Lifestyles Habits and Sleep Quality in Patients Over the Age of 65 Attending Community Pharmacies

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SUMMARY. The objective of the present study was to quantify the relationship between the frequency of certain lifestyle habits and sleep quality in patients over 65 years of age in community pharmacies. A cross-sectional, descriptive, observational study was developed, including patients over the age of 65 who visited the community pharmacy for any reason. All patients completed the "Pittsburgh Sleep Quality Index" questionnaire plus some items designed to measure the frequency of performing certain lifestyle habits in the month prior to the interview. A multivariate linear regression analysis was performed. Sleep quality is significantly associated with gender (p = 0.008), taking hypnotics (p < 0.001), falling asleep unintentionally during the day (p < 0.001), going to bed in an irritated or worried mood (p < 0.001), keeping a bedtime routine (p = 0.041), sleeping in a room that has a suitable temperature (p = 0.003) and being disturbed by something or someone during the night (p = 0.032).

RESUMEN. El objetivo del presente estudio fue cuantificar la relación entre la frecuencia de ciertos hábitos de estilo de vida y la calidad del sueño en pacientes mayores de 65 años de edad en una farmacia comunitaria. Se desarrolló un estudio transversal, descriptivo y observacional en base a los pacientes mayores de 65 años que visitaron la oficina de farmacia por cualquier motivo. Todos los pacientes completaron el cuestionario "Pittsburgh Sleep Quality Index", además de algunos artículos diseñados para medir la frecuencia de ciertos hábitos de estilo de vida en el mes anterior a la entrevista. Se realizó un análisis de regresión lineal multivariado. La calidad del sueño se asocia significativamente con el sexo (p = 0,008), la ingesta de hipnóticos (p < 0,001), el quedarse dormido involuntariamente durante el día (p < 0,001), ir a la cama en un estado de ánimo irritado o preocupado (p < 0,001), el mantenimiento de un rutina de la hora de acostarse (p = 0,041), dormir en una habitación que tiene una temperatura adecuada (p = 0,003) y ser molestado por algo o alguien durante la noche (p = 0,032).

INTRODUCTION

The accessibility of community pharmacies means that patients often visit pharmacists for advice. As a result pharmacists frequently have to evaluate the health conditions of the presenting patients. An example of a patient presenting to community pharmacy would be a patient who perceives and reports that they are not sleeping well.

"Sleep quality" (SQ) is a concept that includes quantitative aspects of sleep such as total sleep time, sleep onset latency, number of waking after sleep onset, etc. as well completely qualitative aspects such as "depth" and "peacefulness" of sleep. According to Yi *et al.* [1], sleep quality could be defined as "the degree of excellence in sleep". It is an important clinical variable because it is directly related to patients' quality of life [2].

Polysomnography (PSG) is the benchmark method for measuring components related to SQ. However, because it is a complicated, expensive technique that is uncomfortable for the patient, and also involves subjective components [1], more inexpensive, complementary techniques need to be used to measure a subject's perception of SQ [3]. One of the most commonly used tools for this purpose is the Pittsburgh Sleep Quality Index (PSQI) [4,5].

Furthermore, with age, sleep becomes lighter

and there are more awakenings during the night. That is why the elderly often have poor SQ. It is more common when there is a pathological condition such as anxiety, depression or pain [6].

SQ could be improved by following appropriate lifestyle habits (LH) [7,8]. This could be very important in the elderly because it could lead to fewer drugs being taken to improve SQ [8,9], a lower chance of the onset of side effects [10-12] and reduced drug costs in this population group.

Some studies have found that some LH worsen SQ while others appear to improve it [13,14]. Others [14-15], however, have shown that LH significantly improve SQ components. These studies have some statistical limitations. Considering the controversy on the subject and these statistical limitations, the aim of this study was to quantify the relationship between the frequency of performing certain LH and SQ in patients over the age of 65 in community pharmacies.

