
| Black | 0.83 (0.72-0.96) | .001 | 0.76 (0.66-0.89) | <.001 |
| AIAN | 1.39 (0.77-2.50) | .15 | 1.13 (0.62-2.06) | .59 |
| Asian | 0.38 (0.27-0.55) | <.001 | 0.54 (0.37-0.78) | <.001 |
| Other | 1.14 (0.93-1.40) | .10 | 1.10 (0.86-1.41) | .30 |
| Hispanic (vs non-Hispanic) | 0.83 (0.72-0.95) | <.001 | 0.87 (0.73-1.04) | .04 |
| Comorbidities (vs not) | | | | |
| Hypertension | 2.19 (1.99-2.42) | <.001 | 1.32 (1.16-1.51) | <.001 |
| CHF | 4.30 (3.15-5.89) | <.001 | 2.24 (1.60-3.14) | <.001 |
| Diabetes | 2.04 (1.76-2.36) | <.001 | 1.17 (0.98-1.38) | .02 |
| Anxiety or depression | 8.25 (7.46-9.11) | <.001 | 5.64 (5.07-6.29) | <.001 |
| None (vs at least 1)‡ | 0.10 (0.08-0.12) | <.001 | 0.20 (0.16-0.26) | <.001 |
| BMI | 1.04 (1.03-1.05) | <.001† | 1.01 (1.00-1.02) | <.001† |
| Underweight | 1.45 (1.06-1.98) | .002 | 1.32 (0.93-1.89) | .04 |
| Healthy | 1.00 | | 1.00 | |
| Overweight | 1.07 (0.96-1.19) | .13 | 0.98 (0.87-1.10) | .61 |
| Obese | 1.63 (1.46-1.82) | <.001 | 1.15 (1.01-1.31) | .005 |
| Unknown | 0.99 (0.79-1.24) | .89 | 0.86 (0.68-1.09) | .10 |

Abbreviations: AA, associates degree in a technical, vocational, or academic program; AIAN, American Indian or Alaskan native; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); CHF, congestive heart failure; CI, confidence interval; GED, general equivalency diploma; HS, high school; NHIS, National Health Interview Survey; OR, odds ratio.

*Covariates in the adjusted logistic model include the following variables: age, sex, BMI, education, race, Hispanic ethnicity, insomnia or trouble sleeping without comorbid conditions, and the following comorbidities: hypertension, CHF, diabetes, and anxiety or depression. By adjusting for these variables, we are able to evaluate the association between insomnia or trouble sleeping and each independent variable in the table while accounting for potential confounding by the other variables.

†Test for trend *P* value.

‡Except insomnia or trouble sleeping in the population with insomnia or trouble sleeping.

(Table 2). The odds of reported insomnia or trouble sleeping decreased in individuals with higher educational attainment ($P < .001$) (Table 2). An analysis of race and ethnicity showed that black and Asian individuals had lower odds of reporting that they regularly had insomnia or trouble sleeping than white individuals (adjusted odds ratio, 0.76 [99% confidence interval, 0.66-0.89], and adjusted odds ratio, 0.54 [99% confidence interval, 0.37-0.78], respectively) (Table 2).

The prevalence of insomnia or trouble sleeping without comorbidities in the US population was estimated by determining the number of individuals in the population who reported regularly having insomnia or trouble sleeping but did not report having any other health condition or comorbidity covered in this survey that could potentially be associated with insomnia or trouble sleeping. A total of more than 50 conditions were considered. Those individuals who reported no other comorbidities were at

significantly lower odds of reporting insomnia or trouble sleeping than those reporting 1 or more comorbidities (adjusted odds ratio, 0.20 [99% confidence interval, 0.16-0.26]) (Table 2). Of those individuals without insomnia or trouble sleeping, 30.1% did not report having any of these other health conditions. However, of those individuals who reported insomnia or trouble sleeping, only 4.1% were free of the other health conditions (Table 1). This can be considered only an estimate because such an analysis depends on the specific chronic health conditions queried in the survey. Nonetheless, it suggests that insomnia or trouble sleeping in the absence of other comorbidities is rare compared with insomnia or trouble sleeping concurrent with other comorbidities.

