Clinical and Socioeconomic Correlates of Insomnia

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Insomnia is characterized by difficulty falling asleep (sleep onset disturbance), difficulty staying asleep (sleep maintenance disturbance), or poor quality (nonrestorative) sleep, leading to impairment of next-day functioning, including psychological distress. Published prevalence estimates of insomnia vary considerably, very likely due to differences in definitions, study setting, and data collection methods. However, estimates based on large population-based surveys provide a rather constant prevalence rate for chronic insomnia in the United States of about 10% (approximately 25 million people). Chronic insomnia is associated with numerous physical and psychiatric conditions and is more common in women and the elderly. Although it is often perceived as a symptom of depression, insomnia is also a precursor of depression and is associated with a substantial increase in the relative risk of major depression. Chronic insomnia is correlated with impaired mood, subjective functioning, and quality of life and, in some cases, with increased daytime sleepiness and accident risk. Those reporting insomnia have higher rates of absenteeism and health care utilization. Direct costs of insomnia have been estimated to be $13.9 billion annually, with a large majority of costs attributable to nursing home care. Chronic insomnia is a common problem, often associated with negative waking mood or function. As such, heightened clinical attention and clinical research appear warranted.

(J Clin Psychiatry 2004;65[suppl 8]:13–19)

Insomnia is a common complaint often associated with other aspects of ill health and well-being.[1–3] Prevalence rates vary considerably, depending on the definitions used, the assessment interval, and data collection methods. Even with conservative estimates, however, it is clear that insomnia affects a substantial segment of the population and is associated with increased morbidity and health care utilization. It should be stressed that these associations do not prove causality. Whether insomnia is a cause or an effect is unknown, as is whether insomnia is simply a minor covariate in a much broader and complex clinical context. Such caveats are necessary for an accurate interpretation of the literature and for the continued elucidation of the true impact of insomnia. The weight of evidence in the literature, however, presents a clear issue—insomnia is an important clinical entity with a potentially significant impact on the patient and on society.

DEFINITIONS

According to the text revision to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR), insomnia is defined as (1) difficulty falling asleep (sleep onset), (2) difficulty staying asleep (sleep maintenance), and/or (3) poor quality of sleep (nonrestorative sleep) for at least 1 month. The duration of insomnia can be transient (1 to several nights), short-term (several nights to a month), or chronic (a month or more). Transient insomnia is typically due to acute stress, acute illness, or travel across time zones. Short-term insomnia is commonly due to emotional or lifestyle events that persist for a significant but limited duration, such as changing jobs or a death in the family. Our present understanding of chronic insomnia involves either the symptoms of sleep disruption associated with one of a variety of psychological or medical disorders or the specific condition of primary insomnia. Clearly, the duration criteria for transient, short-term, and chronic insomnia are somewhat arbitrary, and, in fact, recurring episodes of transient or short-term insomnia may occur sufficiently frequently so as to constitute a form of chronic insomnia.

PREVALENCE

Published prevalence estimates of insomnia vary from approximately 9% to 50% (Table 1[2–16]) when including patient-care settings and population-based surveys. Because insomnia is a symptom of numerous psychiatric and medical conditions,[1–3] higher rates occur in study samples selected from the health care setting. Nevertheless, prevalence rates in population-based surveys are still substantial. Assuming a conservative estimate of a

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Support was provided through an unrestricted educational grant from Sepracor.

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Table 1. Prevalence of Insomnia

