



The economic costs of insomnia comorbid with depression and anxiety disorders: an observational study at a sleep clinic in Mexico

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Abstract

Significant advances documenting the costs associated with insomnia have been achieved. However, those related to insomnia associated with mood disorders remain understudied, even though insomnia is more severe in the presence of comorbid conditions such as depression and anxiety. The aim of this study was to determine the direct and indirect costs of insomnia associated with depression and anxiety disorders (DAD) from the perspective of the patient in a private healthcare system. This was an observational study of chronic insomnia associated with DAD at a private Sleep Disorders Clinic in Mexico City between 2019 and 2020. Patients were followed for up to one year. Healthcare resource utilization data were collected through clinical records. Direct and indirect costs associated with insomnia treatment were estimated through micro-costing. The estimated economic burden was projected to 5 years adjusting for inflation and discounting future costs. A deterministic sensitivity analysis was performed. The median cost of the first year of insomnia treatment associated with DAD was US\$3537.57 per patient. The work productivity loss represented the highest economic burden (63.84%) followed by direct medical costs (28.32%), and the direct non-medical costs (7.85%). The estimated annual economic burden for patients treated in the private healthcare system in Mexico was US\$293 million. The costs of insomnia associated with DAD at a private clinic in México were found to be high. The burden of the costs faced by these patients is substantial relative to the median income of the population. The economic costs at an individual and societal levels are substantial.

Keywords Insomnia · Depression · Anxiety · Healthcare resource utilization · Costs

Introduction

Insomnia represents a worldwide public health concern, as it has significant consequences both on the individual's health and on society as a whole. The potential negative impact on the affected individual's physical and social performance includes low work productivity, decreased quality of life and potential cognitive impairment [1, 2]. Insomnia is the most prevalent sleep disorder in the general population. It has been estimated that 7.5%–15% of the general population suffer from chronic insomnia [3, 4]. The most common factors that have been associated with insomnia include age, gender, educational level, socioeconomic level, employment status, marital status, as well as having a psychiatric or somatic illness, or having suffered a stressful event [3]. Some studies have shown that between 40 and 75% of people with insomnia also suffer from concomitant mental disorders, mainly depression and anxiety [1, 5, 6]. Sleep disorders have

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been reported to be more severe in the presence of comorbid conditions such as mood disorders, namely depression and anxiety [6].

Despite the high prevalence of insomnia, it remains an underrecognized disorder worldwide [7]. In Mexico, there are few specialized sleep clinics in the public health sector. Most of the existing clinics are private or semi-private clinics (at times subsidized by a public institution) [8]. Insomnia continues to be diagnosed and managed to a great extent by general practitioners who may lack the proper training for the diagnosis and management of the condition [7]. Due to the lack of adequate access to a specialized facility, patients frequently experience a delay in accurate diagnoses and therapeutic intervention and may, thus, incur in higher healthcare costs [9, 10].

It has been estimated that the total cost of insomnia in Canada, including direct and indirect costs, is US\$815.61 per quarter or US\$3265.58 per patient per year [11]. In specific age groups in the United States of America (USA), younger adult patients (18 to 64 years old) eventually diagnosed with or treated for insomnia were found to incur an average of US\$4755 in medical expenditures, and subjects aged 65 years incurred an average of US\$5790 [12]. In another study also conducted in USA, the annual average direct cost associated to moderate/severe insomnia was estimated at US\$1254 per patient per year and the average annual indirect cost due to the loss of work productivity at US\$1554 [13].

