

Insomnia in Older Adults with Generalized Anxiety Disorder

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Abstract

Objectives: The purposes of this study are to characterize sleep disturbances experienced by older adults with GAD and compare them with older adults without GAD; compare sleep disturbances among older adults with GAD with and without comorbid depression; and examine the relation between anxiety symptom severity and sleep disturbance.

Design: Cross-sectional

Setting: Participants were recruited through primary care clinics, advertisements, and mass mailings.

Participants: 111 older adults; 31 with GAD, 26 with GAD and depression, 33 worried well, and 21 with no psychiatric diagnosis

Measurements: Psychiatric diagnosis, sleep disturbance, anxiety symptoms, worry, depressive symptoms, and health.

Results: Participants with GAD with and without comorbid depression reported significantly greater sleep disturbance severity than participants with no psychiatric diagnosis and the worried well. The severity of sleep disturbance reported by older participants with GAD is greater than reports by young and middle-aged participants with GAD, and comparable to reports by older adults with a diagnosis of insomnia. Further, worry severity and depressive symptoms (but not depression diagnosis) were independently associated with severity of sleep disturbance.

Conclusions: Ninety percent of older adults with GAD report dissatisfaction with sleep and the majority report moderate to severe insomnia. These findings support the assessment of sleep disturbances within the context of late-life GAD.

Keywords: Anxiety, GAD, insomnia, sleep

Introduction

Sleep disturbances are common in patients with anxiety disorders, particularly Generalized Anxiety Disorder (GAD). Within the context of GAD, sleep disturbance is defined as difficulty falling asleep, difficulty staying asleep, or restless sleep (1). It is not surprising, therefore, that up to 75% of patients with GAD have insomnia (2). Self-reports of sleep disturbances among GAD patients have been supported by polysomnographic evidence (3). Patients with GAD and insomnia have impaired sleep initiation and maintenance (4-6), and Saletu-Zyhlarz and colleagues (6) have suggested that this may be the result of CNS hypervigilance and hyperarousal caused by GAD itself.

Among patients with anxiety disorders, insomnia occurs more frequently at the same time (39%) or after (44%) the start of an anxiety episode, while only 18% of people report insomnia symptoms prior to the first episode of anxiety (7). Similar findings have been reported in an adolescent sample (8). Nonetheless, insomnia has also been found to be a risk factor for anxiety disorders (9), as patients with insomnia are more than 6 times more likely to have an anxiety disorder than patients without insomnia (10).

Sleep disturbances increase with age. Total sleep time and sleep efficiency decreases and the time awake after sleep onset increases during middle age, and sleep efficiency continues to decrease among older adults (11). Older adults also experience changes in their circadian cycle, with earlier bed and wake times (12). Epidemiological studies have documented that up to 45% of older adults report sleep onset or maintenance insomnia (13-14). Despite these findings, little research has examined the frequency and severity of insomnia in older patients with GAD.

Given the increase in sleep problems that occur with age, it is not known if sleep disturbances are more common or equally common among older adults with GAD compared with older adults without GAD. No published studies have examined insomnia among older adults with and without GAD. The primary purpose of this study is to characterize sleep disturbances experienced by older patients with GAD compared with older adults without anxiety. Furthermore, GAD is frequently comorbid with depression, particularly among older adults. Therefore, a second purpose of this study is to compare sleep disturbances in patients with GAD with the sleep disturbances reported by patients with both GAD and depression. The final purpose of this study is to determine if sleep disturbances are associated with anxiety symptom severity.

Methods

Participants

GAD participants. Participants with GAD were part of a larger study of CBT for late-life anxiety. Recruitment for the study is described elsewhere (Brenes et al., under review). Briefly, participants were recruited through primary care clinics, advertisements, and mass mailings. Inclusion criteria for the larger RCT were a DSM-IV principal or co-principal diagnosis of GAD, Panic Disorder, or Anxiety Disorder Not Otherwise Specified (NOS) based on the Structured Clinical Interview for DSM-IV (SCID-IV; 15) and age \geq 60 years. Exclusion criteria included: 1) current psychotherapy; 2) a DSM-IV diagnosis of alcohol or substance abuse; 3) a diagnosis of dementia or global cognitive impairment operationalized as a score of $<$ 24 of the Mini-Mental Status Examination (MMSE; 16); 4) psychotic symptoms; 5) active suicidal ideation; or 6) any change in psychotropic medications within the last 3 months. In this manuscript,

participants with a principal diagnosis of Panic Disorder and Anxiety NOS are excluded from the sample. Participants with GAD were divided into those with coexistent Major Depressive Disorder or Dysthymia ($n = 26$) and without coexistent depression ($n = 31$).