Study	Study Sample	Measures/Design	Time Interval of Insomnia Complaint	Prevalence	Notes
Population-based surveys					
Ancoli-Israel and Roth, 1999[5]	1000 adults (United States)	Telephone survey	Current sleep patterns and history	9%	46% had ever discussed insomnia with physician.
Ohayon and Roth, 2003[3]	14,915 patients, aged 15–100 years (United Kingdom, Germany, Italy, Portugal)	Telephone survey using Sleep-EVAL system	Current sleep patterns	19%	Rate reflects patients who reported insomnia and impaired daytime function. Of these, over 90% of cases reported duration of insomnia of 6 months or greater.
Leger et al, 2000[6]	12,778 adult patients (France)	Self-administered questionnaire	Sleep patterns within past month	29%	Rate reflects patients reporting insomnia at least 3 times per week; 73% reported at least 1 complaint within preceding month.
Mellinger et al, 1985[7]	3161 patients, aged 18–79 years (United States)	Clinically oriented household interviews	Sleep difficulties within past year	35%	Difficulties with sleep onset and maintenance increased with increasing age; 17% of patients stated sleep disturbance bothered them “a lot.”
Schubert et al, 2002[8]	2800 adults, aged 53–97 years in 1 city (Beaver Dam, Wis)	Interview	Onset and maintenance patterns within past month	35%	Value reflects patients reporting repeated awakenings.
Janson et al, 2001[9]	2602 men, aged 30–69 years (Uppsala, Sweden)	Self-administered questionnaire mailed to 4201 randomly selected male residents in 1984; follow-up survey administered 10 years later to 2602 survivors	Sleep patterns within recent “months”	13%	Prevalence rate is for 1994. Insomnia correlated with weight, smoking, physical inactivity, alcohol dependence, hypertension, diabetes, gastritis/peptic ulcers, psychiatric disorders, and joint/back disorders.
Ford and Kamerow, 1989[4]	7954 adults (Baltimore, Md; Durham, NC; Los Angeles, Calif)	Interviews conducted by lay interviewers in the patients’ homes; 10,534 patients completed baseline interviews; 7954 completed follow-up interviews	Present sleep complaints and psychiatric symptoms; based on Diagnostic Interview Schedule	10%	Reflects “trouble falling asleep, staying asleep, or with waking up too early” for a period of ≥ 2 weeks. Responses were recorded as positive if further questioning revealed that respondent told a professional, took medication, or stated that it interfered with life “a lot” and that disturbance was not always the result of physical illness, medication, or drug/alcohol use.
Mallon et al, 2000[10]	1244 adults, aged 45–65 years (Dalarna, Sweden)	Self-administered questionnaire mailed to 2663 randomly selected residents in 1983; follow-up survey administered to 1244 residents in 1995	Present sleep patterns; based on Uppsala Sleep Inventory	43% women; 37% men	Rate is prevalence reported in 1995; of patients who did not have insomnia in 1983, 34% developed insomnia; of patients with chronic insomnia in 1983, 75% still had chronic insomnia in 1995.

continued

Table 1. Prevalence of Insomnia (cont.)

Study	Study Sample	Measures/Design	Time Interval of Insomnia Complaint	Prevalence	Notes
Office-based surveys					
Ustun et al, 1996[11]	5438 patients, aged 15–65 years, selected from ambulatory care settings in 14 countries (WHO Collaborative Study)	Screening questionnaire given to over 25,000 patients; 5438 completed subsequent baseline assessment	Sleep pattern based on history of ever having 2+ weeks of onset or maintenance symptom	27%	Rate reflects "any" sleep complaint; 13 of 14 sites had prevalence rates > 10%.
Katz and McHorney, 1998[2]	3445 patients with psychiatric or medical condition in primary care; sample derived from practices of 523 clinicians in 3 US cities	Self-administered questionnaire	Sleep patterns within past month	50%	16% reported severe insomnia; 34% reported mild insomnia within the last 4 weeks.
Hohagen et al, 1994[12]	2512 adults from 10 general practice offices (Mannheim, Germany)	Questionnaire administered in the office; second questionnaire mailed 4 months later to assess stability of symptoms	Sleep patterns within past month	31%	Reflects "disturbed" sleep at least 3 times a week for 4 consecutive weeks; 4 months later, 87% of patients who initially reported a sleep complaint still had a sleep complaint.
Simon and VonKorff, 1997[13]	1962 adults in primary care staff model health maintenance organization (Puget Sound, Wash)	12-item General Health Questionnaire (all patients) 615 patients deemed eligible for face-to-face interview; 373 completed interviews; 347 completed 3-month follow-up	Not specified	10%	Insomnia associated with significantly greater functional impairment.
Hatoum et al, 1998[14]	1500 patients in managed care setting at 5 sites (Albuquerque, NM; Salem, Va; Cleveland, Ohio; Sacramento, Calif; Danville, Pa)	Self-administered questionnaire mailed to 1100 randomly selected plan enrollees; 400 additional questionnaires administered in clinic	Not specified	32%	32% of patients reported insomnia with daytime dysfunction; an additional 14% reported difficulty initiating or maintaining sleep with no next-day dysfunction.
Kushida et al, 2000[15]	1254 adults in primary care setting (Moscow, Idaho)	Office interview (N = 962) or mail-in questionnaires (N = 292)	Current sleep patterns	32%	Potentially enriched sample overestimating true prevalence; respondents with insomnia may have been more likely to participate.
Shochat et al, 1999[16]	286 adults in primary care settings (Haleiwa, Hawaii; Honolulu, Hawaii; San Diego, Calif)	Sleep questionnaire, modified from 1991 Gallup survey, was distributed by receptionist to all patients entering clinic	Nights of insomnia within past month	19%	19% reported chronic insomnia; 50% reported transient insomnia.

