

The use of natural products for sleep: A common practice?

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Abstract

Background: Despite a paucity of data on efficacy and safety of natural (herbal and dietary) products, their use appears to be widespread. This study aimed at examining the frequency of natural products' use for sleep and their correlates in a population-based sample.

Methods: A randomly selected sample of adults ($n = 997$; 59.9% women) from the province of Quebec completed a postal survey on sleep, use of sleep-promoting products (natural products, prescribed medication, over-the-counter medication and alcohol), physical and mental health, lifestyle habits and demographics.

Results: A total of 18.5% of participants reported having used natural products as sleep aids in the past 12 months, with chamomile being the most popular product. Participants who exclusively used natural products as sleep aids (10.3% of the sample) were predominantly females, younger and had a higher educational level than those using prescribed medications. Natural products users reported engaging in more health-promoting behaviors than the nonusers of sleep aids and, despite the presence of subthreshold insomnia symptoms (mean Insomnia Severity Index score = 9.33), they tended to perceive themselves as healthier when compared with prescribed medication users and nonusers of sleep aids.

Conclusions: The use of natural products as sleep aids is a common practice. Often associated with a general health-promoting lifestyle, it may reflect the common perception that natural products are necessarily beneficial for sleep and without risks.

Key words: Natural products, CAM, Sleep aids, Insomnia, Health behavior, Epidemiology

Introduction

With the advent of self-managed health care, the relative disenchantment with pharmaceutical drugs and the messages provided by the mass media of the putative healing effects of natural products, many people are turning to natural remedies (herbs, vitamins and mineral supplements) as health promoting strategies or solutions to health problems [1]. Herbal/natural products represent one of the most common forms of complementary and alternative medicine (CAM) [2,3]. They are readily available, they can be purchased at supermarkets, pharmacies, and health food stores, and can be taken without supervision, leading to the conclusion that these products are necessarily safe and without risks for health [4]. However, sparse evidence exists to support the beneficial effects of many of these products. Furthermore, it has been shown that natural products can interact with prescribed treatments [5] and, at high or inadequate doses, they can have side effects [6].

An analysis of the National Health Interview Survey dataset published in 2006 [7] revealed that the most commonly used CAM modalities for insomnia were biologically-based therapies. Valerian root, St. John's wort, kava, passionflower and melatonin are some of the herbs and dietary supplements that have been promoted as sleep aids [6]. To date, rigorous scientific data supporting the beneficial effect were not found in most studies of herbal and nutritional supplements used for treating insomnia [8]. Despite this, these treatments are commonly marketed as alternative remedies for insomnia.

Studies that have examined sleep-promoting products and medications have typically evaluated the use of prescribed drugs, specifically benzodiazepine receptor agonists [9,10]. Considering insomnia's high prevalence [11], the prevalence of benzodiazepine (BZD) use appears to be relatively low. For example, in a U.S. survey, 21% of participants having chronic insomnia reported having taken a

prescription medication [12]. A Canadian study showed that, while 29.9% of participants reported insomnia symptoms, 11% had used prescribed sleep medications in the year preceding the survey [13]. The prevalence of prescribed medication use and low rates of medical treatment-seeking for insomnia [12,14] raise the question, “as to what degree the alternative substances/therapies are used to self-treat sleep complaints?”

Some studies have been conducted in order to document the prevalence of over-the-counter (OTC) drugs and alcohol use for sleep [15]. More recently, other studies have analyzed the relationship between vitamins and sleep [16], valerian and melatonin use associated with insomnia [17], and in the analysis of the National Health Interview Survey mentioned above [7] the use of CAM was evaluated within a group of self-defined insomniacs. However, to our knowledge, no study has specifically addressed the patterns of use of natural products for sleep and the characteristics of individuals who rely on them.

The objectives of this study were, first, to determine the proportion of individuals who use natural products as sleep aids, the specific products they use and the patterns of use. Secondly, it was to compare the sleep characteristics, health, lifestyle habits and demographics of those using natural products as sleep aids to those taking prescribed medications and those who reported not taking any sleep aids.

