Risk factors for late-life insomnia in a representative general practice sample

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SUMMARY

Background. *Insomnia is widely reported and widely treated in general practice, yet relatively little research has focused on the natural history of the condition in primary care settings. As a result, there is at present little information to enable clinicians to assess insomnia risk, or anticipate outcomes in older general practice populations.*

Aim. *To estimate, using 8-year longitudinal data, the risk of insomnia onset associated with selected health and lifestyle factors.*

Method. *Survivors from a nationally representative sample (n = 1042) of elderly people originally interviewed in 1985 were reassessed in 1989 (n = 690) and 1993 (n = 410). At the first follow up in 1989, 84 new cases of insomnia were identified (a weighted incidence rate per person per year at a risk of 3.1%; 95% CI = 2.7–3.5). In logistic regression analyses controlling for age and sex, the risk of insomnia onset was then assessed in relation to the selected factors.*

Results. *Three factors assessed in 1985 were significantly and independently related to incident insomnia: psychometric ratings consistent with depressed mood odds ratio (OR) = 4.41; 95% CI = 3.32–5.43); health index scores indicating lower physical health status (OR = 1.19; 95% CI = 1.06–1.31 per unit change in scale score); and moderate and low levels of physical activity (OR = 1.91 and 2.14; 95% CI = 1.91–3.62 and 2.14–3.64 respectively). However, although depressed mood represented a major risk factor, the most likely source of risk was physical rather than mental ill-health.*

Conclusions. *Psychiatric, somatic and lifestyle factors significantly and independently increase the risk of insomnia in older general practice patients. In predicting incident sleep disturbance, these factors exceed in importance the age and sex of patients.*

Keywords: insomnia; ageing; epidemiology; risk factors; depression; physical activity.

Introduction

INSOMNIA affects between 5 and 10% of the adult population,[1] and is both widely reported and widely treated in general practice.[2,3] In England, for example, the number of general practice prescriptions for hypnotics shows only a modest decline in recent years, falling from 13.6 million in 1980 to 12.0 million in 1992 (the last year for which published data are available).[4] Yet despite this sustained commitment to the management

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of disturbed sleep in primary care settings, relatively little research has focused on the natural history of this complaint. Most epidemiological data on insomnia have been derived from cross-sectional studies which, although consistent in identifying elderly people as the group most likely to report disturbed sleep,[5] provide only limited information on possible causes, risk factors and longitudinal outcomes. As a result, there is at present a shortage of data to enable clinicians to predict levels of risk within their practice populations and to understand better the origins and course of insomnia in older patients. These limitations were emphasized recently by a National Institutes of Health consensus statement,[6] which drew particular attention to the need for longitudinal studies to inform both policy and practice in this area.

Where the epidemiological literature has addressed correlates or predictors of sleep disturbance it provides conflicting views of the relative contribution of somatic and psychiatric factors to the onset of insomnia in later life.[7] Community surveys in Uppsala, Sweden, Gislason and Almqvist,[8] for example, conclude that age-related increases in sleep difficulties are most closely related to obesity and physical ill-health, a finding supported by a general practice study conducted in Mannheim, Germany, which found 98% of prevalent insomnia patients to be suffering from acute or chronic somatic disorders.[3] On the other hand, the National Institute of Mental Health Catchment Area Survey in the United States,[9] and the Gospel Oak Study in England,[10] both report a significant overlap between disturbed sleep and depressed mood among older people living at home. Other studies have emphasized psychosocial variables (e.g. recreational activity levels) as correlates of poor sleep in old age.[11] These issues have implications for the appropriate perception, investigation and management of sleep complaints from all causes. If, for example, late-life insomnia is regarded principally as a symptom of psychiatric distress, then many of the complex factors mediating insomnia in old age, particularly somatic factors, are unlikely to receive the attention they deserve. In the analyses reported here, we use data from an 8-year longitudinal study of representative elderly general practice patients to estimate the risk associated with health and lifestyle factors among incident cases of late-life insomnia. Each of these factors has been linked to (or is closely related to a factor that has been linked to) insomnia in the epidemiological literature.

Method

Sample

Data were derived from all three waves (1985, 1989 and 1993) of the Nottingham Longitudinal Study of Activity and Ageing (NLSAA), the original sample for which was constructed as follows. Using electoral ward-level statistics from the 1981 census, three areas of greater Nottingham were combined to provide a study population whose demographic composition (as regards age, sex, social class, ethnicity and proportion of elderly people living alone) reflected the average national pattern for England and Wales. The resulting area included a total of 48 733 individuals served by 25 general practitioners. With the consent and co-operation of these general practitioners, Nottinghamshire Family Practitioner Committee age–sex lists were used to identify all non-institutionalized individuals aged 65 years and over living

within the survey areas. Of 8409 elderly people identified, 1299 eligible individuals (those alive and still living at the address provided) were randomly selected for interview. At sampling, those aged 75 years or older were intentionally over-represented in order to admit sufficient numbers for subsequent longitudinal analyses. Accordingly, while the ratio of 'old' (65–74 years) to 'very old' (75+ years) people in the 1985 British population was approximately 1.62:1 (Office of Population Censuses and Surveys, 1983),[12] a baseline ratio of 1:1 was the target for this study.