Analysis of the 5 selected major comorbid conditions indicated that among individuals who reported regularly having insomnia or trouble sleeping in the previous 12 months, 30.3% reported having hypertension, 3.0% re-

Table 3. Logistic Regression Analysis of CAM Use for Insomnia or Trouble Sleeping Among People With Insomnia or Trouble Sleeping

| Independent Variable | Unadjusted OR (99% CI) | P Value | Adjusted* OR (99% CI) | P Value |
|----------------------------|------------------------|---------|-----------------------|---------|
| Female vs male | 1.43 (0.94-2.19) | .03 | 1.45 (0.93-2.26) | .03 |
| Age, y | 0.98 (0.96-0.99) | <.001† | 0.98 (0.96-0.99) | <.001† |
| 18-24 | 1.00 | | 1.00 | |
| 25-34 | 0.87 (0.40-1.89) | .65 | 0.78 (0.36-1.73) | .43 |
| 35-44 | 0.75 (0.34-1.68) | .36 | 0.70 (0.31-1.58) | .26 |
| 45-54 | 0.53 (0.24-1.19) | .04 | 0.52 (0.23-1.20) | .05 |
| 55-64 | 0.49 (0.21-1.15) | .03 | 0.52 (0.21-1.27) | .06 |
| 65-74 | 0.26 (0.08-0.79) | .002 | 0.32 (0.10-0.99) | .009 |
| 75-84 | 0.23 (0.07-0.80) | .002 | 0.25 (0.07-0.94) | .007 |
| ≥85 | 0.08 (0.01-1.07) | .02 | 0.09 (0.01-1.45) | .03 |
| Education | 1.37 (1.19-1.57) | <.001† | 1.36 (1.16-1.59) | <.001† |
| <HS | 1.00 | | 1.00 | |
| HS graduate or GED | 2.76 (1.37-5.56) | <.001 | 2.58 (1.25-5.34) | .001 |
| Some college or AA degree | 3.08 (1.62-5.85) | <.001 | 2.64 (1.34-5.18) | <.001 |
| Bachelor degree | 4.68 (2.30-9.51) | <.001 | 4.19 (1.95-8.99) | <.001 |
| Advanced degree | 5.77 (2.69-12.38) | <.001 | 5.71 (2.53-12.85) | <.001 |
| Race (vs white)‡ | | | | |
| Black | 0.54 (0.30-0.98) | .007 | 0.56 (0.30-1.03) | .01 |
| Asian | 0.46 (0.06-3.45) | .32 | 0.29 (0.04-2.31) | .12 |
| Other | 1.48 (0.70-3.12) | .18 | 1.51 (0.67-3.37) | .19 |
| Hispanic (vs non-Hispanic) | 1.18 (0.67-2.07) | .44 | 1.18 (0.60-2.32) | .52 |
| Comorbidities (vs not) | | | | |
| Hypertension | 0.49 (0.31-0.78) | <.001 | 0.84 (0.52-1.37) | .37 |
| CHF | 0.75 (0.20-2.78) | .58 | 1.55 (0.39-6.27) | .41 |
| Diabetes | 0.34 (0.15-0.78) | .001 | 0.67 (0.28-1.59) | .23 |
| Anxiety or depression | 1.29 (0.88-1.90) | .08 | 1.35 (0.90-2.02) | .05 |
| None | 1.21 (0.56-2.64) | .64 | 1.08 (0.47-2.45) | .82 |
| BMI | 0.94 (0.91-0.98) | <.001† | 0.96 (0.92-0.99) | .001† |
| Underweight | 1.62 (0.65-4.03) | .18 | 1.58 (0.63-3.97) | .20 |
| Healthy | 1.00 | | 1.00 | |
| Overweight | 0.65 (0.40-1.04) | .02 | 0.76 (0.47-1.24) | .15 |
| Obese | 0.51 (0.31-0.83) | <.001 | 0.61 (0.37-1.02) | .01 |
| Unknown | 0.82 (0.31-2.16) | .60 | 0.85 (0.31-2.33) | .68 |

Abbreviations: AA, associates degree in a technical, vocational, or academic program; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); CAM, complementary and alternative medicine; CHF, congestive heart failure; CI, confidence interval; GED, general equivalency diploma; HS, high school; NHIS, National Health Interview Survey; OR, odds ratio.