Methods

Sample selection

The present study's data are derived from a larger community based longitudinal study of insomnia risk factors [13]. The target population consisted of French speaking residents, aged 18 years or older, of the province of Quebec (Canada). A representative sample was obtained using a random digit dialing method and the Kish method. The study began with a telephone interview (average duration of 13 min) to

document the prevalence of insomnia and determinants of treatment seeking behaviors. Of the 5991 persons solicited, 2001 (33.4%) completed the interview. At the conclusion of the telephone interview, participants were asked to take part in the longitudinal phase of the study, which involved the completion of several postal evaluations. A total of 1473 individuals accepted to participate (73.3%). Of these, 105 were excluded because they reported a diagnosis of a sleep disorder other than insomnia. The first postal evaluation was then mailed to 1362 participants, and 997 questionnaires were returned (73.2% response rate). Of these, 44 further participants were excluded because they reported in the questionnaire another sleep disorder not reported at the telephone interview. For more details about the sample selection see Morin et al. [13]. Data for the present cross-sectional study were derived from these 953 participants. The present sample included 59.9% women and participants' mean age was 43.7 years (SD = 14.0, range 18–83).

Measurements

Variables from the survey particularly salient for the present study were those related to sleep-aid use, insomnia, health and lifestyle and psychological symptoms.

Sleep-aid use

Participants were queried regarding the use of sleep-promoting products by means of yes/no questions: “In the past 12 months, have you used natural products for sleep (such as chamomile tea, valerian or homeopathy)?” Respondents were also asked to list frequency of use over the last month, the name of the products used and the specific reasons for use by means of open-ended questions. Using the same types of questions, participants were also queried about prescribed medication use, OTC products and alcohol for sleep during the past 12 months.

Sleep

The *Insomnia Severity Index* (ISI; [18]) was used to assess insomnia severity. The ISI

is a seven-item self-report scale, with ratings on a 0–4 point scale. A composite score is obtained by summing up the seven ratings (0–28). Higher scores indicate more severe insomnia. This instrument has adequate internal consistency and test-retest reliability and good convergent validity with other subjective measures of insomnia [18–20].

Beliefs in efficacy of conventional treatments for sleep (i.e., prescribed medication) were also assessed using two items from the abbreviated 16-item version of the *Dysfunctional Beliefs and Attitudes about Sleep Scale* (DBAS, [21]), i.e., “medication cures insomnia” and “sleeping pills are needed for next day alertness.” For each statement, the subject has to rate his or her level of disagreement/agreement on a 10-point Likert scale with a higher score indicating more agreement with the belief. The psychometric properties of the scale have been documented for both the French [20] and English versions [22].

Other relevant sleep-related data included self-perceived habitual nightly total sleep time during the preceding month, estimated sleep needs, satisfaction with sleep in the past month (very satisfied, quite satisfied, not so satisfied, not satisfied at all) and a question about daytime sleepiness (“During the past month, how often have you had trouble staying awake while driving, eating or engaging in social activities?”).

Health

Several health-related lifestyle variables were assessed: tobacco use, height, weight, frequency of weekly exercise and weekly alcohol intake. This information was combined to derive a Health Life-style Index (HLI), which was used as a proxy of the individual’s predisposition to control and maintain one’s health. The HLI comprised information on alcohol use, body mass, smoking and exercise that were summed into a four-point scale, depending on the number of health-oriented behaviors present. A higher score on the HLI was considered as a healthier lifestyle.

Optimal weekly alcohol intake was defined as use of up to 3.5 drinks/per week. In a study performed by Fuchs et al. [23], the lowest relative risk of death in female drinkers as compared with female non-drinkers corresponded to the quantities of one to three drinks per week. This cut-off point further suggests a moderate, non-daily pattern of alcohol consumption. Given that information about type of drinks consumed (e.g., liquor, wine, beer) and specific quantities were not collected in the survey, a pattern of daily consumption for the definition of optimal alcohol intake was avoided. Weight control was defined as having a body mass index (BMI) of less than 25. Not smoking and undertaking exercise three or more times per week for at least 20 min per session were the two other health-related behaviors included in the HLI.

Perceived overall health status was also assessed using the following question: “In general, what is your current health status: Excellent, Very good, Good, Fair or Poor?”

