Original Article

Cross-cultural and comparative epidemiology of insomnia: the Diagnostic and Statistical Manual (DSM), International Classification of Diseases (ICD) and International Classification of Sleep Disorders (ICSD)

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ABSTRACT

Objective: To compare the prevalence of insomnia according to symptoms, quantitative criteria, and Diagnostic and Statistical Manual of Mental Disorders, 4th and 5th Edition (DSM-IV and DSM-5), International Classification of Diseases, 10th Revision (ICD-10), and International Classification of Sleep Disorders, 2nd Edition (ICSD-2), and to compare the prevalence of insomnia disorder between Hong Kong and the United States by adopting a similar methodology used by the America Insomnia Survey (AIS).
Methods: Population-based epidemiological survey respondents ($n = 2011$) completed the Brief Insomnia Questionnaire (BIQ), a validated scale generating DSM-IV, DSM-5, ICD-10, and ICSD-2 insomnia disorder.
Results: The weighted prevalence of difficulty falling asleep, difficulty staying asleep, waking up too early, and non-restorative sleep that occurred ≥3 days per week was 14.0%, 28.3%, 32.1%, and 39.9%, respectively. When quantitative criteria were included, the prevalence dropped the most from 39.9% to 8.4% for non-restorative sleep, and the least from 14.0% to 12.9% for difficulty falling asleep. The weighted prevalence of DSM-IV, ICD-10, ICSD-2, and any of the three insomnia disorders was 22.1%, 4.7%, 15.1%, and 22.1%, respectively; for DSM-5 insomnia disorder, it was 10.8%.
Conclusion: Compared with 22.1%, 3.9%, and 14.7% for DSM-IV, ICD-10, and ICSD-2 in the AIS, cross-cultural difference in the prevalence of insomnia disorder is less than what is expected. The prevalence is reduced by half from DSM-IV to DSM-5. ICD-10 insomnia disorder has the lowest prevalence, perhaps because excessive concern and preoccupation, one of its diagnostic criteria, is not always present in people with insomnia.

1. Introduction

Insomnia is a distressing and disabling condition that affects a significant proportion of the general population. One of the problems in interpreting the large body of epidemiological data is the different sets of questions and criteria used to assess and define insomnia, resulting in a wide range of prevalence rates. In a review of more than 50 epidemiological studies [1], the prevalence of insomnia symptoms in the general population was estimated at 10–48%; the prevalence of insomnia symptoms that often or always occur at least three nights per week was 16–21%; the prevalence of symptoms with dissatisfaction in sleep quantity or quality was 9–15%; the prevalence of symptoms with daytime consequences was 8–18%; and the prevalence of Diagnostic and Statistical Manual, 4th Edition (DSM-IV) [2] insomnia disorder was 4–6%.

The use of standardized criteria results in greater accuracy in the estimate of prevalence rates; however, no single set of criteria has been accepted by researchers around the world. The DSM-IV-TR [3], International Classification of Diseases, 10th Edition (ICD-10) [4], and research diagnostic criteria/International Classification of Sleep Disorders, 2nd Edition (RDC/ICSD-2) [5,6] are commonly used diagnostic systems. All three systems have difficulties initiating or maintaining sleep in addition to daytime distress or impairment, but they differ in other symptoms that are required for diagnosis. Non-restorative sleep is one of the insomnia symptoms in DSM-IV-TR and RDC/ICSD-2; for ICD-10, poor-quality sleep is included. RDC/ICSD-2 stipulates that sleep problems occur despite adequate

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opportunity and circumstances for sleep, whereas for ICD-10, pre-occupation with sleeplessness and excessive concern over consequences is one of the diagnostic criteria. Another issue is that recent studies have suggested that sleep dissatisfaction may be an important indicator of sleep pathology [7]. In the newly published DSM-5 [8], dissatisfaction with sleep quantity and quality, a subjective complaint, has been included as a necessary condition for insomnia diagnosis; in addition, the frequency of sleep problems for at least three nights per week and for a duration of at least three months are required.

In Hong Kong, the prevalence of insomnia in the general population was estimated at 11.9% [9], based on the presence of difficulty initiating sleep, difficulty maintaining sleep, or early-morning awakening that occurred at least three nights per week in the past month. Using similar frequency criteria, another study found a prevalence rate of 4% in children in the past 12 months [10]. In mainland China, Xiang et al. found that the prevalence of any symptom of insomnia that occurred nearly every night for at least two weeks in the past year was 9.2% [11]. In a Taiwan study, the prevalence of any insomnia symptoms that occur either usually or at all the time during the past month was 25.5% [12]. Another study showed that the prevalence of any insomnia symptoms that occurred almost every night for more than two weeks was 4.0% in Japan, 9.9% in South Korea, and 10.3% in Taiwan [13]. Although the studies have provided valuable data, owing to the differences in methodology and definition, the actual prevalence of insomnia in Asian countries is still unclear; hence, cross-cultural and cross-country comparisons are not possible.