MATERIALS AND METHODS

A cross-sectional, descriptive, observational study was conducted at 19 community pharmacies in four Spanish cities (Granada, Málaga, Jaén, Almería) from September to December 2009.

All patients over the age of 65 were included, except those who had: (1) a problem that could make it hard to conduct an interview (deaf or dumb individuals, those with cognitive impairment, etc.), (2) diseases causing movement disorders (Parkinson's disease, restless leg syndrome, etc.) and/or (3) sleep apnea. Patients were selected when they visited the pharmacy

for any reason. Participation was voluntary and all subjects signed an informed consent.

Measurement of variables

The Spanish version of the "Pittsburgh Sleep Quality Index" (PSQI) [16] was used to measure SQ. The questionnaire consists of 24 items, 19 of which are self-rated by the subject and 5 are answered by his/her bed partner or roommate. Only the 19 self-rated questions were taken into account. They referred to 7 components of SQ: subjective or perceived sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of hypnotic medication and daytime dysfunction. Each component is scored separately from 0 (no difficulties) to 3 (severe difficulties), and therefore the global PSQI score can range from 0 to 21.

The frequency of performing LH is shown in Table 1. For this purpose, subjects were asked how many days a week they performed each of the LH in the month prior to the interview.

The following data were also collected: age, gender, marital status (partner/no partner, educational level (no schooling/compulsory education/higher education at school or vocational training/university), smoking status (smoker or less than a year as an ex-smoker/non-smoker) and use of hypnotics for more than 6 months (No/Yes).

Procedure

The participating pharmacists were trained to administer the PSQI correctly. They were also instructed how to enter the information obtained on the online platform set up for the study [17]. They then asked patients who met the

Going to bed at the same time	Intensive tasks before bedtime
Getting up at the same time	Going to bed in an irritated, angry or worried mood
Staying in bed after waking	Hot bath before bedtime
Staying in bed for longer than 8 hours	Keeping the same bedtime routine
Falling asleep unintentionally during the day	Light reading before bedtime
Nap of more than 1 hour	Stimulating reading before bedtime
Going to bed immediately after an evening meal	Using the bedroom for anything other than sleep or sex
Trying to fall asleep for more than 30 minutes	Falling asleep with the TV/radio on
Stimulants after 6 pm	Looking at the clock during the night
Heavy evening meal	Sleeping on a comfortable mattress
Going to bed hungry	Sleeping with a comfortable pillow
Drinking wine/beer at the evening meal	Sleeping at a comfortable temperature
Strong alcohol after the evening meal	Sleeping in a quiet room
Relaxing bedtime drink	Sleeping in a dark room
Drinking abundant liquid before bedtime	Being disturbed during the night
Taking physical exercise	

Table 1. Lifestyle habits collected in the study.

inclusion criteria to participate in the study. If the patients agreed to participate, they were asked to sign the informed consent. After signing it, they were interviewed or given an appointment for an interview. When all the interviews had been conducted and entered into the database, the latter was refined for statistical analysis.

Data analysis

Patients who left any items in the questionnaire blank or marked more than one option for an item were excluded from the statistical analysis. Data were analysed using SPSS for Windows version 15 (SPSS Inc, Chicago, Illinois, USA). Measures of central tendency (mean) and dispersion (standard deviation, SD) were used to describe the quantitative variables and measures of frequency (%) were used to describe the qualitative variables.

To study the factors associated with SQ, multivariate linear regression analysis was used. A priori, all independent variables were entered in the model. To obtain a final model that was as stable as possible, predictor variables were eliminated from the initial model one by one using the following criteria: To avoid multicollinearity, predictor variables that showed a moderate or strong correlation between each other were eliminated first (Spearman's rho ≥ 0.3). Variables that provided an explanation for a greater degree of variance were kept in the model (higher coefficient of determination). Then, variables that obtained a beta coefficient with a lower statistical significance (higher p-value) were eliminated from the model, providing they were not confounding variables. If several variables had similar p values, the first ones to be eliminated were those that needed a larger sample size to ensure model stability.

