

# Sleeping tablet consumption, self reported quality of sleep, and working conditions

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## Abstract

**Study objective**—The aim was to assess the frequency of sleep disorders in relation to working conditions.

**Design**—This was a cross sectional study. Data were collected prospectively, on a standardised form, by 13 occupational physicians. The quality of sleep was assessed by self perceived sleep disturbances and consumption of sleeping tablets. Working conditions were described by the worksite physician as well as by the participants.

**Setting**—2769 small or medium sized firms in the Paris area

**Participants**—A random sample of 7629 wage earners was studied. Among the participants, 61% were men and 39% women; 44% were blue collar workers.

**Main results**—The prevalence of sleeping tablet consumption was 6.1% and 11.3% respectively for men and women. Sixteen percent of men and 26% of women stated that they had sleep disturbances ( $p < 0.001$ ). In both sexes, drug consumption and sleep disturbances increased with age and were highest among individuals aged 55 years and more. No association between working conditions (exposure to noise, assembly line working, or physical workload) and sleep disturbances or drug consumption was found. Sleeping tablet consumption was higher among subjects reporting a bad atmosphere at work; the same was true for men with little interest in their job and for women working under time pressure. For both sexes, subjects reporting any of these conditions were more likely to report sleep disturbances.

**Conclusions**—A high prevalence of self reported sleep problems and related drug consumption was observed. Physical working conditions were not related to the quality of sleep in contrast to perceived job conditions. The results suggest that sleep quality might be a useful health indicator for the occupational physician.

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Various predictors of sleep quality, such as age, psychological stress, coffee drinking, cigarette smoking, self perceived health status, and life satisfaction, have been described.<sup>1,2</sup> Studies designed to determine the effects of shift systems have shown that sleep quality was poorer among rotating shift workers than among permanent day workers.<sup>3-6</sup> However, few epidemiological studies on sleep and working conditions have been

published. Due to their frequency and their consequences (industrial injuries, health care use, drug consumption), sleep disturbances should be counted as a public health problem. In France a dramatic increase in the use of psychotropic drugs has been observed over the past 20 years.<sup>7</sup> Furthermore sleep disturbances may be an early sign of some psychiatric disorders, or even their cause, and deserve attention with a view to preventing such disorders.<sup>8</sup> In France, occupational physicians might be able to screen for sleep disorders because they are concerned with a large population—11 461 000 workers in 1989.<sup>9</sup> The aim of the present study was thus to assess the frequency of sleep disorders in relation to working conditions. Given the well documented methodological problems in evaluating sleep disorders,<sup>1,10,11</sup> two main aspects were chosen to estimate sleep: self perceived sleep disturbances and consumption of sleeping tablets. The relationships between working conditions and sleep were studied using these measures as surrogates.

## Methods

This cross sectional study was organised in the Paris area. Data were collected prospectively between July 1986 and July 1987 by 13 occupational physicians.

The population under study was composed of wage earners from 2769 small or medium sized firms. They were mechanical, chemical engineering, and non-industrial firms (offices, restaurants, or garages). The only criterion for the inclusion of a company was that it was under the medical control of one of the 13 occupational physicians who participated in the study. Each employee who had been working more than one year in the same firm was part of the study population. A random sample of the eligible participants was selected and included during the annual mandatory medical visit. The sampling fraction was  $\frac{1}{2}$  or  $\frac{1}{3}$  depending on the physician, but was constant for a physician during the study. The first, second, or third subject was included depending on the day of the month, and then every second or third subject—according to the physician's sampling fraction—was consecutively included. For each subject a standardised form was filled in prospectively. Meetings were organised with the occupational physicians during the study to standardise the data collection.

Lifestyle, social and demographic data, self perceived working conditions (on a four point scale), and alcohol, coffee and cigarette consumptions were recorded by the individual. Subjects who drank at least one glass of alcoholic beverage

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(10 g alcohol), smoked at least one cigarette, or drank one cup of coffee per day were considered as alcohol, cigarette, or coffee consumers. Life events during the previous year, and absenteeism due to illness or industrial injuries were also recorded. The geographical origin of a participant was defined by his/her father's birthplace. Participation in sports was defined as at least one hour of sport per week. Occupational status was classified in seven categories according to the French National Institute for Statistical and Economic Studies. Working conditions (working on an assembly line, schedule constraints, physical workload) were described by the occupational physician. Exposure to noise was defined by a threshold of 85 dBA measured at the work place with a Bruel and Kjaer sonometer. The noise level recorded was based on the results of several measurements performed on a yearly basis by the worksite physician; intermittent noise exposure was not considered. Sleeping tablet consumption was obtained by interview; individuals were considered to be current consumers when they stated that they used sleeping tablets at least once a week. Self reported quality of sleep was assessed by a single question: "Do you sleep well without sleeping tablets?" Three quantitative measurements of sleep were collected: (1) length of sleep, estimated by the duration between turning lights out and waking up; (2) sleep latency: duration between turning lights out and falling asleep; (3) awakenings: monthly number of broken nights. These variables were recorded as stated by the subjects.