Comparison participants. Participants without a current psychiatric diagnosis were included as a comparison group. These participants were recruited in 2 ways. First, participants who were ineligible for the larger RCT because they did not meet the criteria for an anxiety disorder were included in the comparison sample if they had no current diagnosis based on the SCID-IV interview. These participants are referred to as worried well ($n = 33$). Second, participants approached in primary care clinics who did not indicate anxiety were asked to complete the SCID-IV and assessment measures in order to be included in a comparison group. These participants are referred to as the no diagnosis control group ($n = 21$). Only participants with no current psychiatric disorder were included in this group.

Procedure

All participants completed the SCID-IV to determine diagnostic status. Participants were given the option to complete the SCID-IV either in person or by telephone. Participants completed a battery of questionnaires at home and returned them by mail.

Measures

Insomnia Severity Index. The type and severity of sleep disturbance was assessed using the Insomnia Severity Index (ISI; 17). The ISI is based on DSM-IV criteria for insomnia and consists of 7 questions that assess severity of problems with sleep onset, sleep maintenance, and early morning awakening; dissatisfaction with sleep;

interference with daily functioning; impact on quality of life; and worry about sleep problems. Participants rate their level of concern with each symptom on a 5 point Likert scale and responses are summed. The rating of each symptom is made without specific reference to a dimension of time, e.g., how long it took to fall asleep. Scores of 0-7 represent an absence of clinically significant insomnia, 8-14 represents subthreshold insomnia, 15-21 represents moderate clinical insomnia, and 22-28 represents severe clinical insomnia. The ISI has demonstrated good concurrent validity with polysomnographic data and sleep diaries, and is sensitive to change with psychotherapeutic and pharmacological treatments for insomnia (18). The internal consistency of the ISI in this study is .90.

Beck Anxiety Inventory. Self-report anxiety symptoms were measured using the Beck Anxiety Inventory (BAI; 19). The BAI was specifically designed to differentiate anxiety from depression symptoms. Participants rated 21 symptoms of anxiety (e.g., feeling nervous, heart pounding or racing) on a 4-point Likert scale and responses were summed. The BAI cognitive and somatic symptoms were also summed separately. The BAI has been validated in older community (20), medical (21), and psychiatric (22) samples. It has also demonstrated sensitivity to change with treatment for late-life anxiety (23). The internal consistency of the BAI in this study is .93.

Penn State Worry Questionnaire. The Penn State Worry Questionnaire (PSWQ; 24) is a measure of the frequency and intensity of worry. Participants rated 16 items on a 5-point scale and responses were summed, with higher scores indicating greater worry. The PSWQ has demonstrated reliability and validity in older adults with GAD (23, 25-26). The internal consistency of the PSWQ in this study is .74.

Beck Depression Inventory. The Beck Depression Inventory (BDI; 27) is a 21-item measure of depressive symptoms. Responses are summed and can range from 0 to 63, and higher scores indicate greater depressive symptoms. The BDI has good psychometric properties in samples of both younger and older adults with GAD (28-29). The internal consistency of the BDI in this study is .87.

Health. Participants reported if they had they had various disorders that might interfere with sleep. They were then categorized into cardiac disorders (congestive heart failure, coronary artery disease, heart attacks), endocrine disorders (diabetes, thyroid disease), gastrointestinal disorders (crohn's disease, gastroesophageal reflux, irritable bowel syndrome), pain (osteoarthritis, rheumatoid arthritis, back pain, fibromyalgia, and shingles), and pulmonary disorders (asthma, chronic obstructive pulmonary disease, emphysema). Participants also listed all medications they were currently taking. Medications were then categorized as benzodiazepines, selective serotonin reuptake inhibitors (SSRIs), other anti-depressant medications (such as, duloxetine), and sleep aids (such as, zolpidem).