While there has been progress in documenting healthcare resource utilization, associated costs and the economic burden of insomnia [14], specific economic information of insomnia comorbid with DAD remains scarce [15–17]. The economic burden of insomnia associated with the already recognized high prevalence of DAD [18] is expected to increase in the coming years as a result of changes in lifestyle [19], the increasing use of technology and electronic media (which contributes to sleep disruption) [20], and the increasing age of the population [21]. These realities are particularly significant in Mexico, as in many Latin American countries, where insomnia and mood disorders are manifested in an environment of limited financial resources and a growing need to prioritize resources. To understand the context, the Mexican health system consists of three main components operating in parallel: (1) employment-based social insurance schemes managed by centralized national institutions, (2) public assistance services for the uninsured supported by a financial protection scheme operated by both state and federal authorities and providers, and (3) a private sector composed of service providers and insurers. Public spending accounts for 58% of total financing, with private contributions being mostly comprised of out-of-pocket spending. In 2017, Mexico's Gross Domestic Product (GDP) amounted to approximately US\$18,149 per capita compared

with an average of US\$15,777 in Latin America and the Caribbean, and US\$43,351 in the Organisation for Economic Co-operation and Development (OECD). Mexico has the largest income inequality in the OECD, but similar in magnitude to Argentina, Ecuador and Peru, and an unemployment rate of 3.5%. In general, Mexico's multidimensional poverty rate remains high but stable (46.0% of the total population, US\$3.10 per day) [22].

Thus, the objective of this study was to determine the direct and indirect costs of insomnia associated with DAD from the perspective of the patient in a private healthcare system in the hope to facilitate a more rational allocation of resources.

Materials and methods

Study design and setting

This is an observational, prospective study carried out at the Sleep Disorders Clinic (SDC) located in the General Hospital of Mexico, in Mexico City. The clinic provides multidisciplinary assessment of sleep disorders to the general population and serves as an education and research site for the medical school.

Patients

The study sample included male and female patients, between 18 and 65 years old, clinically diagnosed with chronic insomnia associated with depression and/or anxiety, newly treated at the SDC between February 2019 and February 2020, and who agreed to participate in the study. The follow-up period was one year. Patients who did not answer the questionnaire, who dropped out of treatment or who had other psychiatric comorbidities such as a psychotic episode or schizophrenia were excluded. The protocol was approved by the Research and Ethics Committee of the Metropolitan Autonomous University. All patients provided written informed consent to participate. Figure 1 shows the flow chart for the selection of subjects included in the study. A total of 135 patients were screened for eligibility, six patients were ineligible and another 12 declined to participate or had a psychiatric comorbidity. A total of 117 patients with chronic insomnia associated with DAD were included in the analysis.

Insomnia and mood disorders were diagnosed using the International Classification of Diseases, 10th edition (ICD-10) codes G47.0 (insomnia); F32.0, F32.1, and F32.29 [Depressive Episode]; F33.0, F33.1, F33.3 and F33.4 [Recurrent Depressive Disorder]; F40.0 and F40.1 [Phobic Anxiety Disorders]; or F41.0, F41.1, and F41.2 [Other Anxiety Disorders]. The psychiatric medical team performed the

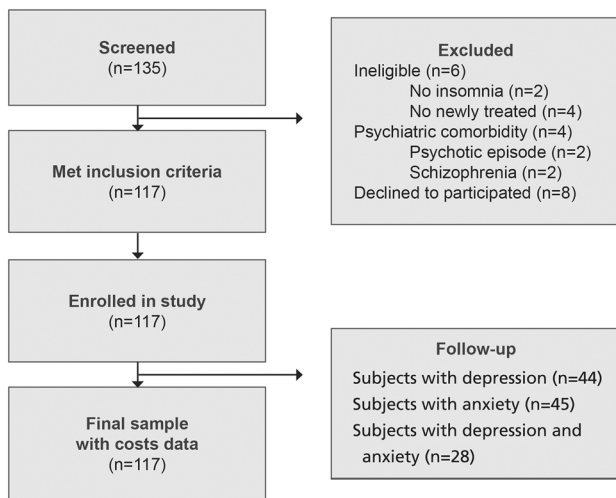


Fig. 1 Flow chart of subjects included in the study

clinical diagnosis, prescribed therapeutic intervention, and were responsible of the follow-up of the patients.