Psychological symptoms

To assess mood disturbance, two well-validated and widely used instruments were included: the *Beck Depression Inventory-II* (BDI-II) [24] and the *Trait Anxiety Inventory* [25]. The BDI-II is a 21-item instrument, scored on a four-point Likert-type scale, assessing a variety of depression symptoms experienced over the past 2 weeks. A total score ranging from 0 to 63 is derived, with a higher score suggesting a higher level of depression symptomatology. The *Trait Anxiety Inventory* is a subscale of the *State-Trait Anxiety Inventory* which targets anxiety as a more stable personality trait. This section comprises 20 items rated on a four-point Likert scale (1 = not at all, 4 = a lot). The psychometric properties of this scale have also been documented for the French version [26]. Perception of mental health was also assessed using the following question: “In general, what is your current mental health status: Excellent, Very good, Good, Fair or Poor?”

Analyses

Descriptive statistics were computed to estimate (a) the proportion of participants using each type of sleep aid in the total sample; (b) the proportion of participants who scored within the ISI insomnia range (15–28) and, among those, the proportion that used natural products as sleep aids; (c) the proportion of natural product users that scored within the ISI insomnia range; (d) type and frequency of use of natural products for sleep during the past month; and (e) proportions of participants engaging in specific positive health-related behaviors.

Inferential analyses were conducted to flesh out primary differences regarding the characteristics of natural products users. Participants who exclusively took natural products for sleep, those who exclusively took prescribed medications and those who reported not using any of the sleep aids described in the questionnaire were compared. Participants taking other sleep aids or combining different sleep aids were excluded from these analyses. Demographic characteristics were compared using Chi-square tests for categorical data and one-way ANOVAs (for ordinal or interval data). Differences on sleep-related variables were investigated using one-way ANCOVAs for continuous dependent variables and generalized linear models for dichotomous dependent variables [27], controlling for age and gender. When overall significant differences were observed, the Ryan–Einot–Gabriel–Welsch multiple comparisons test [28] was used to determine which means differed, and pairwise comparisons (Bonferroni adjusted $\alpha = .05/3 = .017$) were used to determine which percentages differed. Similar analyses were performed to compare lifestyle habits and physical and mental health between the three groups of respondents, while controlling for age and insomnia severity. Adjusted means with their standard error are presented for the continuous dependent variables, and adjusted percentages are presented for the dichotomous dependent variables. Analyses were performed

using SAS version 9.1.3 [29] and the alpha level was set at a two-tailed 5%.

Results

Use of sleep aids, patterns of use of natural products and type of products

Natural products were the most common products used for sleep, with 18.5% ($n = 176$) of participants reporting to have used them in the preceding year. Of the total sample, 10.3% ($n = 98$) relied on them exclusively while 8.2% ($n = 78$) used them in combination with other types of sleep aids (prescribed medications, OTC and/or alcohol). Natural products were followed by prescribed medications, with 11.8% of participants ($n = 112$) reporting use in the preceding year. Alcohol and OTC medications were used by 8.3% ($n = 79$) and 6.7% ($n = 64$) respectively. The remaining 67.6% ($n = 644$) of respondents reported not having used any of the sleep aids described.

A total of 125 participants (13.1% of the sample) scored within the ISI guidelines' insomnia range, and about one-third of this subsample (36.0%) reported having used natural products for sleep. In the same way, of the 176 respondents using natural products as sleep aids, 25.5% scored within the ISI insomnia range.

Among the 176 respondents who used natural products in the preceding year, 70.3% ($n = 123$) also reported having used them in the preceding month. Forty-four out of 123 respondents (35.8%) were using natural products for sleep three or more times a week. A higher proportion of regular users was found in the group who reported taking natural products in combination with other sleep aids. In this group, nearly half of respondents (49.1%) reported having used natural products three or more times a week (Table 1). Of the 176 individuals who reported having used natural products for sleep in the preceding year, 71 (40.3%) specified which natural products they used for sleep difficulties or reasons possibly related to sleep problems, such as anxiety, stress or relaxation. For reporting purposes, commercial name of the

product was substituted by the name of the component. Ten respondents reported having used a “natural product” which, in fact, had no natural ingredients (e.g., OTC drugs with diphenhydramine).

