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## Prevalence of causes of insomnia in primary care:

a cross-sectional study

### Abstract

#### Background

As a result of a research interest in primary insomnia, the prevalence of other causes of insomnia in primary care must be ascertained. No source was found in the literature. It is also essential to know the epidemiology of the common causes of a condition to make an accurate diagnosis in primary care.

#### Aim

To determine the prevalence of causes of insomnia in primary care, as part of a method of identifying patients with primary insomnia.

#### Design and setting

Cross-sectional study in three general practices in Auckland, New Zealand.

#### Method

Consecutive patients from the waiting room were asked to complete a nine-page questionnaire on possible causes of insomnia.

#### Results

In total, 1517 patients were approached and 955 completed the nine-page questionnaire (63%). Of the 41% (388) who reported difficulty with sleeping, primary insomnia occurred in 12% (45) of the population [95% confidence interval = 9% to 15%]; 50% (195) had depression, 48% (185) had anxiety and 43% (165) had general (physical) health problems. Obstructive sleep apnoea occurred in 9% (34) and delayed sleep phase disorder in 2% (7). Only primary insomnia and delayed sleep phase disorder are mutually exclusive; the others can co-exist.

#### Conclusion

This is the first description of the prevalence of causes of insomnia in primary care. It is hoped that the focus on primary insomnia will result in more behavioural treatments and lower the use of hypnotics in primary care; it should also assist in the appropriate detection and treatment of other causes of insomnia in primary care.

#### Keywords

prevalence; primary health care; sleep initiation and maintenance disorders.

### INTRODUCTION

Insomnia affects approximately 20–30% of the population<sup>1,2</sup> and between 10% and 50% of patients attending primary care.<sup>3,4</sup> The different prevalences depend on the definition of insomnia. In Simon and VonKorff's study,<sup>4</sup> 10% of consecutive patients in primary care had a definition of major current insomnia (taking at least 2 hours to fall asleep nearly every night).<sup>4</sup> Such an 'extreme' definition probably explains the relatively low prevalence rate compared with other studies.

Although insomnia has been measured in primary care, there has been no attempt to categorise the specific causes of it. For daily general practice, it is essential that the prevalence of potential causes of insomnia is known so that conditions can be considered and eliminated as part of the diagnostic process. This is important as treatments for different causes vary; for example, the treatment for obstructive sleep apnoea is quite different from that for depression.

This research interest has been focused around the diagnosis and treatment of primary insomnia, which the authors suspected was common in primary care; as such, a case-finding tool for those patients with primary insomnia was developed. This led to the creation of a two-page questionnaire — the Auckland Sleep Questionnaire Case-Finding tool (ASQCF)

reported elsewhere (which contains 1–2 questions about 11 conditions).<sup>3</sup> To achieve this it is necessary to rule out the other common causes of insomnia in primary care as primary insomnia is defined as a person with a significant sleep problem (occurring at least 3 nights per week) lasting longer than 1 month, who has no other contributing health conditions or sleep disorder diagnoses.<sup>5</sup> To assist with this, the Auckland Sleep Questionnaire Version 1 (ASQV1, available from the authors on request) was developed as a seven-page, gold-standard tool for specific diagnoses; this has been validated against an assessment by a sleep specialist (it contains gold standard questions for each of the 11 conditions).<sup>5</sup> The only other research tool that gives a range of diagnoses (other than when conducted by a clinician) is the Sleep-Eval computer-assisted interview for community epidemiological studies,<sup>6</sup> but the authors were unable to access this resource. The Sleep-Eval publication guided the authors to a choice of common conditions. One other questionnaire, the Global Sleep Assessment Questionnaire (GSAQ),<sup>7</sup> has been developed for primary care; however, it was felt that this missed some important causes of insomnia in primary care, such as drug and alcohol abuse and delayed sleep phase disorder. As the authors are not aware of any report in the literature on the common causes of

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### How this fits in

This is the first study to report the prevalence of the common causes of insomnia in primary care. This is important as conditions such as primary insomnia require that other causes be eliminated in order to be treated effectively. It is essential to know the epidemiology of a condition so that an accurate diagnosis can be made.

sleep disorders in primary care, the aim of this study was to describe the prevalence of sleep disorders in this setting.

### METHOD

The study was conducted in three primary care clinics that were chosen for convenience; each had spare rooms in which the study could be conducted. Two of the clinics were suburban and in middle-to-lower socioeconomic areas; the other was

an inner-city clinic that catered for business people. Patients were eligible if they:

- were aged  $\geq 16$  years;
- could read English;
- did not have dementia;
- were not intoxicated; and
- were able to understand the consent form.