*Covariates in the adjusted logistic model include the following categories: age, sex, BMI, education, race, Hispanic ethnicity, insomnia or trouble sleeping without comorbid conditions; and the following comorbidities: hypertension, CHF, diabetes, and anxiety or depression. By adjusting for these variables we are able to evaluate the association between CAM use for insomnia or trouble sleeping and each independent variable in the table while accounting for potential confounding by the other variables.

†Test for trend P value.

‡No person identified as American Indian or Alaskan native and having insomnia or trouble sleeping reported using CAM for insomnia or trouble sleeping.

Table 4. CAM Domains Used for Insomnia or Trouble Sleeping by People With Insomnia or Trouble Sleeping*

| CAM Domain† | Overall (n = 1 615 699) | No Other Comorbidity (n = 78 706) | Obesity (n = 326 719) | Hypertension (n = 291 292) | CHF (n = 37 374) | Diabetes (n = 65 994) | Anxiety or Depression (n = 774 951) |
|-----------------------------|----------------------------|-----------------------------------------|--------------------------|-------------------------------|---------------------|--------------------------|-------------------------------------------|
| Alternative medical systems | 138 (8.5) | 0 | 32 (9.9) | 4 (1.5) | 0 | 9 (13.4) | 66 (7.9) |
| Biologically based | 1047 (64.8) | 26 (33.1) | 212 (64.8) | 199 (68.2) | 21 (55.0) | 44 (66.6) | 531 (63.2) |
| Manipulative and body based | 75 (4.6) | 0 | 26 (8.0) | 19 (6.5) | 0 | 7 (11.0) | 37 (4.4) |
| Mind-body | 631 (39.1) | 53 (66.9) | 147 (45.1) | 100 (34.5) | 17 (45.0) | 15 (22.4) | 319 (37.9) |

Abbreviations: CAM, complementary and alternative medicine; CHF, congestive heart failure.

*Data are given as number in thousands (percentage) of each group.

†Respondents did not use energy therapies for treatment of insomnia or trouble sleeping.

ported having CHF, 10.8% reported having diabetes, 45.9% reported having anxiety or depression, and 29.4% reported being obese based on a body mass index calculated from self-reported height and weight (Table 1). The odds

of reporting insomnia or trouble sleeping were significantly higher for individuals with either hypertension, CHF, anxiety or depression, or obesity relative to individuals who did not report these conditions (Table 2 and the **Figure**).

Table 5. Reasons for CAM Use Among Those Who Used CAM for Their Insomnia or Trouble Sleeping

| Questions About Choosing CAM and CAM Modalities | Across All Modalities (n = 1 615 699) | Herbs (n = 284 756)* (n = 932 401)† | Relaxation (n = 115 538)* (n = 517 122)† |
|----------------------------------------------------------------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------------|
| 1. Do you think this helped your condition? | | | |
| A great deal | | 140 (49.2)‡ | 56 (48.2) |
| Some | | 94 (33.0) | 46 (13.4) |
| Only a little | | 29 (10.3) | 19 (24.7) |
| Not at all | | 21 (7.5) | 16 (13.6) |
| 2. Did you tell any conventional medical professional about use? | 981 (60.7) | 508 (54.5) | 202 (39.0) |
| 3. How important was your use of the CAM modality in maintaining your health and well-being? | 910 (56.3)§ | | |
| Very important | | 354 (37.9) | 224 (43.4) |
| Somewhat important | | 268 (28.8) | 150 (29.1) |
| Slightly important | | 202 (21.7) | 119 (23.0) |
| Not at all important | | 98 (10.5) | 24 (4.5) |
| Refused to reply/do not know/not ascertained | | 10 (1.1) | 0 |
| 4. Why did you choose the CAM modality? | | | |
| Conventional treatments not helpful | 658 (40.7) | 206 (22.1) | 163 (31.5) |
| Conventional treatments too expensive | 400 (24.8) | 191 (20.5) | 97 (18.7) |
| Combined with conventional treatments | 1030 (63.8) | 510 (54.7) | 279 (54.0) |
| Conventional medical professional suggested | 569 (35.2) | 192 (20.6) | 127 (24.5) |
| Thought it would be interesting to try | 1076 (66.6) | 540 (57.9) | 396 (76.5) |

Abbreviation: CAM, complementary and alternative medicine.