The most widely used natural product for sleep was chamomile ($n = 46$). The next most common were mixtures of herbal/natural compounds (valerian root, lemon balm, lavender, hops, magnesium, etc.), generally sold in the form of tablets ($n = 12$). Valerian was reported by four respondents, while St. John's wort and homeopathic medicines were reported by two respondents respectively. Each of the other four products was used by only one respondent (Dicentra, Chinese green tea, Passiflora and essential oils).

Health-related lifestyle variables

About half of the sample (53.9%, $n = 472$) had a BMI of less than 25. Nearly three-quarters of participants (72.7%, $n = 664$) reported consuming less than 3.5 drinks per week, 67.7% ($n = 643$) were non-smokers and 36.0% ($n = 342$) reported engaging in physical exercise for sessions of 20 min or more three or more times per week.

Demographic characteristics associated with the use of natural products

Natural product users were younger ($p < .01$) than the prescribed medication users. Both groups of users included a higher proportion of women than the non-users group ($p < .00$). There were significantly more subjects with a higher education level in the natural products users group than in the prescribed medications group ($p < .05$), however, no statistical differences with regard to marital status were observed between any of the groups (Table 2).

Sleep-related variables associated with the use of natural products

The mean ISI score was higher for the two sleep aids users groups ($p < .00$). However, according to the ISI scoring guidelines, both groups' mean scores were

within the subthreshold insomnia category. Sleep aid users reported being more dissatisfied with their sleep than the non-users ($p < .00$). Natural products users reported having slept less time during the preceding month than the non-users ($p < .00$). Nevertheless, average total sleep time reported by the three groups was consistent with normal sleep values of a non-insomniac sample [30]. There were no significant between group differences in daytime sleepiness, and estimated sleep needs were not significantly higher for the natural products users compared to the two other groups.

Prescribed medication users endorsed the belief that medications were helpful to treat insomnia much more strongly than the two other groups ($p < .00$). Unlike this group, natural products users did not endorse these beliefs more strongly than the non-user group (Table 3).

Lifestyle habits, physical and mental health-related variables associated with the use of natural products

Natural products users engaged in more health-promoting behaviors than the non-users group ($p < .03$). A higher proportion of natural products users rating their health status in a positive way showed a tendency to perceive their health status as better than the two other groups ($p = .06$). However, this difference did not reach statistical significance. Mean anxiety and depression scores were significantly higher in the prescribed medications users group, while perceived mental health status did not significantly differ between the three groups (Table 3).

Discussion

This study addressed the patterns of natural products use for sleep in a community-based sample. Results suggest that natural products are the most commonly used sleep aids. Documenting the use of natural products for sleep seems particularly relevant given that research evidence suggests that a significant portion of people

use herbal and nutritional supplements as a self-managed health promoting practice [2] and that the vast majority of insomnia symptoms appear to be self-treated [31]. Our results further point out that those individuals more involved in health-promoting behaviors may be more inclined to use natural products for sleep. Consistent with other studies on the use of herbal/natural products for a variety of disorders [32–35], the present results suggest that female gender, younger age and a higher educational level were related to the use of natural products for sleep.

Use of natural products as sleep aids was found to be a fairly common practice in our study, with 18.5% having used them for sleep in the preceding year. To our knowledge, the only other study which has assessed CAM use to promote sleep in a community based sample [7] yielded lower estimates (4.5%). A plausible explanation for the different figures observed in these two studies may be that, in the Pearson et al. study, use of CAM was specifically assessed in a subsample of self-defined insomniacs, whereas we evaluated the use of natural products for sleep in a population-based sample, where it is possible that individuals who reported using these products might not have done so to treat sleep difficulties specifically. Nevertheless, in our study the use of natural products in the subsample of insomniacs was even higher (36%). This difference might reflect overall different CAM use prevalences between the U.S. and Canada. Canada's stricter approach to the regulation of botanicals and supplements [36] may raise less concern for usage of these products among Canadians. In addition, whereas a study about the trends in use of natural products in the U.S. [33] suggested that usage had reached a plateau, a survey study published the same year by the Natural Health Products Directorate (NHPD) in Canada [37] pointed out that the majority of respondents considered that natural health products were gaining popularity.