Costs

Direct and indirect costs related to insomnia associated with DAD were estimated from the patient's perspective. Direct medical costs included medical visits and medications. Direct non-medical costs included transportation, expenses related to the consumption of energy drinks, gym or aerobic classes prescribed in an effort to improve sleep, modifications prescribed to improve the bedroom environment, and purchasing accessories such as earplugs and sleep masks. Indirect costs were evaluated as work productivity loss in terms of absenteeism and presenteeism.

The healthcare resource utilization was collected from medical records, identifying the number of medical visits, the frequency and dose of medication prescribed for insomnia associated with DAD during the follow-up period. The unitary costs of these healthcare resources were obtained from the SDC public price list. Medication costs were estimated from the average price reported by the 3 most important private pharmacy franchises in Mexico City. Since the treatment regimen was different from patient to patient, the annual drug cost was calculated individually and subsequently annualized.

Direct and indirect non-medical costs related to insomnia were estimated using a standardized questionnaire, which contained 42 items related to sociodemographic data (sex, age, marital status, education level, place of residence and occupation), transportation, consumption of energy drinks or alcohol, recommended gym or aerobic classes enrollment to help improve sleep, home modifications, purchase of special accessories, working hours, and monthly salary income.

Work absenteeism and presenteeism were evaluated through the Spanish version of the World Health Organization Health and Performance Questionnaire (HPQ) [23].

The monetary value of direct and indirect costs was expressed in US dollars, adjusting to an average exchange rate corresponding to the year 2020 (US\$1 = MXN\$21.50) [24]. Direct medical costs were calculated by multiplying the average frequency of annual healthcare resource utilization \times unitary cost. Except for transportation costs, direct non-medical costs were calculated by multiplying the monthly average resource used \times the average monthly expenses reported by the patients in the applied questionnaire and were subsequently annualized.

The transportation cost was calculated in 3 ways. If the patient used public transportation (subway and/or bus), the cost was calculated multiplying the fare $\times 2$ to consider the round-trip, and subsequently was multiplied by the number of medical visits; if the patient was accompanied, then the cost was multiplied $\times 2$. If the patient used taxi or app-taxi, the cost was calculated by multiplying the average fare \times the number of medical visits $\times 2$ to consider a round-trip. If patient used her/his own car, the transportation cost was calculated by multiplying the gasoline volume consumed according to distance estimates \times the unitary price per liter of gasoline plus the tolls for using urban highways and parking fees, the total was multiplied $\times 2$ to consider a round-trip and finally was multiplied \times the number of medical visits. The national average price of gasoline per liter was obtained from the Energy Regulatory Commission for the year 2020 [25].

Indirect costs associated with work productivity loss due to absenteeism or presenteeism were calculated by multiplying the number of lost work hours \times the average wage per hour for both patient and companion and were subsequently annualized.

Statistical analysis

The descriptive analysis of the sample and costs of insomnia associated with DAD was done using frequency distribution for central tendency and dispersion. A deterministic sensitivity analysis of the variables subject to uncertainty was performed, based on a frequentist approach. The effect on the expected value was estimated using a variation interval of $\pm 25\%$ for costs and the dispersion limits reported in the source of information where prevalence data was obtained. A base case was established. On the other hand, the estimated economic burden was projected to 5 years, adjusting for inflation using the average monthly rate of 4.6% estimated from the Consumer Price Index records for the last 5 years (January 2016–December 2020) reported by the National Institute of Statistics and

Table 1 Sociodemographic characteristics

Variable	Total (117) n (%)
Women	64 (54.7)
Men	53 (45.3)
Age	
18–29	18 (15.4)
30–49	33 (28.2)
50–59	37 (31.6)
60–65	29 (24.8)
Marital status	
Single	55 (47.0)
Married	53 (45.3)
Widow	3 (2.6)
Divorced	6 (5.1)
Education	
Elementary	11 (9.40)
Junior High School	17 (14.53)
Senior High School	33 (28.21)
Undergraduate School	41 (35.04)
Postgraduate School	15 (12.82)
Occupation	
Formal job	36 (30.8)
Informal job	26 (22.2)
Entrepreneur	4 (3.4)
Without paid work	51 (43.6)
Living area	
Metropolitan area	100 (85.5)
Province	17 (14.5)

Geography (INEGI for its acronym in Spanish) [26]. The projection was also made adjusting by discount of future costs at a rate of 5%.