STATISTICAL METHODS

Descriptive analyses were performed on the whole sample. The quantitative indicators of sleep were studied among subjects who did not take any sleeping tablets. Comparisons of means were done with the Student *t* test and percentage comparisons with the  $\chi^2$  test. Multivariate analyses were performed using BMDP statistical software.<sup>12</sup> Logistic regression was used to study the quality of sleep without sleeping tablets and sleeping tablet consumption. The results were considered statistically significant at  $p < 0.05$ .

Results

POPULATION

Out of the 8235 employees who were included, complete data were available for 7629 subjects. Among them, 61% were men and 39% women. Mean age was 38.9 (SD 11.2) years. The mean alcohol consumption was 18.1(32.3) g/d. Eighty four percent of subjects were regular coffee drinkers. The origin of these workers was Europe (86%), Maghreb (7%), and other countries (7%). Three percent were craftsmen and managers, 7.5% executives, 22.4% middle executives, 23.4% clerks, 22.8% skilled workers, 13.8% unskilled factory workers, and 7.0% unskilled service personnel. Six percent of the employees were exposed to noise  $\geq 85$  dBA. Three percent were working on an assembly line. The physical workload was heavy for 11% and moderate for 34%. Eighty eight percent of the individuals were working on regular day work schedules (between 7 am and 7.30 pm); 3% were shift workers (most often 6 am to 2 pm alternating with 2 pm to 10 pm), 1% worked in three shifts, and 1% worked at night. The average working week was 39 hours. Groups were also defined according to three levels of education: 27.5% had 12 years of schooling or more, 57.4% had from 6 to 11 years, and 15.1% had five years of schooling or less. Illness was the main cause of absenteeism: 30.8% of women and 33.8% of men had stopped working for at least one day during the previous year; 2.0% and 5.3% respectively stopped working for at least one day because of industrial injuries.

Table I Self perceived sleep disturbances, sleeping tablet consumption, and age groups.

	Age (years)					p	Total
	< 25	25-34	35-44	45-54	$\geq 55$		
	<i>Men</i>						
Number	362	1339	1387	1031	445		4564
Sleep disturbances	9.7%	11.7%	16.7%	19.4%	22.5%	<0.001	15.8%
Tablet users	2.5%	2.8%	5.8%	9.3%	12.6%	<0.001	6.1%
Tablet users in case of sleep disorders	26%	24%	35%	48%	56%	<0.001	39%
	<i>Women</i>						
Number	399	891	850	612	313		3065
Sleep disturbances	15.3%	19.4%	25.9%	35.9%	42.5%	<0.001	26.3%
Tablet users	4.3%	5.8%	11.5%	16.3%	25.6%	<0.001	11.3%
Tablet users in case of sleep disorders	28%	30%	44%	45%	60%	<0.001	43%

Table II Socioeconomic, demographic, and lifestyle risk markers of reported sleep disturbances and sleeping tablet consumption

		Men		Women		p	
		n	Sleep disturbances (%)	Tablet users (%)	n		Sleep disturbances (%)
Years of schooling	$\geq 13$	1311	14.3	5.7	809	18.4	8.8
	6-12	2524	15.7	6.2	1871	28.7	12.4
	< 6	711	19.4	6.6	380	32.4	12.1
	p		<0.05	NS		<0.001	<0.05
Origin	Europe	3786	15.6	6.5	2798	27.2	11.9
	Maghreb	460	18.5	4.8	80	17.5	6.3
	Other countries	357	14.0	3.9	204	17.6	5.9
	p		NS	<0.1		<0.01	<0.05
Sports	Yes	1405	11.2	4.1	619	16.6	7.9
	No	3185	17.9	7.0	2462	28.6	12.1
	p		<0.001	<0.001		<0.001	<0.01
Life events	Yes	669	26.0	11.4	650	37.4	17.5
	No	3829	14.1	5.2	2373	23.3	9.7
	p		<0.001	<0.001		<0.001	<0.001