Baseline and follow-up surveys

The first (baseline) survey was conducted between May and September 1985. Of the 1299 individuals approached, 1042 were interviewed (a response rate of 80%). In order to preserve numbers for longitudinal analyses, yet allow for change in the variables of interest, 4-year follow-up periods were considered optimal. Information on mortality within the baseline sample was provided by the National Health Service Central Register (NHSCR), which supplied copies of all death certificates as they accrued. The first follow up was conducted between May and September 1989. All surviving respondents from 1985 who were still resident in Nottingham were invited to continue their participation. Overall, 781 people from the original sample were available for follow up, of whom 690 agreed to be reinterviewed (a reinterview rate of 88%). The second follow up commenced in May 1993, with the bulk (97%) of interviews being completed by September 1993 (a small number of interviews were conducted outside the intended May–September period owing to difficulties in tracing and contacting those who had moved into residential or sheltered accommodation). Again, all surviving respondents were invited to participate (540 people overall), and 410 were successfully reinterviewed (a reinterview rate of 72%). Although technically eligible, none of those who refused an interview in earlier waves agreed to participate in later waves. All interviews were conducted by trained interviewers.

Interview questionnaire

The interview questionnaire included sections covering health, lifestyle and demographic characteristics. Psychological well-being was assessed using the Symptoms of Anxiety and Depression (SAD)[13] scale and a 13-item version of the Life Satisfaction Index (LSI).[14] While the SAD anxiety and depression subscales yielded dichotomous classifications of case/non-case, the LSI provided a scale score (range 0–26) indicating higher or lower levels of morale. Physical health was assessed using a 13-item additive scale (range 0–13) covering the presence or absence of heart, stomach, eyesight or foot problems; giddiness, headaches, urinary incontinence, arthritis and falls; long-term disabilities and drug (excluding hypnotics) and walking aid use; and contact with (primary and secondary care) medical services.[15] Levels of customary physical activity were assessed using a detailed inventory of indoor, outdoor, social and practical activities. Factor analysis of these inventories identified three principal components accounting for over 50% of the sample variance. For at-risk individuals in the present analyses, general activity is expressed as the factor score derived from the first of these principal components (accounting for up to 38% of variance in the original analyses).[16] Quality of sleep was assessed using the item 'do you ever have problems sleeping?', with five response categories (never, seldom, sometimes, often, all the time). If appropriate, respondents were then asked whether they had experienced this problem in the preceding week. In the present analyses, insomnia was considered to be present if respondents reported a sleep problem 'often' or 'all the time', and if

that problem had been experienced in the previous week.

Assessment of risk factors

To avoid problems associated with selective attrition over the full 8 years of the study, risk factors were assessed only for the first 4-year period. The odds of becoming an incident case at the first follow-up survey in 1989 were calculated in relation to assessments made in 1985. In order to maximize use of the available data and control for age and sex, odds ratios were computed using logistic regression, rather than case–control matching procedures. A total of eight factors were analysed: morale (increased risk per unit change in score); bereavement since 1985 (yes/no); anxiety (above/below threshold score of 3 on the SAD anxiety subscale); depression (above or below criterion level on the total SAD scale); living alone (yes/no); body weight (above and below the recommended body weight for stature); overall physical activity level (high, intermediate or low activity according to factor score tertile ranges); and physical health status (above/below the median health scale score and increased risk per unit change in health scale score). Age and sex were also included in the regression model. All data were analysed using SPSS for Windows version 6.0.[17]

Results

From the baseline (1985) survey, 802 (78.8%) individuals did not meet the present criteria for insomnia and were therefore judged to be at risk. Within this group, 84 new cases were identified at the first follow up in 1989, giving an overall (weighted) incidence rate per person–year at risk of 3.1% (95% CI = 2.7–3.5). From logistic regression analyses controlling for age and sex, three factors assessed in 1985 were significantly and independently related to incident insomnia identified in 1989: a SAD score consistent with depression (OR = 4.41; 95% CI = 3.32–3.43); health scale scores indicating poorer health (OR = 1.19 per unit change in score, 95% CI = 1.06–1.31; and OR 4.3, 95% CI = 2.90–5.80 for low scores); and lower levels of physical activity (ORs 1.91 and 2.14; 95% CI = 1.91–3.62 and 2.14–3.64 for intermediate and low levels respectively; Table 1).

To examine outcomes associated with psychiatric and somatic risks, each of the 84 incident cases was placed in one of four categories on the basis of 1985 ratings: (1) insomnia preceded by low physical health status; (2) insomnia preceded by a SAD score indicating depressed mood; (3) insomnia preceded by both low physical health status and depressed mood; and (4) insomnia

Table 1. Logistic regression estimation of risks for insomnia.