Results

One hundred and seventeen patients were included in the study; the mean age was 47.9 years old ($SD = 14.21$). More than a half the sample were women (54.7%), 47% of the patients were single, 34.2% of insomnia patients had a formal job and 35% of the sample had an academic level of undergraduate school. Most of the patients lived in the central metropolitan area of the country (85.5%). (Table 1).

Health care resource utilization, costs and economic burden

On average, patients made 4 visits during their first year of treatment: a first-time visit and 3 follow-up visits with a psychiatrist specialized in sleep disorders; the total annual medical visits costs per patient was US\$106.97. The identified drug therapies were amitriptyline, citalopram, desvenlafaxine, duloxetine, escitalopram, gabapentin, mirtazapine, paroxetine, pregabalin, sertraline, trazodone, venlafaxine, vortioxetine, and zolpidem. The estimated annual average drug cost per patient was US\$894.79. Table 2 shows the result of the drug costs and the individual details per patient are found in the supplementary material.

Within the direct non-medical costs, gym or aerobic classes enrollment to help mitigate symptoms of insomnia, induction/sleep promotion and home modifications resulted to be the highest costs (Table 2). It was possible to identify

Table 2 Direct annual costs estimated per patient with insomnia associated with DAD during the first year of treatment

Variable	Average resource consumption per patient per year	Unitary cost (US\$)	Cost per patient per year (US\$)
Direct medical costs			
First-time medical visit	1	\$30.23	\$30.23
Follow-up medical visit	3	\$25.58	\$76.74
Medications	See supplementary material	See supplementary material	\$894.79
Variable	Average cost per patient per year (US\$)		
Direct non-medical costs			
Transportation		\$44.31	
Energy drinks		\$5.75	
Gym or aerobic classes enrollment		\$112.43	
Home modifications		\$102.58	
Auxiliary accessories (e.g., ear plugs and/or sleep masks)		\$12.52	

Table 3 Indirect costs (work productivity loss)

Variable	Absenteeism	Presenteeism reduced productivity
Monthly estimate		
# work hours (Mean) ^a	172.97	172.97
% loss due to insomnia ^b	1.75%	23.03%
Lost hours due to insomnia (Mean) ^c	3.03	39.84
Average cost of one working hour (US\$) ^d	\$4.39	\$4.39
Monthly cost (US\$) ^e	\$13.3	\$174.90
Annual estimate		
Lost hours due to insomnia (Mean)	36.36	478.08
8-h workdays lost due to insomnia (Mean)	4.54	59.76
Average cost of an 8-h work day (US\$)	\$35.12	\$35.12
Annual cost (US\$)	\$159.45	\$2098.77
Cost of work productivity loss per patient per year (US\$)	\$2258.22	

^aMean number of work hours per month reported by patients

^bCalculated from the responses provided by patients in the Spanish version of the World Health Organization Health and Performance Questionnaire (HPQ)

^cCalculated by multiplying the # work hours (Mean) × % loss due to insomnia

^dCalculated by dividing the monthly salary income into # work hours (Mean)

^eCalculated by multiplying the lost hours due to insomnia (Mean) × Average cost of one working hour (US\$)

that, as part of the sleep hygiene recommendations, the most common expenses were mattress renovation and installation of blackout curtains or blinds.

Regarding work productivity loss due to insomnia associated with DAD (Table 3), presenteeism, seen as reduced productivity, had a high cost (US\$2098.77), thirteen times more than the cost of absenteeism (US\$159.45). From the 117 subjects included in the sample, only 66% performed

a paid work activity, and 46% of the subjects were absent or had reduced productivity due to their insomnia problem.