Data Analyses

One way ANOVAs and chi-square analyses were computed to determine if there were any significant differences in demographic or health-related information by diagnosis (control, worried well, GAD, GAD and depression). Variables that were significantly different at $p < .10$ were entered as covariates in adjusted models. We then fit a series of ANCOVA models to determine if there were differences in sleep disturbances by diagnosis. Bonferonni post hoc methods were used for pairwise comparisons between diagnosis groups. A chi-square analysis of variance was conducted

to determine if there were significant differences in categorization of insomnia (none, subthreshold, moderate, severe) by diagnosis. Six post hoc comparisons were then performed between all groups. Third, 2-sample t-tests were used to examine age differences in insomnia among GAD patients and to compare the severity of insomnia among older patients with GAD and older patients with insomnia. These t-tests compared the ISI severity score from the current study with those obtained in 1) a study of early and midlife GAD and 2) a study of late-life insomnia. Finally, we examined the associations between anxiety, depressive, and worry symptoms and sleep disturbance through correlations and multiple regression analyses.

Results

Description of the sample

A total of 111 people are in the sample. Participants ranged in age from 60 to 94 years of age, with a mean age of 70.3 years ($SD = 7.4$). The sample was well-educated ($M = 13.9$ years, $SD = 2.8$) and the majority were women (75.7%). Half were married (49.5%), 32.1% were widowed, 3.7% were never married, and 14.7% were separated or divorced. Although the sample was largely white (75.7%), 15.3% were African American, 6.3% were Native American, and 0.9% were Hispanic. With respect to health, 16.4% reported cardiac diseases, 29.1% reported endocrine diseases, 26.4% reported gastrointestinal diseases, 70.9% reported diseases associated with pain, and 19.1% reported pulmonary diseases. Almost one-third of the sample reported taking benzodiazepines (29.7%); 13.5% reported taking SSRIs; 6.3% reported taking other anti-depressant medications; and 6.3% reported taking sleep aids. Demographic information by diagnosis is presented in Table 1. Significant differences ($p < .10$) between groups

were found for age ($F(3, 108) = 2.36, p = .076$), gender ($X^2(3) = 7.50, p = .057$), gastrointestinal diseases ($X^2(3) = 11.59, p = .009$), pulmonary diseases ($X^2(3) = 10.17, p = .017$), and benzodiazepine use ($X^2(3) = 12.35, p = .006$). These variables were entered as covariates in ANCOVA models.

Sleep characteristics

Table 2 presents the findings of the ISI controlling for age, gender, gastrointestinal diseases, pulmonary diseases, and benzodiazepine use. There were significant differences by condition for difficulty falling asleep, difficulty staying asleep, waking up too early, being dissatisfied with current sleep, sleep problems interfering with daily functioning, noticeable sleep problems, and being distressed about sleep problems. Interference with daily functioning was the only item that distinguished the worried well from participants with GAD, while difficulty staying asleep, interference with daily functioning, noticeable sleep problems, and distress caused by sleep problems distinguished the worried well from participants with comorbid GAD and depression. The amount of distress caused by sleep problems distinguished the worried well from the no diagnosis control participants. Total sleep score also differed significantly by group. Post hoc analyses indicated that participants with a diagnosis of GAD with or without comorbid depression reported a greater degree of insomnia symptoms than worried well and no diagnosis control participants. There was a trend for greater insomnia symptoms among worried well than no diagnosis control participants ($p = .093$) but there were no significant differences between GAD participants with comorbid depression and without comorbid depression. Similar findings were obtained for the categorization of insomnia severity (none, subthreshold, moderate, or severe) by diagnosis ($X^2(9) = 42.40, p < .001$;

see Table 3). Individual chi-square analyses were then conducted to determine significant differences by diagnosis. A Bonferonni correction was made and an alpha of .008 (.05/6) was used to judge significance. The no diagnosis control participants differed significantly from patients with GAD with ($X^2(3) = 25.46, p < .001$) and without comorbid depression ($X^2(3) = 21.23, p < .001$) while the worried well participants differed significantly from participants with comorbid GAD and depression ($X^2(3) = 14.52, p = .002$).