Each time a variable was eliminated, a new model was obtained, which was tested for the following: collinearity between independent variables (statistical tolerance and variance inflation factor), linearity of quantitative variables (partial scatter plots), normal distribution of the residuals with constant variance (homoscedasticity), and independence of errors (Durbin-Watson test).

Before entering the quantitative independent variables, it was verified whether they met the assumption of linearity by testing for linear trend. Non-linear variables were categorised. In the case of LHs, the categories were: not done (0-1 times per week), sometimes done (2-4 times per week), and done (5-7 times per week). If the number of cases in any of these categories was very low (< 15), the categorisation was as follows: not done (0-1 times per week), done (2-7 times per week). Age, for its part, was categorised by tertile.

RESULTS

329 patients were included, 53 of whom were excluded from the statistical analysis for one of the reasons detailed above. Therefore, 276 patients were entered in the final analysis.

The mean age of the study sample was 71.9 years (SD: 6.0, range: 65-93), of which 58.7% were women. The mean Body Mass Index (BMI) was 28.1 (SD: 4.1) kg/m2 (range: 18.9-43.0). Other characteristics are shown in Table 2.

		n (%)
Gender	Male	114 (41.3)
	Female	162 (58.7)
Partner	No	117 (42.4)
	Yes	159 (57.6)
Educational level	No schooling	76 (27.5)
	Compulsory education	109 (39.5)
	Higher education at school/Vocational training	42 (15.2)
	University	49 (17.8)
Smoking status	Non-smoker	238 (86.2)
	Smoker	38 (13.8)
Hypnotics and sedatives	No	149 (54.0)
	Yes	127 (46.0)

Table 2. Sociodemographic characteristics of the sample (n = 276).

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The mean score for the PSQI was 8.4 (SD: 4.6); 75% of the sample had a score of less than 12 and 90% less than 15. The frequencies of performing each LH are shown in Table 3.

The multivariate analysis showed that gender ($p = 0.008$), using hypnotics ($p < 0.001$), falling asleep unintentionally during the day ($p < 0.001$), staying awake for more than 30 minutes when trying to get to sleep ($p < 0.001$), going to bed in an irritated or worried mood ($p < 0.001$), keeping a bedtime routine ($p = 0.041$), sleeping at a comfortable temperature ($p = 0.003$) and being disturbed during the night ($p = 0.032$) were associated with the score obtained in the PSQI (Table 4).

So, in this sample, a male patient who does not take hypnotics, does not fall asleep unintentionally, does not take longer than 30 min to get to sleep, does not go to bed worried, does not have a bedtime routine, does not go to bed at a comfortable temperature and is not disturbed during the night has a PSQI of 5.453. The variables in the final model explained 56.6% of the total between-subject variability in the PSQI score.

Fig. 1 shows the homoscedasticity, normality and independence of the model residuals (Durbin-Watson test).

DISCUSSION

One of the most important functions of a pharmacist is to provide patients with health education when needed. Good LH may frequently avoid the establishment of a pharmacologic treatment. This is important in sleep disorders due to the adverse effects caused by the medicines used to treat them, especially in ancient