Recently, a standardized questionnaire, the Brief Insomnia Questionnaire (BIQ), was developed for use in the America Insomnia Survey (AIS). Validated against clinical diagnoses by experts, the BIQ was able to estimate the prevalence of insomnia according to the DSM-IV-TR, ICD-10, and RDC/ICSD-2 criteria [14]. With two additional questions, the prevalence of DSM-5 insomnia disorder could be obtained with sufficient accuracy [15]. A wide range of the prevalence of insomnia was derived based on different diagnostic systems. DSM-IV-TR insomnia disorder in the US general population was estimated at 22.1% according to the AIS; for RDC/ICSD-2, it was 14.7%; for ICD-10, it was 3.9%; and based on any of the systems, it was 23.6% [16]. Data derived from the Great British Sleep Survey suggested that 45.7% of the general population was having DSM-5 insomnia disorder [17] which was unexpectedly high compared with previous studies; as the questionnaire that was used had not been validated against clinical diagnosis, the accuracy of the estimate is uncertain. With a similar methodological limitation, the Nord-Trøndelag Health Study estimated that the prevalence of DSM-5 insomnia disorder was 7.1% in Norway [18]. In view of the changes from DSM-IV-TR to DSM-5, comparative data on the prevalence of insomnia disorder are needed. We used a validated Chinese version of the BIQ to examine the prevalence of insomnia symptoms and disorders in the general population of Hong Kong. The findings would have significant implication in cross-cultural and comparative epidemiology of insomnia.

2. Methods

2.1. Sample

The study population consisted of Hong Kong residents who were ≥18 years of age and able to communicate in Cantonese or Mandarin Chinese language. The randomization and telephone interview, conducted by the Public Opinion Programme, University of Hong Kong, have been presented in our previous study [15]. The randomization process included randomization of telephone numbers and selection of respondents in households according to the next-birthday rule. As of September 2012, the fixed telephone line density in Hong Kong was 102 lines per 100 households, which was among the highest in the world [19]. We selected telephone numbers randomly from a computerized residential telephone directory, and then generated additional numbers using the "+/– 1 and 2 method" to capture some unlisted numbers. Verbal consent was obtained from all the participants and all the procedures used in this study were reviewed and approved by the local institutional review board. A total of 25,554 telephone numbers were called from 24 July 2012 to 6 December 2012. After exclusion of the invalid numbers ($n = 9886$), no-response numbers, busy lines, or numbers with answering device despite a minimum of five recalls ($n = 5286$), fax numbers ($n = 1187$), nonresidential numbers ($n = 2110$), numbers with calls blocked or other technological difficulties ($n = 194$), numbers which hung up before or after introduction ($n = 3144$), non-Chinese residential numbers ($n = 561$), and numbers with no eligible respondents ($n = 59$), a total of 3127 telephone calls comprised the eligible sample. From this targeted sample, we successfully interviewed 2011 respondents, but there were 1019 refusals at household or respondent levels and 97 partial responses. The overall response rate was 64.3%.

2.2. Measures

The translation of the BIQ into Chinese was conducted according to the World Health Organization guidelines [20], with steps including forward translation, expert review, back-translation, expert review, pretesting and final version. The criterion validity and test–retest reliability of the Hong Kong version of the BIQ are satisfactory [15]. The study's senior authors (KC and WY) conducted clinical reappraisal interviews using a standardized semi-structured questionnaire, developed specifically for BIQ validation [14], blind to the subjects' BIQ results. The areas under the receiver operating characteristics curve for the DSM-IV-TR, DSM-5, ICD-10, and RDC/ICSD-2 insomnia disorder ranged from 0.76 to 0.86, indicating a high individual-level concordance between the BIQ and clinical-interview diagnoses. Short-term test–retest reliability over a period of 2–14 days was moderate for most of the BIQ items. Prevalence estimates based on the BIQ classification were not significantly different from the estimates based on clinical interviews for the DSM-5, RDC/ICSD-2, and any of the DSM-IV-TR, ICD-10, and RDC/ICSD-2 insomnia disorder. With modification of the scoring algorithm for DSM-IV-TR and ICD-10, the accuracy of the BIQ estimates was improved, with no significant difference between prevalence estimates based on the BIQ classification and clinical interviews [21].

2.3. Procedure

A fully structured, lay-administered telephone interview was conducted. The first section included an introduction and verbal consent, followed by the BIQ, and then sociodemographics, including age, gender, occupation, and level of education. In most cases, the telephone interview was completed within 15 min.

2.4. Data analysis

All statistical analyses were done using SPSS 20.0. Basic descriptive statistics were used to describe sample characteristics and compare with the 2011 population census. All prevalence estimates and 95% confidence interval (CI) were calculated by weighing the cases according to the population distribution of sex and age.

3. Results

The study sample had a slightly higher mean age and higher proportion of females, married people, retirees, homemakers, and people with no income, compared with the census population (Table 1). Table 2 presents the prevalence of insomnia symptoms, quantitative