Comparisons with patients with GAD and insomnia

Belanger et al (2) reported a mean ISI total score of 11.5 in a sample of 44 young and middle aged adults with a primary diagnosis of GAD. We conducted a t test comparing the mean ISI scores among our participants with GAD with and without comorbid depression with a score of 11.5 in order to determine if there are age differences in self-report insomnia among patients with GAD. We found that older participants with GAD only [$t(30) = 2.72, p = .001$] and comorbid GAD and depression [$t(24) = 5.10, p < .001$] had significantly higher mean ISI scores than younger and middle-aged adults with GAD. Similarly, we compared the ISI scores among our participants with GAD with and without comorbid depression with the scores reported by Bastien et al. (18) among their sample of older insomnia patients seeking treatment (M ISI score = 15.4). We found no significant differences between participants with GAD only [$t(30) = -1.04, p = .31$] and comorbid GAD and depression [$t(24) = 1.19, p = .24$] and older adults with insomnia.

Correlates of sleep disturbances

Correlational and multivariable analyses were computed to determine the relationships between age, education, gender, race, marital status, health, medication use, anxiety, depression, and worry severity with sleep disturbance severity. There were no significant correlations between demographic characteristics and diseases and sleep disturbance severity. Benzodiazepine medication use was correlated with sleep disturbance severity ($r = .27, p = .005$). Correlational analyses indicate moderate relationships between sleep disturbance and BAI total scores ($r = .52, p < .001$), BAI cognitive subscale scores ($r = .50, p < .001$), BAI somatic subscale scores ($r = .48, p < .001$), PSWQ scores ($r = .52, p < .001$), and BDI scores ($r = .56, p < .001$). After controlling for age, education, gender, race, health, and medications, these relationships remained significant (see Table 4). The independent relationships of the BAI, PSWQ, and BDI scores to sleep disturbance severity were examined by entering them simultaneously into the regression model. The step containing these 3 variables was significant [$F(3, 88) = 12.64, p < .001$]. However, only the PSWQ ($\beta = 2.25, p = .027$) and BDI ($\beta = 2.21, p = .03$) scores were significant.

Discussion

Sleep disturbances are common among older adults with GAD, with 52-68% of adults with GAD in this study reporting moderate or severe insomnia and over 90% reporting dissatisfaction with sleep. The most frequently reported type of insomnia was sleep maintenance insomnia, followed by early morning awakening, and initial insomnia. This is consistent with Saletu et al.'s (6) findings of polysomnographic evidence of increased wake times, increased early morning awakenings, and decreased total sleep among a wide age range of patients (24 to 65 years) with GAD. They suggested that one

potential mechanism is that CNS hypervigilance and hyperarousal associated with GAD causes insomnia.

ISI scores were lowest among individuals with no diagnosis and highest among individuals with GAD diagnoses (with or without comorbid depression), with the worried well falling in the middle. ISI scores for participants with GAD were similar to those reported by Bastien and colleagues (18) in a sample of older adults recruited for an RCT to treat insomnia ($M = 15.4$), and higher than the scores of young and middle aged adults recruited for an RCT to treat GAD ($M = 11.5$) (2). Thus, older adults with GAD report levels of sleep disturbances similar to those of older adults diagnosed with insomnia and higher than those of young and middle-aged adults with GAD. This suggests that the increased prevalence in sleep disturbances among nonclinical samples of older adults is present in participants with GAD as well.

Total sleep scores on the ISI distinguished the worried well from participants with GAD. This is consistent with Wetherell and colleagues (30) who found that disturbed sleep was one of the strongest discriminators among normal, worried well, and GAD older adults in multivariate discriminant function analyses. Although a large percentage of worried well participants reported they were dissatisfied with their sleep (85%), only 16% had moderate or severe insomnia. Approximately 90% of participants with GAD also reported dissatisfaction with sleep; by contrast 52-68% met criteria for insomnia.