	n (%)		
	No	Sometimes	Yes
Going to bed at the same time	22 (8.0)	66 (23.9)	188 (68.1)
Getting up at the same time	20 (7.2)	41 (14.9)	215 (77.9)
Staying in bed after waking	117 (42.4)	46 (16.7)	113 (40.9)
Staying in bed for longer than 8 hours	126 (45.7)	51 (18.5)	99 (35.9)
Falling asleep unintentionally during the day	161 (58.3)	67 (24.3)	48 (17.4)
Nap of more than 1 hour	185 (67.0)	40 (14.5)	51 (18.5)
Going to bed immediately after an evening meal	214 (77.5)	32 (11.6)	30 (10.9)
Trying to fall asleep for more than 30 minutes	87 (31.5)	88 (31.9)	101 (36.6)
Stimulants after 6 pm	239 (86.6)	37 (13.4)	
Heavy evening meal	199 (72.1)	51 (18.5)	26 (9.4)
Going to bed hungry	201 (76.8)	54 (19.6)	21 (7.6)
Drinking wine/beer at the evening meal	198 (71.7)	40 (14.5)	38 (13.8)
Strong alcohol after the evening meal	249 (90.2)	27 (9.8)	
Relaxing bedtime drink	202 (73.2)	41 (14.9)	33 (12.0)
Drinking abundant liquid before bedtime	167 (60.5)	65 (23.6)	44 (15.9)
Taking physical exercise	165 (59.8)	58 (21.0)	53 (19.2)
Intensive tasks before bedtime	244 (88.4)	32 (11.6)	
Going to bed in an irritated, angry or worried mood	121 (43.8)	100 (36.2)	55 (19.9)
Hot bath before bedtime	245 (88.8)	31 (11.2)	
Keeping the same bedtime routine	21 (7.6)	255 (92.4)	
Light reading before bedtime	189 (68.5)	87 (31.5)	
Stimulating reading before bedtime	245 (88.8)	31 (11.2)	
Using the bedroom for anything other than sleep or sex	151 (54.7)	47 (17.0)	78 (28.3)
Falling asleep with the TV/radio on	125 (45.3)	50 (18.1)	101 (36.6)
Looking at the clock during the night	101 (36.6)	61 (22.1)	114 (41.3)
Sleeping on a comfortable mattress	13 (4.7)	263 (95.3)	
Sleeping with a comfortable pillow	12 (4.3)	264 (95.7)	
Sleeping at a comfortable temperature	22 (8.0)	254 (92.0)	
Sleeping in a quiet room	13 (4.7)	263 (95.3)	
Sleeping in a dark room	24 (8.7)	252 (91.3)	
Being disturbed during the night	193 (69.9)	41 (14.9)	42 (15.2)

Table 3. Frequency of lifestyle habits (n = 276). Categories: No: 0-1 days/week, Sometimes: 2-4 days/week, Yes: 5-7 days/week. LH with fewer than 15 subjects in any of the above categories are shown as No: 0-1 days/week and Yes: 2-7 days/week.

		Simple linear regression			Multivariate linear regression				
							Collinearity		R²
		β	*p*-value	R²	β	*p*-value	Toleran.	VIF	
Gender	Male	Ref	0.003	0.028	Ref	0.008	0.918	1.089	
	Female	1.635			1.020				
Hypnotics	No	Ref	<0.001	0.313	Ref	<0.001	0.806	1.240	
	Yes	5.147			3.576				
Unintentional nap	No	Ref		0.057	Ref				
	Sometimes	0.791	0.222		0.678	0.127	0.914	1.089	
	Yes	3.152	<0.001		1.965	<0.001	0.842	1.240	
> 30 min trying	No	Ref		0.272	Ref				
	Sometimes	1.661	0.318		1.111	0.017	0.705	1.418	
	Yes	5.635	0.260		3.697	<0.001	0.638	1.569	0.566
Irritated, worried	No	Ref		0.214	Ref				
	Sometimes	2.804	<0.001		0.954	0.028	0.759	1.318	
	Yes	5.621	<0.001		1.831	0.001	0.664	1.505	
Routine	No	Ref		-0.002	Ref				
	Yes	0.685	0.511		1.455	0.041	0.934	1.070	
Temperature	No	Ref		0.055	Ref				
	Sometimes	-2.854	0.181		-2.522	0.096	0.265	3.779	
	Yes	-6.041	0.001		-3.951	0.003	0.262	3.810	
Disturbed	No	Ref		0.022	Ref				
	Sometimes	1.682	0.031		0.577	0.282	0.906	1.104	
	Yes	1.739	0.025		1.135	0.032	0.923	1.083	