One of the most interesting results of the present study is that the natural

products users engaged in more of the health-oriented practices assessed than the non-users. There appears to be a wide-spread belief that “natural” equals “harmless,” so taking natural products for sleep may reflect the common perception that they are safe and beneficial for health and sleep. This further suggests that the use of natural products for sleep may be viewed as part of a broader orientation to health promotion, one that embraces healthy habits to maintain health and prevent diseases. In a study by Yoon and colleagues [38] evaluating the reported purposes for taking herbal products, about three fourths of the sample reported using herbal products for preventive reasons; 41% reported using them to maintain health or to prevent possible health problems, while 36% used herbal products both to prevent and to treat health problems. In the present study natural products use was also associated with sleep dissatisfaction and higher ISI scores. These observations point out that experiencing some sleep disturbance may increase the likelihood that one will use natural products for sleep, which might indicate an intended therapeutic use of these products. Nevertheless, sleep disturbances did not appear very severe in our sample. Another interesting result is that natural products users tend to perceive themselves as healthier than the other two groups. This adds support to the idea that the use of natural products for sleep may be viewed as a “healthy practice” to maintain and preserve health. Moreover, this practice was a regular habit for a good proportion of users, with 35.8% reporting use of natural products for sleep three or more times per week.

Chamomile was the most common natural product for sleep. This reflects its popular reputation as a relaxing substance that facilitates sleep [39]. Nevertheless, scientific data supporting its efficacy as a relaxant or to promote sleep are lacking [8]. In addition, the assumption that chamomile is inherently safe may be dangerous, as it has been postulated that chamomile may interact with anticoagulant

and antiplatelet drugs, BZDs and other drugs with sedative properties [40,41].

In keeping with other findings about trends in herbal and other natural products use for a variety of health conditions, younger subjects [32] and females [33–35] were the more frequent users of these products for sleep. Findings regarding level of education are also consistent with the majority of studies showing that CAM use becomes more prevalent as the levels of education and household income increase [5,32]. Several interpretations for this association may be suggested. Education, for example, may increase the likelihood that individuals will seek more information about their conditions and the variety of available treatments. Another hypothesis could be that educated individuals may be more inclined to question the authority and expertise of conventional medicine practitioners and conventional medicine's healthcare model and decide to take more autonomous control over their health. Consistent with previous findings in the literature [9,42,43], the prescribed medications users' profiles, characterized by older age, elevated anxiety and depression levels and stronger beliefs about the efficacy of medications, appeared in stark contrast with those of natural products users.

The present study's limitations include the possibility that there may be a bias towards subjects with sleep problems, who may have been more inclined to participate in the study. This could have inflated the frequency of sleep-aid use. However, prevalence of prescribed medication use in our sample was quite similar to prevalence reported in other studies [9,13,43,44]. Generalization of these results is also limited by the initial low response rate and the restriction of the sampling frame to people who speak French. Moreover, there were many missing data regarding type of natural product used and specific reasons of use. Despite these limitations, this study has produced interesting findings that can serve as the basis for further research.

In light of these results, it seems important to improve quality control of dietary/herbal supplements and the establishment of post market surveillance of drug-herbs and drug-supplements interactions. Although claims are made that herbal/natural products are safer than conventional medicines, herbal and drug interactions or herbal and herbal interactions are basically unknown [45]. In addition, to support individuals in making safe and appropriate choices, healthcare professionals should develop greater awareness of the nature and potential effects of these self-care approaches and include questions about the use of these products as a routine part of the history taking process, as they would ask patients about tobacco and alcohol use, for example.

In order to understand why a significant portion of the population is going outside mainstream biomedicine to treat their insomnia symptoms and/or to maintain their general health and wellbeing, future research may consider examining models on the determinants of this specific health-related behavior. These models may also provide insight into intervention strategies to modify or, in the event that natural products prove to have beneficial effects on sleep, to promote this behavior. The use of natural products is one type of health self-management activity. There are other forms of CAM modalities (e.g., acupuncture, yoga) that individuals may also consider using to self-treat their insomnia symptoms. Comparing the characteristics of individuals who rely on other forms of CAM to treat their insomnia symptoms may be another interesting research approach. CAM, through its current popularity, is a challenge to health care professionals and researchers alike.