*Number of individuals who answered the first question (Do you think this helped your condition?); this sample is limited to those survey participants who said insomnia or trouble sleeping was 1 of the top 3 conditions for which they took herbs or used relaxation techniques.

†Number of individuals who answered questions 2 to 4, which were not condition specific.

‡Data are given as number in thousands (percentage) of each group

§Aggregated if any CAM modality used to treat insomnia or trouble sleeping was listed as “very important.”

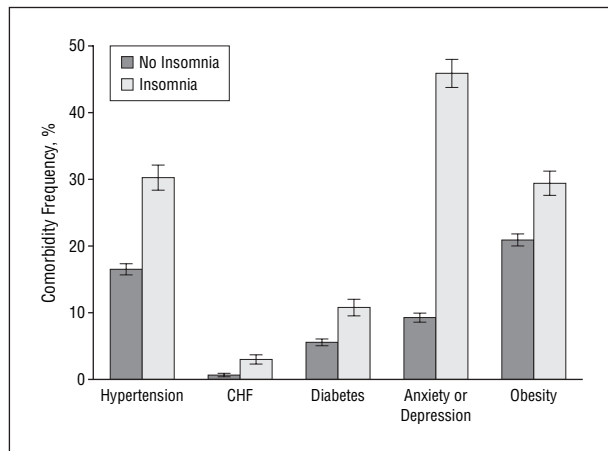


Figure. Insomnia or trouble sleeping and comorbidity status. Results are expressed as prevalence rates with 99% confidence interval bars; CHF indicates congestive heart failure.

Within the population reporting insomnia or trouble sleeping, 4.5% reported using some form of CAM to treat their sleep problem. Although this may seem like a small percentage, based on the NHIS it extrapolates to approximately 1 615 699 adults in the US civilian, noninstitutionalized population. In the adjusted model, sex, race, and ethnicity were not associated with the use of CAM to treat insomnia or trouble sleeping (Table 3). Those in younger age brackets and with higher educational attainment were more likely to use CAM for insomnia or trouble sleeping ($P < .001$) (Table 3). In the adjusted model there were no statistically significant associations be-

tween CAM use for insomnia or trouble sleeping (with or without comorbid conditions) or any 1 of the 5 comorbid conditions analyzed (Table 3).

Survey respondents reported using therapies within 4 of the 5 broad CAM domains for treatment of their insomnia or trouble sleeping. Individuals who used CAM to treat their insomnia or trouble sleeping, whether or not the sleep disorder was associated with another comorbid condition, primarily used biologically based therapies (64.8%) or mind-body therapies (39.1%) (Table 4, column 1). Interestingly, although those without comorbid conditions showed a preference for mind-body therapies, those with comorbidities preferred biologically based therapies (Table 4).

Four survey questions addressed motivation and behavior related to CAM use to treat insomnia or trouble sleeping (see the “Methods” section). The results are summarized in Table 5. Analyzing all CAM domains together, we found that 60.7% of respondents told a conventional medical practitioner that they were using a CAM therapy to treat their insomnia. Approximately 56% reported that a CAM therapy was very important to maintaining their health and well-being. The most common reason for choosing a CAM therapy to treat insomnia or trouble sleeping was that respondents thought it would be interesting to try (66.6%). The second most common reason was that respondents thought that the CAM treatment combined with a conventional treatment would be helpful (63.8%).

Because of the way the survey was structured, we were not able to analyze the question, “Do you think this helped your condition (insomnia or trouble sleeping)?” across

all CAM domains. Therefore, we analyzed the answer to this question, plus the answers to the other 3 motivational or behavioral questions, for 2 of the most commonly used CAM modalities: 1 in the biologically based therapies domain (herbal therapies) and 1 in the mind-body therapy domain (relaxation therapy). As shown in Table 4, these 2 domains of CAM therapies were by far the most common domains used to treat insomnia or trouble sleeping. Of the respondents who used herbal therapies or relaxation therapy, 49.2% and 48.2%, respectively, felt that the therapy helped their condition a great deal (Table 5).

COMMENT

In summary, 17.4% of the adult US population have reported regularly having insomnia or trouble sleeping in the past 12 months. Insomnia or trouble sleeping is strongly associated with 4 health conditions selected for in-depth analysis (hypertension, CHF, anxiety or depression, and obesity) but not with diabetes. Approximately 1.6 million US adults use CAM therapies to treat insomnia or trouble sleeping, with CAM therapies in the biologically based and mind-body domains being by far the most commonly used.