Table 4. Simple and multivariate linear regression analysis of lifestyle habits associated with the PSQI. The model that explained most variability and was most parsimonious is presented. Ref: Reference; Toleran.: Tolerance; VIF: Variance inflation factor; β: Regression coefficient; R²: Coefficient of determination.
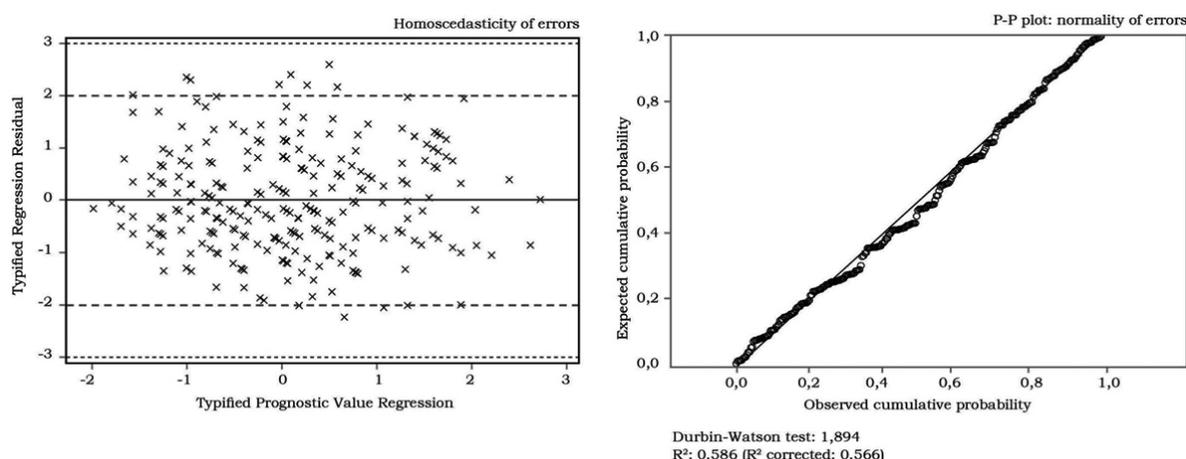

Durbin-Watson test: 1,894
R²: 0.586 (R² corrected: 0.566)

Figure 1. Homoscedasticity and normality of linear regression errors in the Durbin-Watson test and coefficient of determination (R2) of the most parsimonious model.

population, who are more sensitive to their effect.

The association between LH and SQ has been studied in the older adult population [18,19]. None of the studies carried out so far has found a quantitative measure showing a clear relationship between the frequency of a certain LH and SQ. This is interesting from the point of view of trying to establish evidence-based health education on sleep.

Only a few of the great number of LH studied have demonstrated a statistical significant association with SQ. For instance, trying to fall asleep for more than 30 min has showed to reduce the SQ. This result is consistent with the one obtained by Vitiello *et al.* [20]. This may be explained by the state of anxiety that is created when waiting to fall asleep. Therefore, pharmacists should advise patients who have to wait to fall asleep more than 30 min to get up, to do something else and go back to bed when they feel sleepy [21].

Going to bed angry, irritated or worried showed to reduce SQ as well, as supported by Gellis & Lichstein [20]. This had already been confirmed before [21-24] and in fact, it is known that a state of tranquillity and repose is needed in order to enter phase 1 of the NREM period [6]. So, one of the rules that pharmacists have to transmit to patients having a poor perception of their SQ, is to avoid activities which irritate or worry them before going to bed.

On the other hand, it has been reported that keeping bedtime routine (going to bed and getting up at the same time) favours a good SQ [22]. This is due to the circadian rhythms structure. That is the opposite of what has been found in our study. It should be noted that 92.4% of elders in our population had the same sleep routine. This highly disparate frequency distribution among the categories of this variable could have influenced the direction of results. This is the reason why these data should be interpreted with caution.