Table 4 shows the total estimated cost per patient during the first year of treatment for insomnia associated with DAD (US\$3537.57). Work productivity loss was the cost that contributed the most to the economic burden (63.84%) followed by direct medical costs (28.32%), while direct non-medical costs contributed the least to the total cost

Table 4 Total cost per patient per year and estimation of economic burden in Mexico of insomnia associated with DAD for the year 2020

Variable	Value
Direct medical costs per patient per year (USD\$)	\$1001.76
Direct non-medical costs per patient per year (USD\$)	\$277.59
Indirect costs for loss of labor productivity per patient per year (USD\$)	\$2258.22
Total cost per patient per year (USD\$)	\$3537.57
Expected cases of insomnia in Mexico ^a	23,690,637
Expected cases of insomnia associated with DAD in Mexico ^b	11,845,318
Expected cases of insomnia associated with DAD seeking medical attention in Mexico ^c	592,266
Expected cases of insomnia associated with DAD attended in the private sector ^d	82,917
Economic burden	\$293,325,498

DAD depression and anxiety disorders

^aCalculated by multiplying the total Mexican population (126,014,024 inhabitants) × the prevalence of insomnia (18.8%) [27]

^bCalculated by multiplying the estimated cases of insomnia in Mexico × 50% (mean value prevalence described by Atalay [1])

^cCalculated by multiplying the estimated cases of patients with insomnia associated with DAD × 5% (percentage of patients with insomnia who seek professional help specialized in sleep disorders) [28]

^dCalculated by multiplying the estimated cases of patients with insomnia associated with DAD who seek medical attention in the private setting (14%) [29]

(7.85%). Considering 126,014,024 inhabitants in Mexico according to the results of the population and housing census carried out in 2020 by INEGI [27], a prevalence of insomnia of 18.8% [28], within which 40%–60% of people with insomnia are associated cases to DAD [1, 5, 6], it was estimated that there are a total of 11,845,318 cases of insomnia associated with DAD. Considering that only 5% of patients with insomnia seek professional from a sleep medicine provider [29] and that 14% seek help in the private setting [30], it was estimated that 82,917 cases are treated in Mexico, which represents an estimated economic burden of just over USD\$293 million when estimating direct and indirect costs (Table 4).

Figure 2 shows the economic burden of insomnia associated with DAD, which is expected to increase to just over US\$320 million to 5 years into the future in the private setting in Mexico, considering an average monthly inflation of 4.6% based on the average Consumer Price Index of the last 5 years [26]. However, when making an adjustment by discounting future costs at a rate of 5%, the economic burden of insomnia associated with DAD in present-day terms would be just over US\$229 million 5 years into the future.

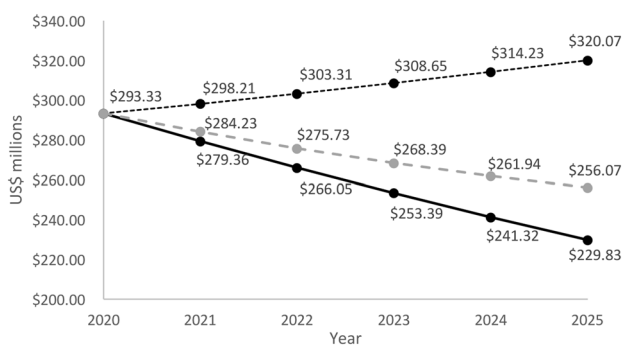


Fig. 2 Projection of the economic burden of insomnia associated with DAD. Dash line: adjusted for inflation, solid line: adjusted for discounting future costs, spaced dash line: overall analysis (inflation + discounting future costs)

The overall projective analysis, taking into account both inflation adjustment and discount of future costs, shows that the economic burden in present-day terms would be up to USD\$256 million 5 years into the future (Fig. 2).