Table 1

Past-month frequency of use of natural products (NP) for sleep.

	Exclusively using NP in the preceding year ($n = 98$)	Using NP in combination with other sleep aids in the preceding year ($n = 78$)	Total ($n = 176$)
Use during preceding month % (n/n_{total})	72.2 (70/97)	68.0 (53/78)	70.3 (123/175)
High frequency of use (>3 times/week) % (n/n_{total})	25.7 (18/70)	49.1 (26/53)	35.8 (44/123)

Table 2

Demographics of users of natural products (NP), users of prescribed medications (PM) and nonusers of sleep aids.

	Exclusively using NP ($n = 98$)	Exclusively using PM ($n = 65$)	<u>Non users</u> of sleep aids ($n = 644$)	p -value
Age (Mean) (SD)	39.89 (<u>13.48</u>) _a	53.11 (12.29) _b	43.49 (14.07) _a	.00
<i>Gender (%)</i>				
Female	74.5 _a	76.9 _a	57.5 _b	.00
<i>Marital status (%)</i>				.20
Married/Common law	52.6	58.5	62.0	
Unmarried	47.4	41.5	38.0	
<i>Education level (%)</i>				.02
Secondary or less	41.8 _a	64.6 _b	53.1 _{a,b}	
Junior college or University	58.2	35.4	46.9	

Values with different subscripts are significantly different at $p < .05$ according to multiple comparisons test.

Table 3

Sleep-related characteristics, lifestyle habits, physical and mental health of natural products users (NP), prescribed medications users (PM) and nonusers of sleep aids.

	Exclusively using NP (n = 98)	Exclusively using PM (n = 65)	Non-users of sleep aids (n = 644)	p-value
Insomnia severity (ISI) (mean) (SE)	9.33 (0.50) _a	10.40 (0.63) _a	5.44 (0.20) _b	.00*
Sleep satisfaction [†] (%): <i>satisfied</i>	68.0 _a	68.9 _a	87.4 _b	.00*
Self-reported average sleep time during last month – in hours – (mean) (SE)	7.04 (0.12) _a	7.30 (0.15) _{a,b}	7.43 (0.05) _b	.00*
Estimated sleep needs –in hours – (mean) (SE)	7.83 (0.10) _{a,b}	8.17 (0.12) _a	7.80 (0.04) _b	.02*
Daytime sleepiness in the past month [‡] (%): never or less than once a week	89.1	82.7	89.2	.74*
Beliefs in efficacy of conventional care for sleep				
Medication cures insomnia	1.24 (0.22) _a	3.33 (0.27) _b	1.53 (0.09) _a	.00*
Sleeping pills needed for next-day alertness	2.08 (0.24) _a	5.14 (0.31) _b	1.63 (0.10) _a	.00*
Health lifestyle index (mean) (SE)	2.51 (0.10) _a	2.34 (0.13) _{a,b}	2.20 (0.04) _b	.02 [¶]
Self-rated general health status [#] : <i>positive</i> (%)	98.6	91.2	94.7	.06 [¶]
Self-rated mental health status [#] : <i>positive</i> (%)	97.1	93.7	97.5	.22 [¶]
Trait anxiety (STAI) (mean) (SE)	38.52 (0.86) _a	42.64 (1.06) _b	38.30 (0.33) _a	.00 [¶]
Depression (BDI-II) (mean) (SE)	7.84 (0.66) _{a,b}	9.90 (0.82) _a	6.94 (0.25) _b	.00 [¶]

Values with different subscripts are significantly different at $p < .05$ according to multiple comparisons test.

* Analyses were adjusted by age and gender.

[¶] Analyses were adjusted by age and ISI score.

[†] Responses to this question were dichotomized. Values show percentages of participants responding “very satisfied” or “quite satisfied”.

[‡] Responses to this question were dichotomized.

[#] Responses to this question were dichotomized. Values show percentages of participants responding “good”, “very good” or “excellent”.

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