Although this analysis provided useful new data, it also has limitations. From this survey we cannot analyze the frequency of use of conventional therapies for insomnia or trouble sleeping or whether specific conventional therapies are used with CAM therapies. However, the responses to the question of why individuals chose a CAM therapy for treatment of insomnia or trouble sleeping suggest that 1 major reason is to combine the CAM therapy with a conventional therapy (complementary medicine). Although the question asking whether the CAM therapy helped provides useful information on the public's perception of effectiveness of CAM therapies for insomnia or trouble sleeping, it does not directly address the efficacy of the CAM therapy. A positive answer to this question could be due to a placebo effect, the natural history of the condition, or other unidentified influences rather than efficacy of the CAM treatment. The survey questions did not distinguish the severity of the insomnia or trouble sleeping. Likewise, the types and severity of diabetes, hypertension, anxiety or depression, and CHF were not addressed in the survey questions. The number of survey participants who reported using CAM to treat insomnia or trouble sleeping comorbid with CHF or diabetes was low, so estimates of CAM use in the general population for these diseases should be viewed with caution. Finally, although analysis of this survey data can point to associations between insomnia or trouble sleeping and specific demographic groups or comorbid conditions, it does not provide data on why these associations exist. In this regard, these data are hypothesis generating and provide a basis for further hypothesis-driven research.

Despite these limitations, the analysis described here has produced interesting findings that can serve as the basis of further research. Unlike studies that rely on medical record review or data collected from highly select populations, such as clinic-based surveys or surveys of health

maintenance organization members, the NHIS data allow for a large representative sample of the general adult US population. This is especially important for surveys of CAM use because many CAM therapies do not require a health care provider, and a significant number of individuals who use CAM for health reasons do not tell their conventional medical practitioner about their CAM use. In addition, the use of face-to-face interviews and Spanish translations in the NHIS allowed for more complete and accurate data compared with those collected via telephone interviews or mailed questionnaires.

Overall, this analysis of the 2002 NHIS¹⁸ confirmed some earlier findings about insomnia or trouble sleeping, generated new results that differ from earlier findings, and revealed new data on the use of CAM therapies to treat sleep disorders. Much of the demographic data summarized in Table 1 are consistent with earlier findings. However, the fact that insomnia or trouble sleeping seemed to peak in middle age and not rise to similar levels again until very old age, and that this trend persisted even when corrected for 5 major comorbidities and other factors, is of interest. This does not seem to be completely consistent with studies²²⁻²⁵ that suggest insomnia or trouble sleeping is highly prevalent in old age or with the concept that comorbidities, and not age per se, is the cause of insomnia in old age. This clearly deserves further study.

Also of interest was the strong association among 4 comorbid conditions and insomnia or trouble sleeping. Although this statistical association does not reveal why insomnia or trouble sleeping is associated with these other health conditions, this result is consistent with the hypothesis that these conditions and sleeping disorders such as insomnia may be connected in a complex way through common biological mechanisms, as has been proposed elsewhere,⁶⁻¹² and supports ongoing research into the biological basis of these associations. Our low estimate of the prevalence of insomnia or trouble sleeping not associated with any of the approximately 50 comorbid conditions in this survey also suggests that insomnia or trouble sleeping is most often concurrent with other medical conditions.

In analyzing the use of CAM for treatment of insomnia or trouble sleeping, we found that younger respondents and those with higher education were more likely to use CAM to treat insomnia or trouble sleeping. These data are similar to demographic data for individuals who use CAM in general.^{20,26} We also found that 60.7% of respondents told a conventional medical practitioner that they were using a CAM therapy for insomnia or trouble sleeping. This is higher than an estimate of the number of individuals who tell their conventional medical practitioners that they are using a CAM therapy in general based on a previous survey.²⁷ Finally, the high use of biologically based therapies and mind-body therapies to treat insomnia or trouble sleeping is new and useful information. We also observed that most respondents who used herbal therapies or relaxation techniques found these therapies helpful for managing their insomnia or trouble sleeping. Taken together, our data justify further research on the efficacy of these CAM therapies to treat sleeping disorders such as insomnia and trouble sleeping.

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