Factor	Odds ratio	95% Confidence interval	P value
Age	0.99	0.94–1.06	0.98
Female gender	1.18	0.59–1.85	0.63
Morale (per unit change)	0.98	0.92–1.05	0.59
Bereavement	0.44	0.03–1.07	0.07
Anxiety (higher)	1.01	0.13–1.91	0.99
Depression	4.41	3.32–5.43	0.01
Living alone	0.51	0.09–1.14	0.11
Body weight (high)	0.84	0.19–1.47	0.79
Physical activity			
Intermediate	2.89	1.91–3.62	0.02
Low	2.94	2.14–3.64	0.01
Physical health scale			
(Per unit change)	1.19	1.06_1.31	0.02
(Lower scale scores)	4.3	2.90–5.80	0.01

Table 2. Four-year outcomes (1989–93) among 84 incident cases of insomnia classified according to earlier reported psychiatric or somatic risk factors.

Risk factors in 1985	Cases identified in 1989	Outcomes in 1993 [n (%)*]		
		Insomnia	no Insomnia	Died
Low physical health	43	6 (14.0)	12 (22.9)	22 (51.2)
Depressed mood	3	1 (33.3)	1 (33.3)	1 (33.3)
Low physical health and depressed mood	14	1 (7.1)	6 (42.9)	5 (35.7)
Neither low physical health nor depressed mood	24	2 (8.3)	18 (75.0)	4 (16.7)

*Where outcome numbers are lower than case numbers, this is due to non-response.

not preceded by low physical health status or depressed mood. The number of cases in, and 4-year outcomes associated with these categories is shown in Table 2. While cell sizes did not permit overall contingency analyses, it is clear that most incident cases were associated with poor physical health scores 4 years earlier, while the best outcomes occurred among those cases whose insomnia had not been preceded by poor physical health or depression.

Discussion

Detailed criteria for the classification of sleep disorders have recently been proposed in both ICD-10[18] and DSM-IV,[19] with each system diagnosing insomnia only if the sleep disturbance is severe, persistent and current. A similarly conservative emphasis was adopted for the present analyses. Given the representativeness of the survey sample, the high response rates obtained at each survey wave and the operational criteria used, we feel that the present study provides valid and generalizable estimates of insomnia risk among elderly general practice patients. It should be emphasized, however, that on both logical and empirical grounds elderly patients reporting disturbed sleep fall into two distinct epidemiological categories; those who acquire their sleep problems in later life, and those long-term poor sleepers who have aged with their insomnia.[20] The present analyses have focused on, and should be considered in relation to the first of these groups.

Overall, the results both confirm and quantify the risks associated with mental and physical health factors, with both low SAD scores and lower health scale scores significantly increasing the odds of insomnia onset within a 4-year period. More importantly, however, although depressed mood clearly emerges as a major risk for insomnia, it was linked in the present analyses only with a minority of cases. The risk factor shared by the greater proportion of incident cases was poor physical health, suggesting that many late-life onset insomnias originate in somatic rather than psychiatric ill-health. Clinically, however, it may be that such distinctions are unclear when the complaint of insomnia actually presents. A detailed cross-sectional study of 1617 elderly men and women in southern California, for example, found that, after controlling for current medication use, depressive symptoms were strongly related to emphysema, arthritis, diverticulitis, constipation and stroke in both men and women.[21]

The present results also emphasize the role of non-health-related factors in the origins of sleep disturbance. Levels of physical

activity within this random sample were generally low,[22] such that the 'intermediate' and 'low' activity scores associated with increased risk can reasonably be interpreted as indicating low and very low levels of day-to-day activity. Since this risk was independent of mental and physical health, the proposition that activity itself promotes, and is protective of, good sleep in later life receives some support from these findings. The clinical relevance of discriminating between the various risk factors for, and causes of insomnia is also clearly emphasized in Table 2. In the absence of health-related risk factors (depressed mood or low health scores), incident cases of insomnia show a high level of improvement between 1989 and 1993, with the majority (75%) reporting no insomnia at the 1993 follow up. On the other hand, those cases of insomnia for whom somatic and psychiatric risk factors were present, show both higher levels of mortality and higher levels of chronicity.

In all longitudinal studies, inter-wave periods reflect a compromise between practical and methodological considerations. Although considered optimal for the present study, the relatively long inter-wave period of 4 years may have introduced two important sources of bias into the analyses reported here, resulting in an underestimate of true incidence. First, it is possible that incident cases may have occurred and remitted within the inter-wave period, and second, it is possible that cases may have occurred and died within the interwave period. The impact of this underestimate on the identification and estimated magnitude of various risk factors is difficult to gauge. Nevertheless, given the agreement between the findings reported here and earlier studies of somatic[3,8] and psychiatric[9,10] associations with insomnia, it is unlikely that the possible under-representation of cases introduced serious bias.

In conclusion then, the present analyses show that psychiatric, somatic and lifestyle factors significantly and independently increase the risk of insomnia in older general practice patients. Furthermore, with these factors controlled, age and gender, perhaps the most frequently reported correlates of insomnia,[1] are not associated with increased risk. It is particularly relevant to note that all three risk factors identified in the present analyses could be assessed and quantified within the framework of the annual health check offered to patients aged 75 years and over.

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