There were no significant differences between participants with GAD with and without comorbid depression on total sleep disturbance scores or on individual items. This suggests that the sleep of older GAD participants is impaired regardless of the

presence of a comorbid depression diagnosis. It is not known if sleep disturbance within the context of GAD is a risk factor for depression.

Anxiety severity, including cognitive and somatic symptoms of anxiety, as well as depressive symptoms and worry severity were associated with sleep disturbance. This is in contrast with Belanger et al. (2) who found no relationship between anxiety severity and sleep disturbance in patients with GAD. This inconsistency could be due to a restricted range of anxiety severity, as Belanger only included people with GAD diagnoses in the sample. However, when we excluded the no diagnosis control participants and the worried well from our sample, anxiety severity continued to be associated with sleep disturbance (data not shown). When these variables were simultaneously added to the regression analysis, only worry and depressive symptoms were independently related to sleep disturbance severity, and the strength of their relationships with sleep disturbance was similar. Worry may be related to insomnia in the form of specific worries about sleep (e.g., how a lack of sleep might significantly impact functioning) or general worries that interfere with a person's ability to fall and stay asleep. Depression has been consistently linked with GAD (31) as well as with sleep disturbances (32). Although we found that a comorbid depression diagnosis was not a source of additional sleep disturbance among patients with GAD, depressive symptoms are indeed related to sleep disturbance. Depressive symptoms are assessed and analyzed on a continuous scale and provide a finer level of distinction among participants in the low to moderate range of depressive symptoms than does the presence or absence of a diagnosis of depression.

These findings must be interpreted within the context of some limitations. First, the order of occurrence of sleep disturbances and anxiety symptoms are not known. Therefore, we cannot determine if sleep disturbances preceded GAD or vice versa. Second, we do not have objective measures of sleep (e.g., polysomnography) or sleep diaries.

Results of other studies suggest that insomnia within the context of GAD can be successfully treated, and this treatment can have an impact on anxiety severity. Belanger et al (2) found that CBT for GAD produced significant declines in sleep disturbance even though concerns about sleep were not specifically targeted by the intervention. More recently, Pollack and colleagues (33) evaluated the addition of eszopiclone to escitalopram for the treatment of sleep disturbance in adults with GAD. Participants who received eszopiclone and escitalopram demonstrated greater improvements in sleep disturbance than participants who received escitalopram and placebo. Further, participants who received both medications also demonstrated greater reduction in anxiety severity, faster response, and greater likelihood of remission. Thus, treatment of insomnia among people with GAD may result in greater and faster anxiolytic effects.

Given the high rates of sleep disturbance and dissatisfaction with sleep reported by adults with GAD, sleep disturbances should be routinely assessed and treated when warranted among older adults with GAD. Some have integrated sleep management skills into their GAD treatment protocol (34) while others provide a sleep management module only to those with significant sleep disturbances (35). Further research is needed to determine if improvements in sleep mediate the effects of treatment on anxiety severity.

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Table 1. Demographic characteristics of the sample.

	Controls (n = 21)	Worried well (n = 33)	GAD (n = 31)	GAD and depression (n = 26)
Age	73.2 (8.8)	71.0 (6.6)	69.9 (7.3)	67.6 (6.7)
Education	14.1 (2.8)	14.4 (3.4)	13.7 (2.6)	13.4 (2.4)
Males	33.3%	36.4%	9.7%	19.2%
Marital status				
Never married	9.5%	3.0%	0%	4.0%
Married	61.9%	42.4%	50.0%	48.0%
Widowed	28.6%	33.3%	30.0%	36.0%
Divorced/separated	0%	21.3%	20.0%	12%
Race				
White	90.5%	68.8%	80.6%	69.2%
African American	9.5%	25.0%	12.9%	11.5%
Native American	0%	6.3%	6.5%	11.5%
Hispanic	0%	0%	0%	4.0%
Health				
Cardiac diseases	19.0%	12.1%	12.9%	24.0%
Endocrine diseases	33.3%	21.2%	25.8%	40.0%
Gastrointestinal diseases	9.5%	18.2%	29.0%	48.0%
Pain	61.9%	69.7%	67.7%	84.0%
Pulmonary diseases	14.3%	6.1%	22.6%	36.0%

Medications				
Benzodiazepines	4.8%	24.2%	35.5%	50.0%
SSRIs	9.5%	6.1%	12.9%	26.9%
Other anti-depressants	0%	6.1%	3.2%	15.4%
Sleep aids	4.8%	3.0%	6.5%	11.5%

Table 2. Adjusted differences on the ISI by diagnosis.