10% prevalence of chronic insomnia reported by Ford and Kamerow,[4] over 25 million people are affected by chronic insomnia in the United States.

Prevalence rates are also affected by whether the study captures insomnia as a symptom or further defines it according to diagnostic criteria such as DSM-IV criteria. Ohayon[17] recently categorized prevalence data in over 40 epidemiologic studies comprising approximately 130,000 patients. Not surprisingly, studies with the least restrictive criteria had the highest overall prevalence rate (33%), while studies employing DSM-IV criteria had the lowest rates (4.4%–6.4%). Rates were intermediate when frequency (16%–21%), severity (10%–28%), or daytime functioning (10%) was used as a criterion.[17]

Severe insomnia complaints appear to be more persistent than mild insomnia. In a sample of 3445 patients, Katz and McHorney[18] found a prevalence rate of 34% for mild insomnia and 16% for severe insomnia at baseline. When the study population was reassessed 2 years later, 83% of patients with severe insomnia remained so categorized, whereas only 59% of patients with mild insomnia reported the same degree of sleep difficulty.[18]

Sleep maintenance problems are just as common, if not more so, as sleep onset problems. The World Health Organization (WHO) collaborative study[11] analyzed over 5400 patients from 14 countries. Sixteen percent of respondents stated they had difficulty falling asleep, whereas 25% said they either had difficulty staying asleep (15%) or awoke too early (9.9%).[11] Similarly, in a longitudinal study of 2512 survey respondents, Hohagen et al.[12] found that 18% of respondents initially reported sleep onset difficulty, and 18% either had difficulty maintaining sleep (5%) or awoke too early (13%). However, the nature of the insomnia complaint was not stable over time. Of patients with sleep maintenance problems at the first assessment, only 17% had sleep maintenance problems 4 months later.

Insomnia is more prevalent in the elderly[7] and in women.[19] Mellinger et al.[7] found that the rate of serious insomnia in people aged 65 to 79 years is 25%, compared with only 14% in people aged 18 to 34 years. Epidemiologic studies (reviewed in Ohayon[17]) consistently show that women have higher rates of insomnia. Risk of insomnia in women is approximately 1.5 times higher than that in men ($p < .005$).[19]

Chronic insomnia is more prevalent in patients with medical or psychiatric comorbidities.[20] Buysse et al.[1] have estimated that approximately 44% of cases of insomnia referred to sleep centers are related to psychiatric conditions, while about 20% are cases of primary insomnia.[1] The remaining cases include insomnia related to medical conditions and other primary sleep disorder diagnoses, such as sleep-related breathing disorders. Insomnia was associated with a higher risk of major or subthreshold depression, myocardial infarction, congestive heart failure, angina pectoris, chronic obstructive pulmonary disease, back problems, hip impairment, osteoarthritis, rheumatoid arthritis, and peptic ulcer disease.[2] Risk of severe insomnia was substantially higher in patients with major depression (odds ratio = 8.2, 95% confidence interval [CI] = 5.7 to 12.0, $p \leq .001$]).[2]

Table 2. Relative Risk of Psychiatric Disorders in Patients With Insomnia[a,b]

Disorder	No Insomnia (N = 6704)	Insomnia at Baseline (N = 560)	Insomnia at Baseline and 1-Year Follow-Up (N = 251)
Major depression	1.0	1.6 (0.5 to 5.3)	39.8 (19.8 to 80.0)
Anxiety disorder	1.0	1.5 (0.9 to 2.5)	6.3 (3.6 to 10.9)
Any psychiatric disorder	1.0	1.6 (1.0 to 2.4)	4.0 (2.4 to 7.2)

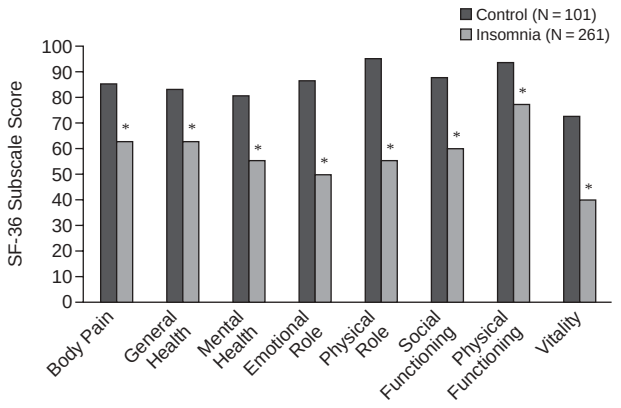
[a]Data from Ford and Kamerow.[4]
[b]Adjusted odds ratio relative to patients with no insomnia. All statistically significant.