Sensitivity analysis

Table 5 shows a summary of the results found in the sensitivity analysis. As observed, the parameters that most influenced the estimates of the economic burden in Mexico in the private setting were the prevalence of insomnia associated with DAD, the work productivity loss, and the percentage of people seeking care in the private system, causing a change on the economic burden base case in a range of 10–27%.

Discussion

To our knowledge, this is the first study that describes the costs of insomnia in Mexico, and particularly, insomnia associated with DAD, showing that the costs are high and that work productivity loss was the cost that contributed the most to the economic burden. International studies have reported the economic impact of insomnia [14]; however, the cost of insomnia associated with DAD has not been previously evaluated [15–17]. Furthermore, this is the first study carried out from the perspective of the patient in the private health sector. Also, we found no similar reports from Latin America and only a single study was identified on the use of resources in the treatment of insomnia related to major depressive disorder at an international level [17].

Epidemiological studies on insomnia have consistently linked this sleep disorder to factors such as female gender, old age, employment status, shift work, and family history of insomnia [31]. The sample study included more women than men, which agrees with the findings from other researchers [32]. On the other hand, although older age has been associated with an increased risk of insomnia, reports of

Table 5 Sensitivity analysis

Parameter	Range of economic burden per patient		Change with respect to the base case (%)
	Lower value	Top value	
Base case	\$293,325,498		Reference
Medication cost	\$274,777,121	\$311,873,874	6.3
Direct medical costs	\$272,559,707	\$314,091,288	7.1
Direct non-medical costs	\$287,571,294	\$299,079,746	2.0
Indirect costs due to work productivity loss	\$246,514,162	\$340,136,833	16.0
General insomnia prevalence	\$271,482,109	\$315,792,982	7.4–7.7
Prevalence of insomnia associated with DAD	\$234,660,398	\$351,990,579	20.0
Percentage of people seeking care in the private setting	\$213,708,577	\$324,962,748	10.8–27.1

DAD depression and anxiety disorders

insomnia or sleep problems have been found to peak in middle age (range, 45–54 years old) [33]. Most of the patients included in the sample of the present study were in the range of 50–59 years old, an age very close to the aforementioned range corresponding to the maximum point in the middle age.

The costs of insomnia associated with DAD are high, as the direct costs per patient per year were USD\$1279.35. Given that the SDC is a private clinic and that the direct costs are paid by the patients without any subsidy or discount, the impact on the patient's economy is remarkable. The average monthly salary of the patients included in the study was USD\$663.5, considering that direct costs per patient per month result in USD\$106.61, these represent 16.1% of the patient's monthly income, a high percentage that can have important economic consequences within the family environment. In Mexico, just over half of the working population earns USD\$286.5 per month or less [34], so their access to specialized medical care in the private setting to treat these disorders is very limited, if not practically impossible; their option is to seek care in the public health service which, despite the efforts in recent years to guarantee universal access, does not have enough providers to serve the population that requires it. Medication costs contributed the most to the total direct cost (69.94%), a high percentage notwithstanding the fact that almost all prescribed drugs are marketed in Mexico in their generic version.

The costs associated with the loss of labor productivity due to absenteeism and presenteeism (reduced productivity) accounted for most of the total cost per patient per year (around 64%). Within these costs, the greatest contribution was made by reduced productivity, representing 93% of the total indirect costs per patient per year. Reduced productivity has a high impact not only on the individual but on society in general as it can delay the goals within the work environment or it can lead to job abandonment, which can bring financial repercussions for the employer.

In this study, the direct costs per patient per year, fall within the range reported by Tian et al. [17] for patients with insomnia related to major depression disorder in 2012 (US\$824–US\$1378). The present study included direct non-medical costs such as home modifications, gym, or aerobic class enrollment, among others. In addition, the study by Tian et al. included hospitalization costs and emergency room costs, expenses not incurred by the population analyzed in the present study. In addition, the average annual labor productivity loss per patient reported by Tian et al. ranged from US\$1378 to US\$5326, depending on whether the patients had prescribed insomnia medications or whether the number of paid times off and days of short-term disability were quantified. The work productivity loss estimated in this study was within the range reported in the study by Tian et al., with the difference that the subjects included in

the present study did not incur short-term disability but did have decreased productivity (presenteeism).