Most of the LH did not show a statistically significant relationship. With regard to smoking and other stimulants, our results corroborate the conclusions drawn in other studies [19,23] that state that there is no relationship with SQ, despite nicotine and caffeine having been considered as sleep-altering substances.

In order to give appropriate weight to the results of this study it should be remembered that the sample is not representative of the global elderly population. With regard to the scale used to measure the frequency of performing LH, it should be noted that we searched for a scale that would match the number of days in a week, in order to provide a better understanding and enable the results to be extrapolated to real life. In this respect, the Practice Section of the Sleep Hygiene Awareness and Practice Scale (SHARP) [13,23] also uses a score ranging from 0 to 7 to measure the frequency of performing LH, but the score for each LH is added up to obtain a single total score. In this case, we wanted to observe the relationship of the frequency of each proposed LH and the PSQI score, and so we did not want to obtain a total score. And with regard to the period of time applied to measure the frequency of LH, we used the month prior to the interview in order to match the reference time used in the PSQI validation. Also, it should be noted that the absence of linear relationship between the individual LH and SQ does not imply that there is no other type of relationship, and therefore this topic should still be examined in future studies in order to determine which LH factors are in fact protective factors or risk factors in SQ.

Apart from the LH, socio-demographic variables were measured. With regard to the gender, the findings of this study are consistent with results obtained by other authors among the elderly. For example, women have lower SQ than men [23-25]. Although sleep disorders are usually more pronounced in men than in women (3) it appears that women may perceive them as worse or complain about them more than men. Vitiello *et al.* [18] concluded that in women there was a worse relationship between objective SQ measures and women's perception of it. This supports our findings in this study.

Regarding to the age, it was not associated with SQ. Also Gras *et al.* [25] did not find a relationship between age and SQ either. From the age of 50 onwards there may be physiological alterations in sleep patterns that could lead to poor SQ perception [27]. This physiological change may be more perceptible during the first years that it occurs (age 50-60 years); beyond the age of 65 it may not be so notable 26. For this reason there are no age-related differences in SQ.

Therefore, complaints of poor SQ could be increased with age and gender. This should be taken into account by pharmacists because it could lead to establish a non-necessary treatment. Appropriate information could solve the problem.

Finally, the use of hypnotics for more than 6 months was also measured. The results of this study show that patients who take hypnotics have lower SQ than those who do not take them. This may be because these drugs produce a slight reduction in the most restorative sleep phase (slow wave sleep) [12,27]. In addition, this stage is physiologically shorter in the elderly [6]. The sum of these two factors may be the cause of the elderly's poor perception of SQ when

they use hypnotics. Furthermore, since these drugs are eliminated more slowly in the elderly (6) [6], this may increase daytime drowsiness, which already occurs as a result of fragmented sleep that is characteristic of this age group and it may increase the likelihood of patients falling asleep unintentionally during the day. If patients sleep during the day, even unintentionally, they will sleep less at night, thus exacerbating the process that leads to poor SQ at night.

These are the reasons why pharmacists must be conscious that it is necessary to control the use of hypnotics and that they have to advise its use only when really necessary. Moreover, they must insist on treatment duration and suitable doses considering that these drugs are classified by Beers criteria as potentially inappropriate drugs [27].

In summary, pharmacists may have an important role on patient education in order to improve their related-to-sleep LH. This could improve the SQ and decrease the consumption of hypnotics as a consequence. Given that elders are more sensitive to this drug's adverse effects, the decrease in its use could lead to an improvement in the quality of life as well as to the reduction in direct and indirect burden for the health system.

CONCLUSION

The results of this study showed that the following LH worsen the elderly's perception of their SQ: a) taking hypnotics, b) falling asleep unintentionally, c) taking more than 30 min to fall asleep, d) going to bed irritated or worried, e) keeping a bedtime routine and being disturbed when asleep. On the other hand, a suitable room temperature improves these patients' perception of SQ. Good SQ among the elderly is an important goal for health professionals. Promoting suitable LH may be an important way to achieve this goal.

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