MORBIDITY

Although the direct consequences of chronic insomnia have not been fully elucidated, a number of negative correlates have been described. These morbidities may differ by insomnia subtype, but a number of general observations can be made. Insomnia is often a precursor of depression. Ford and Kamerow[4] analyzed risk of depression and other psychiatric disorders in 7954 respondents questioned at baseline and 1 year later. At baseline, risk of major depression was 1.6 times higher for insomniacs relative to respondents without insomnia. In respondents who reported insomnia both initially and at follow-up 1 year later, however, risk was 39.8 times higher than in patients reporting no insomnia (95% CI = 19.8 to 80.0; $p < .001$) (Table 2). Similarly, Breslau et al.[21] demonstrated a depression incidence of approximately 16% for insomniacs, compared with 5% in controls over 3.5 years of follow-up. Chang et al.[22] also noted that adjusted relative risk of depression was twice as high in those reporting insomnia in a sample of 1053 men followed for a median of 34 years in the Johns Hopkins Precursors Study. The compelling aspects of the Chang study are the length of follow-up and the fact that sleep difficulty in early adulthood was a risk factor for depression that persists for at least 30 years. These data raise the intriguing hypothesis, which remains to be systematically tested, that treatment of insomnia may reduce risk of major depression.

Although it is commonly perceived that treatment of depression will resolve insomnia in depressed individuals, insomnia can persist even with response to antidepressant therapy. In 108 patients who were considered full responders to 8 weeks of fluoxetine 20 mg/day, as determined by the Hamilton Rating Scale for Depression (HAM-D), 44% of patients had threshold or subthreshold (i.e., almost, but not quite, fulfilling the criteria defined in the Structured

Figure 1. Impact of Insomnia on Quality of Life in 261 Insomniacs Relative to 101 Controls[a]



[a]Adapted with permission from Zammit et al.[32] Patients were recruited by advertisement (N = 900 respondents) and then screened for eligibility using a structured interview (N = 362). Patients completed Short Form-36 (SF-36) questionnaires at home or in the clinician's office. Relative to controls, insomniacs demonstrated statistically significant decrements ($p < .0001$) in all 8 domains.
*$p < .0001$.

Clinical Interview for DSM-III-R, Patient Edition) symptoms of sleep disturbances after demonstrating a response on the HAM-D.[23] Even patients responding to antidepressant therapy may require additional interventions for their sleep complaints.

Chronic insomnia has also been correlated with impaired subjective functioning, cognitive function, and quality of life, as well as mood disturbance and increased sleepiness, accident risk, and absenteeism. In a 4-city call-in study of 1383 respondents,[24] a majority of untreated insomniacs reported that they were easily upset, irritated, or annoyed (83%), were too tired to do things (78%), and had trouble remembering (59%). A significant proportion reported they had confused thinking/judgment (43%), forgot presleep activities (44%), and felt sleepy driving in the car in the afternoon (42%).[24]

Deficits in memory in primary insomniacs have not been consistently documented, but 2 laboratory studies suggest insomnia is associated with impaired memory.[25,26] Both of these trials used polysomnograms to document insomnia, in conjunction with carefully controlled tests of cognitive function. In both studies, insomniacs had decreased sleep efficiency and decrements in measures of sleep maintenance. Bonnet and Arand[25] found that, compared with matched controls, insomniacs had impaired short-term memory, as well as more confusion, tension, and depression and less vigor ($p \leq .05$ for all comparisons). Mendelson et al.[26] showed insomniacs had impairment in long-term memory. Large, population-based surveys have also shown that chronic insomniacs report impaired next-day functioning.[3]