	No diagnosis	Worried well	GAD only	GAD and depression	df	F	p	Post hoc
Difficulty falling asleep								
M (SD)	0.79 (0.29)	1.13 (0.21)	1.69 (0.22)	1.75 (0.25)	3, 103	2.72	.049	No sig. diff.
% moderate/severe problems	21.1%	25.0%	58.6%	64.0%				
Difficulty staying asleep								
M (SD)	1.11 (0.24)	1.66 (0.17)	2.26 (0.18)	2.51 (0.21)	3, 105	7.34	< .001	1 vs. 3 1 vs. 4 2 vs. 4
% moderate/severe problems	21.1%	60.6%	83.3%	88.0%				
Difficulty waking up too early								
M (SD)	1.04 (0.29)	1.58 (0.21)	2.14 (0.21)	2.41 (0.25)	3, 104	4.62	.005	1 vs. 3 1 vs. 4

% moderate/severe problems	36.8%	51.5%	73.3%	75.0%				
Dissatisfied								
M (SD)	1.68 (0.26)	2.38 (0.20)	2.77 (0.20)	2.97 (0.23)	3, 107	4.84	.003	1 vs. 3 1 vs. 4
% moderate/severe problems	50.0%	84.4%	90.3%	92.0%				
Interference								
M (SD)	0.81 (0.24)	1.36 (0.18)	2.18 (0.18)	2.41 (0.22)	3, 108	9.79	< .001	1 vs. 3 1 vs. 4 2 vs. 3 2 vs. 4
% moderate/severe problems	23.8%	36.4%	77.4%	84.0%				
Noticeable								
M (SD)	0.54 (0.22)	0.88 (0.17)	1.28 (0.17)	1.82 (0.20)	3, 108	6.19	.001	1 vs. 4 2 vs. 4
% moderate/severe problems	9.5%	18.2%	45.2%	76.0%				

Distressed								
M (SD)	0.23 (0.23)	1.42 (0.18)	2.08 (0.18)	2.68 (0.21)	3, 108	19.67	< .001	1 vs. 2 1 vs. 3 1 vs. 4 2 vs. 4
% moderate/severe problems	9.5%	45.5%	67.7%	88.0%				
Total ISI score								
M (SD)	6.63 (1.28)	10.41 (0.98)	14.35 (0.99)	16.53 (1.17)	3, 108	12.20	< .001	1 vs. 3 1 vs. 4 2 vs. 3 2 vs. 4
% moderate/severe insomnia	4.8%	16.1%	51.6%	68.0%				

Note. 1 = no diagnosis controls; 2 = worried well; 3 = GAD; 4 = GAD and comorbid depression; analyses were adjusted for age, gender, gastrointestinal diseases, pulmonary diseases, and benzodiazepine use.

Table 3. Level of insomnia by diagnosis.

	Controls (n = 21)	Worried well (n = 33)	GAD (n = 31)	GAD and depression (n = 26)
No clinically significant insomnia (ISI 0-7)	66.7%	30.3%	9.7%	4.0%
Subthreshold insomnia (ISI 8-14)	28.5%	48.5%	38.7%	28.0%
Moderate clinical insomnia (ISI 15-21)	4.8%	15.1%	48.4%	56.0%
Severe clinical insomnia (ISI 21-28)	0%	6.0%	3.2%	12.0%
Moderate or severe clinical insomnia (ISI 15-28)	4.8%	21.1%	51.6%	68.0%

Table 4. Anxiety severity and insomnia.

	df	F	p	ΔR^2
BAI total score	1, 92	20.09	<.001	.14
BAI cognitive subscale	1, 92	20.93	<.001	.15
BAI somatic subscale	1, 92	13.32	<.001	.10
PSWQ	1, 93	33.48	<.001	.21
BDI score	1, 93	35.65	<.001	.22