The total economic burden estimated for insomnia associated with DAD in Mexico outreach to just over US\$293 million, and even adjusting for discount of future costs in the projection model, the economic burden remains high, despite a projected decrease of 20% in 5 years. In contrast, the economic burden of insomnia associated with DAD estimated in the present study is lower than the burden of diabetes mellitus [35] or osteoporosis [36], as it requires fewer health resources despite having a higher prevalence in the Mexican population. Furthermore, knowing that insomnia and sleep quality are bidirectionally related to anxiety and depression, and depression/anxiety, respectively [37], possibly due to elevated levels of cytokine-mediated systemic inflammation [38], amygdala changes [39], and hypothalamic–pituitary–adrenal axis overactivity [40], the problem becomes even more complex, since the prevalence of insomnia associated with DAD may be greater than what has been observed so far. It is necessary to be aware of the economic burden of insomnia associated with DAD, mainly to acknowledge the magnitude of the economic impact that insomnia is having nowadays, to encourage its recognition as a public health concern and to facilitate adequate administrative actions from a public health perspective. In particular, as the costs associated with untreated insomnia have been estimated to be significantly higher than the costs associated with its treatment [11].

The present results set the foundation for further research focused on the costs of insomnia in Mexico and other similar Latin American countries. The economic information generated from these studies will help to identify the factors that lead to decreased work productivity to identify viable actions to reduce such negative outcomes and thereby, restrain the economic impact on society. Likewise, the most cost-effective therapeutic options can be determined to optimize the use of health resources.

The findings of this study must be interpreted considering a number of limitations. The study was carried out in a private health service, so it cannot be generalized to other contexts such as public health services. The sample was small to estimate the costs associated with workplace accidents and errors, as well as vehicle accidents or alcohol consumption. Other financial and non-financial costs that have been associated with insomnia [14], including health costs associated with hospitalization, productivity costs associated with premature death, the costs of informal care provided by other, and cost related to loss of well-being were not evaluated, since the sample included in our study did not incur these costs. Other sleep disorders such as obstructive sleep apnea–hypopnea syndrome and its complications, with a significant associated economic burden, were not taken into account in our study. The projection of the estimated

economic burden may vary due to unexpected events, such as the COVID-19 pandemic that started in 2020 or the crisis in Ukraine in 2022, which have had an effect on global inflation. Furthermore, epidemiological data reported for Mexico included in scientific articles and in reports from the Pan American Health Organization were used to estimate the economic burden; they were not specifically determined for this study. However, the sensitivity analysis carried out outlined that, despite these potential limitations, the effect of the variables that had the greatest impact on the estimated total economic burden was within the five-year projected limits adjusted for inflation and discount of future costs.

Conclusions

The direct and indirect costs per insomniac patient comorbid with DAD per year from the patient's perspective were USD\$1279.35 and USD\$2258.22, respectively. Work productivity loss was the cost that contributed the most to the economic burden. The out-of-pocket expense derived from care in private clinics is high and has a high impact on the patient's economy. The recognition of comorbid Insomnia and DAD needs to be reflected in the proper administrative allocation of the healthcare budget to make available adequate services for this population, including access and supply of suitable medications.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s41105-022-00412-6>.

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Author contributions JMM-N, RS-M, CC-C and GIT-G: designed the study; GIT-G: compiled the data, performed analysis, and drafted the article; AB-M, UJ-C, LR, FL-N and JMM-N: participated in the discussion and interpretation of findings, critically revised the manuscript for important intellectual content, approved the final version, and agreed to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript.

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Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest The authors declare no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the Research and Ethics Committee of the Sleep Disorders Clinic and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The protocol was approved by the Research and Ethics Committee of the Metropolitan Autonomous University.

Consent to participate Informed consent was obtained from all individual participants included in the study.

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