Consecutive patients were approached in the waiting room by a research assistant and offered an information sheet and consent form. The questionnaire was long, and no attempt was made to assess participants' quality of life, in part due to the burden of completion.

### Questionnaire development

The choice of questions was based on some of the community work of Ohayon and Smirne<sup>8</sup> and through discussion among the clinicians involved in the study. Two of the authors run sleep clinics, one as a specialist and one in primary care. Matching what was seen in clinical practice and what was found by Ohayon and Smirne enabled the authors to come up with a list of conditions together with Sleep-Eval.

A screening questionnaire for sleep disorders was included in the study; this was administered immediately prior to ASQV1. The research assistants were instructed not to look at either of the questionnaires and not to direct patients in how they should answer any of the items in them. The cut-off points and the diagnostic categories for the various sleep disorders are reported in Table 1.

The diagnostic criteria used were derived from either standard primary care inventories — namely GAD-7 (for anxiety),<sup>9</sup> PHQ-9 (for depression),<sup>10</sup> CAGE<sup>11</sup> (for alcohol) or the International Classification Sleep Disorders (ICSD)<sup>12</sup> criteria converted into a questionnaire format. The most difficult item to convert was that of delayed sleep phase disorder, which is very non-specific in the ICSD manual. A similar logic to that of Ohayon's study was used;<sup>6</sup> this started with those who reported a sleep problem then removed those with identifiable causes of insomnia, leaving those with no other causes as the group with primary insomnia or delayed sleep phase disorder.<sup>6</sup> A further analysis of the data then separated those two conditions. The only conditions which are mutually exclusive by definition are primary insomnia and delayed sleep phase disorder.

**Table 1. Criteria used to define sleep and other disorders**

| Condition                         | Auckland Sleep Questionnaire criteria   |
|-----------------------------------|---|
| Reported sleep problem            | Do you have problems getting to sleep, staying asleep, or waking early such that it affects your work function the next day? This includes feeling excessively sleepy the next day for a duration of at least 1 month   |
| Depression                        | PHQ-9 score $\geq 10$   |
| Anxiety                           | GAD-7 score $\geq 8$  |
| Obstructive sleep apnoea          | Having $\geq 4$ of: (i) excessive daytime sleepiness; (ii) pauses in between breaths during sleep; (iii) morning headache; (iv) dry mouth; (v) loud snoring<br>(i) and (ii) must be present.  |
| Delayed sleep phase disorder      | All of the following: <ul style="list-style-type: none"><li>• Considers self to be an evening person</li><li>• Choosing to go to bed late and choosing to wake up late and has no other specific cause for insomnia</li><li>• Mood disorder</li><li>• Substance problem</li><li>• Breathing disorder or other sleeping disorder</li><li>• Going to bed after midnight</li></ul> |
| Sleep walking                     | <ul style="list-style-type: none"><li>• Reported sleep walking, started before teenagehood</li><li>• Difficulty arousing during episode, no subjective awareness</li><li>• Occurring <math>\geq 3</math> times per week, causing disturbance to bed partner, no subjective awareness</li></ul>  |
| Bruxism                           | <ul style="list-style-type: none"><li>• Reported teeth grinding and one of: abnormal wear of teeth; sounds associated with grinding; or jaw muscle discomfort, occurring <math>\geq 3</math> times per week</li></ul>   |
| Restless legs                     | <ul style="list-style-type: none"><li>• Unpleasant sensations (aches, pains, or creeping) in legs affecting sleep but relieved by movement or rubbing, occurring <math>\geq 3</math> times per week</li></ul>   |
| General (physical) health problem | Significant health problems affecting ability to sleep well, occurring $\geq 3$ times per week  |
| Alcohol problem                   | CAGE score $\geq 3$   |
| Other substance problem           | Reported drugs affecting sleep or quality of sleep  |
| Primary insomnia                  | Reports a sleep problem but has no other diagnosable disorder listed in this table  |

CAGE = alcohol questionnaire.<sup>11</sup> GAD-7 = seven-item Generalised Anxiety Disorder Questionnaire.<sup>9</sup> PHQ-9 = nine-item Patient Health Questionnaire.<sup>10</sup>

**Table 2. Demographics and characteristics of study population**

| Characteristic   | n (%)    |
|--|----------|
| Age, years, n = 955  |          |
| 16–35  | 437 (46) |
| 36–55  | 324 (34) |
| 55–75  | 144 (15) |
| ≥76  | 39 (4)   |
| Missing  | 11 (1)   |
| Sex, n = 955   |          |
| Male   | 382 (40) |
| Female   | 573 (60) |
| Ethnicity, n = 955   |          |
| European   | 605 (63) |
| Maori  | 45 (5)   |
| Pacific  | 39 (4)   |
| Chinese  | 39 (4)   |
| Indian   | 18 (2)   |
| Multiple   | 41 (4)   |
| Other  | 133 (14) |
| Missing  | 35 (4)   |
| Proportion of patients on screening test reporting sleep problem, n = 955                | 388 (41) |
| Proportion of patients reporting taking some medication to assist with sleeping, n = 388 | 72 (19)  |

The criteria for the ASQV1, including the threshold scores relating to depression, anxiety and alcohol use that were used, are detailed in Table 1. The study was conducted between December 2007 and March 2009.