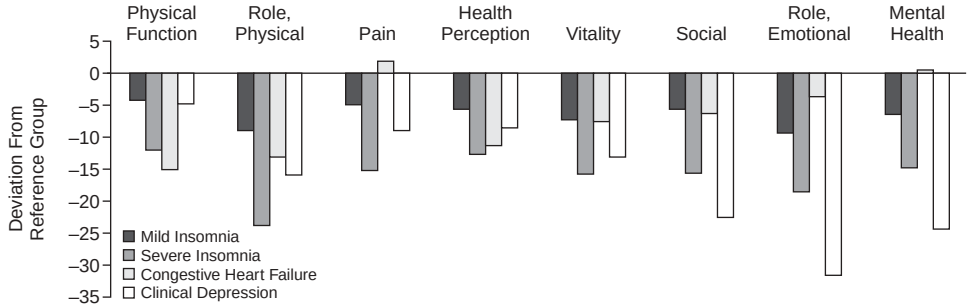
A number of detrimental outcomes have been observed in the daily lives of insomnia sufferers, although it is unknown if these effects are directly linked to disturbed sleep. In a study of sleep quality in naval recruits, Johnson and Spinweber[27] demonstrated that patients reporting poor sleep had fewer promotions, lower pay, a lower rate of reenlistment recommendations, a higher attrition rate, and higher hospitalization rate. Other studies have demonstrated a higher rate of absenteeism,[28] reduced subjective productivity,[29] and increased risk of accidents[30,31] associated with chronic insomnia or poor sleep.

Chronic insomniacs consistently report reduced quality of life. Zammit et al.[32] found statistically significant decrements in all 8 domains of Short Form-36 (SF-36), a validated quality-of-life tool, in insomniacs relative to controls (Figure 1). In fact, as Katz and McHorney[18] have reported, in some domains of SF-36, severe insomnia has been shown to decrease quality of life to a degree comparable to conditions such as chronic heart failure or depression (Figure 2).

COSTS

Patients with insomnia more frequently use health care services,[4,13] have more days with limited activity,[13] and spend more days in bed[13] relative to people without insomnia. Direct costs include cost of medical care borne by patients, health care providers, insurance companies, or the government. Indirect costs include those due to decreased economic output attributable to morbidity and mortality. Related costs include nonhealth effects that can be reasonably associated with a condition, such as property damage. In 1994, Stoller[33] estimated the total costs of insomnia to range from $92.45 to $107.53 billion, $15.4 billion of which was direct costs, with the remainder attributable to indirect or related costs. This analysis assumed, however, a 33% prevalence of insomnia (higher than generally accepted), and many costs were attributed to sleepiness, not insomnia. In 1999, Walsh and Engelhardt[34] estimated (using 1995 dollars) direct costs of insomnia to be $13.93 billion, which consisted of health care services ($11.96 billion)—including nursing home costs ($10.9 billion)—and medications/substances used for treatment ($1.97 billion). Several considerations must be applied to these figures. There is little information about insomnia-related use of health services, and therefore inferences and extrapolations were made in calculating direct costs. Also, because health care is difficult to compartmentalize, and medical conditions have varying degrees of overlapping expenditures, some costs attributed to insomnia may in fact be due to other coexisting conditions; on the other hand, expenditures due to illness that is caused or worsened by insomnia may not be accounted for. Finally, these figures are based on only the non-institutionalized civilian population; they do not include either indirect costs or related costs. Thus,

Figure 2. Quality-of-Life Decrements in Patients With Insomnia, Congestive Heart Failure, or Depression, as Assessed by Self-Administered Short Form-36[a]



[a]Data from Katz and McHorney.[18] Study participants (N = 3445) were recruited from offices in 3 U.S. cities. Data from physician-completed forms were used to assign a clinical diagnosis. Reference group was patients with mild hypertension and no insomnia.

it is likely that they represent a relatively small portion of the total economic impact of insomnia.[34]

In the Walsh and Engelhardt analysis,[34] nursing home costs accounted for 78% of the total direct costs of insomnia. This figure, though seemingly high, is more plausible when one considers that a substantial percentage of caregivers state that the only reason for institutionalization is an inability to accommodate the elderly family member's sleep disorder.[35] Over half of caregivers state that if the sleep problem were corrected, the patient could remain at home. Approximately 20% of caregivers specify sleep disturbances as the primary reason for institutionalization.[36]

CONCLUSIONS

Although a direct causal relationship has not been established between sleep disturbance and associated impairments such as decrements in performance or increased accident risk, correlations between insomnia and a number of morbidities have been consistently observed. As a correlate of numerous comorbidities and a known risk factor for depression, insomnia is a clinical indication of poor health. Defining causal associations and determining if interventions for insomnia reduce comorbid conditions remain scientific challenges.

Drug name: fluoxetine (Prozac and others).

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