## RESULTS

In the waiting rooms of the three family practices a total of 1517 patients were approached by the research assistant and invited to participate in the study. Of these, 1077 (71%) consented; 122 did not complete the ASQV1 leaving 955 for analysis and giving a response rate of 63%. Forty-one percent (388/955) (95% confidence interval [CI] = 38 to 44) reported having a sleep problem. The demographics and characteristics of the study population are shown in Table 2.

The prevalence of specific conditions is shown in Table 3 and are further examined in Table 4 by age and sex.

There are a number of conditions where the highest prevalence is in the younger age group decreasing with age. These include depression, anxiety, alcohol, substance problems, delayed sleep phase disorders, and primary insomnia. This was not the case for the more physical causes of insomnia such as general (physical) health problems or obstructive sleep apnoea.

## DISCUSSION

### Summary

These results show that mental health problems (such as depression and anxiety) and physical health issues (such as pain, breathing difficulties) are the major causes of sleep problems in primary care. The results shown are not mutually exclusive and many conditions co-exist. Delayed sleep phase disorder had a prevalence of 2%. This can be thought of a teenage pattern of sleep where the individual goes to bed after

midnight and then sleeps in during the day. This becomes an issue when the person needs to be at work relatively early in the morning, for example 7 am. These individuals are fine during weekends and vacations when they can choose their hours of sleep. The treatment for this condition is melatonin at night and bright light boxes or sunlight in the morning.<sup>13</sup> Obstructive sleep apnoea was no surprise and the prevalence would depend on population age and the prevalence of obesity. The definitive diagnosis is made by observing and making measurements of patients' breathing and oxygen saturations in an overnight sleep study. This is not immediately available to GPs. Formal measure of quality of life was not included in the study as the questionnaire was long enough and 122 participants did not complete the ASQV1 in its present form. There is a possibility that a small but important cause of insomnia in primary care may have been missed. If this is the case such knowledge will emerge with use of the ASQV1.

### Strengths and limitations

A strength of this study is that it is the first to attempt to describe the prevalence of specific conditions that cause insomnia in a primary care population. It was conducted on consecutive primary care patients in primary care settings. Most of the diagnostic categories were taken from known diagnostic inventories, while the more specific sleep disorders were taken from the ICSD. The questionnaire was validated in a small sample against a blinded history from a sleep specialist.<sup>5</sup>

The response rate of 63% is reasonable given that the questionnaire was lengthy (seven pages) and came after a two-page screening questionnaire; indeed, the length of the questionnaire may have discouraged some patients from completing it.

These findings may overestimate the proportion of those with insomnia as these individuals may have been more highly motivated to complete the questionnaire; however, this may have had no impact on the relative proportions of the individual conditions. The restless legs results are almost certainly an over-estimate as this condition is not seen very commonly in sleep clinics. A question on severity was not included with this question and many patients reported leg movements which were suspected to be occasional nocturnal leg twitching rather than a true restless legs syndrome or periodic limb movement disorder. This has been changed in the subsequent version of the questionnaire

**Table 3. Specific causes of insomnia as a proportion of those with a sleep problem, n = 388**

| Condition                                 | Proportion of those with specific condition compared with those with a reported sleep problem, n (%) |          |
|---|--|----------|
|   | n (%)  | 95% CI   |
| Depression                                | 195 (50)   | 45 to 55 |
| Anxiety                                   | 185 (48)   | 43 to 53 |
| Obstructive sleep apnoea                  | 34 (9)   | 6 to 12  |
| Delayed sleep phase disorder <sup>a</sup> | 7 (2)  | 1 to 4   |
| Sleep walking                             | 5 (1)  | 0 to 3   |
| Bruxism                                   | 11 (3)   | 2 to 5   |
| Restless legs                             | 86 (22)  | 18 to 27 |
| General health problem                    | 165 (43)   | 38 to 47 |
| Alcohol problem                           | 31 (8)   | 6 to 11  |
| Other substance problem                   | 17 (4)   | 2 to 7   |
| Primary insomnia <sup>a</sup>             | 45 (12)  | 9 to 15  |

<sup>a</sup>Primary insomnia and delayed sleep phase disorder are mutually exclusive. All other conditions are not.

**Table 4. Specific causes of insomnia as a proportion of those with a sleep problem**

| Condition                                    | Female, n (%) | Male, n (%) | Age, years, n (%)     |         |         |       |
|--|---------------|-------------|-----------------------|---------|---------|-------|
|  |               |             | 16-35                 | 36-55   | 56-75   | ≥76   |
| Depression, n = 195                          | 131 (67)      | 64 (33)     | 104 (53) <sup>a</sup> | 66 (34) | 21 (11) | 3 (2) |
| Anxiety, n = 185                             | 129 (70)      | 56 (30)     | 104 (57) <sup>a</sup> | 64 (35) | 15 (8)  | 1 (1) |
| Obstructive sleep apnoea, n = 34             | 19 (56)       | 15 (44)     | 9 (26)                | 20 (59) | 5 (15)  | -     |
| Delayed sleep phase disorder, n = 7          | 4 (57)        | 3 (43)      | 6 (86)                | 1 (14)  | -       | -     |
| Sleep walk, n = 5                            | 4 (80)        | 1 (20)      | 5 (100)               | -       | -       | -     |
| Bruxism, n = 11                              | 9 (82)        | 2 (18)      | 8 (73)                | 2 (18)  | 1 (9)   | -     |
| Restless legs, n = 86                        | 56 (65)       | 30 (35)     | 36 (42)               | 36 (42) | 13 (15) | 1 (1) |
| General health problem, n = 165 <sup>a</sup> | 106 (64)      | 59 (36)     | 55 (33)               | 70 (43) | 34 (21) | 5 (3) |
| Alcohol problem, n = 31                      | 12 (39)       | 19 (61)     | 19 (61)               | 12 (39) | -       | -     |
| Other substance problem, n = 17              | 10 (59)       | 7 (41)      | 16 (94)               | 1 (6)   | -       | -     |
| Primary insomnia, n = 45 <sup>a</sup>        | 28 (62)       | 17 (38)     | 25 (57)               | 17 (39) | -       | 2 (4) |

<sup>a</sup>Missing data — there was no age recorded for one patient hence denominators are n-1.

and also a specific question on frequency. Twelve patients (3%) reported only restless legs as their sleep complaint and if any/all of those were not true restless legs they could be primary insomnia.

#### Comparison with existing literature

As this is the first study of its kind in primary care there is no other basis for comparison. One study by Ohayon is the closest to the current study but, as it is community based, the prevalences of conditions are likely to be different from a primary care setting.<sup>8</sup> Ohayon found that mental disorders were contributors to insomnia making up about 10% of the sleep disordered population in Italy.<sup>8</sup> The general (physical) health issues were much lower at 0.5%, which differs majorly from primary care, as would be expected.<sup>6</sup> A later study conducted by Ohayon and Smirne<sup>8</sup> found that primary insomnia was about one-third of those with problems and again this may reflect the community nature of the study.<sup>8</sup> Circadian rhythm disorders (which include delayed sleep phase) were about 8% of the disorders.<sup>8</sup> The results from the Ohayon studies were reported differently in each of the papers and are difficult to reconcile.<sup>2,6,8</sup> The peak of anxiety, depression, alcohol, and substance disorders in young adults is also consistent with national data.<sup>14</sup> The fact that primary insomnia decreases with age is noted. The psychological causes of insomnia also decrease with age while the

more physical ones, obstructive sleep apnoea and physical health, do not.

#### Implications for practice

It would be helpful to repeat this study in another setting, using the same tool; this may or may not find similar results to the current study. Differences based on relevant variables such as age and obesity would be expected. Many of the conditions listed in Table 3 will come as no surprise to primary care clinicians, however, it was felt that conditions such as delayed sleep phase disorder, primary insomnia, and the restless legs are not ones that are commonly considered in primary care. Alcohol and substance problems were higher than expected and these issues may require consideration by primary care clinicians.

The authors' interest was primary insomnia and, given that 12% of those who have insomnia have primary insomnia, it is a significant issue. Behavioural techniques, including restriction of time in bed,<sup>15</sup> are an effective way of treating this condition. Considering primary insomnia as a diagnostic category may increase treatment options and decrease the use of hypnotics. These findings are essential as, without a knowledge of the common epidemiology of the causes of the symptom, it is not possible to accurately make a diagnosis. It is important to note that for insomnia the majority of patients can be diagnosed by history alone.

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#### Ethics committee

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#### Provenance

Freely submitted; externally peer reviewed.

#### Competing interests

The authors have declared no competing interests.

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