DRUG CONSUMPTION AND QUALITY OF SLEEP

Sociodemographic characteristics

The prevalence of sleeping tablet consumption was 6.1% and 11.3% respectively for men and women. In both sexes, consumption increased with age and was highest among individuals aged 55 years and more (table I). In both sexes, sleeping tablet consumption was lower among individuals who stated that they practised a regular sporting activity and higher among those who reported a major life event during the previous year. Among women, sleeping tablet consumption was higher among subjects originating from Europe and lower among those with a high educational level. By contrast, sleeping tablet consumption was not associated with socio-professional categories. There was a correlation between alcohol consumption and sleeping tablet use in women: 14.8% of alcohol drinkers took sleeping tablets, in contrast to 10.5% of non-drinkers ( $p < 0.01$ ).

Sixteen percent of men and 26% of women reported that they had sleep disturbances ( $p < 0.001$ ). For both sexes, reported sleep disorders increased with age (table I). In both sexes, the higher the educational level, the lower the proportion of sleep complaints ( $p < 0.001$ ) (table II). Among women only, the highest rates were found in the lowest social class categories: 30% in unskilled service personnel, and 32% in unskilled factory workers; it was lower among managers (23%), executives (21%), middle executives (25%), employees (27%), and skilled workers (25%) ( $p < 0.001$ ). Subjects who did not take part in sport and those who had experienced a major life event during the previous year reported more sleep disturbances than others (table II). In contrast, consumption of alcohol, tobacco and coffee was not associated with quality of sleep.

#### *Working conditions as described by the occupational physician*

On the total sample, no association between working conditions (exposure to noise, assembly line working, or physical workload) and sleep disturbances or drug consumption was found. These working conditions were further analysed on the working class sample (skilled workers, unskilled factory workers, and unskilled service personnel) which was homogeneous for other variables (sociodemographic, lifestyle, etc). This subgroup was composed of 3563 employees (1826 skilled workers, 1156 unskilled factory workers, and 581 unskilled service personnel), 73.4% of whom were men and 26.6% women. The mean age was 39.2 (SD 10.1) years. They originated from Europe (75.6%), Maghreb (15.0%), and other countries (9.4%). Again, in this subgroup working conditions were not related to the quality of sleep and drug consumption.

#### *Working conditions as perceived by the worker*

Sleeping tablet consumption was higher among subjects reporting a bad atmosphere at work; the

same was true for men with a low level of interest in their job and women working under time pressure. For both sexes, subjects reporting any of these conditions were more likely to report sleep disturbances (table III).

#### *Absenteeism and medical care use*

Sleeping tablet consumption was strongly related to medical care use: 95% of the subjects who consumed drugs reported a visit to a physician at least once during the year preceding the interview, as opposed to 70% among other individuals ( $p < 0.001$ ). Similarly subjects who stated that their quality of sleep was poor had gone more frequently to a physician (83.6% reported a visit in the previous year) than subjects who did not report any sleeping problem (69.2%) ( $p < 0.001$ ). In both sexes, absenteeism from illness was associated with a poor quality of sleep: 13% of men and 22% of women who had not been absent from work during the previous year reported sleep problems, compared to 21% and 31%, respectively, of those who had ( $p < 0.001$  in each case). The figure was similar concerning sleeping tablet consumption: 5% versus 10% in men, 9% versus 16% in women (both  $p < 0.001$ ). This was not the case for industrial injuries.

#### MULTIVARIATE ANALYSES

Using a logistic regression, working conditions described by the physician were not associated with sleeping tablet consumption or quality of sleep. In contrast, lack of a calm bedroom, a significant life event during the previous year, and age remained associated with both sleeping tablet consumption and sleep disturbance ( $p < 0.001$  in both sexes). In men, Maghreb origin ( $p < 0.01$ ) and in women a low educational level ( $p < 0.001$ ) were also associated with poor quality of sleep. For men, working under time pressure was correlated with sleeping tablet intake ( $p = 0.05$ ). The other variables included in the model (age, geographical origin, coffee and alcohol consumption, assembly line work, work schedules, noise exposure) were not significantly associated with drug consumption or quality of sleep.

Table III Working conditions as perceived by the worker, sleep disturbances, and sleeping tablet consumption

		Men			Women		
		n	Sleep disturbances (%)	Tablet users (%)	n	Sleep disturbances (%)	Tablets users (%)
Atmosphere at work	Bad	617	27.6	12.0	457	42.0	18.8
	Good	3895	14.1	5.3	2566	23.7	10.1
	p		<0.001	<0.001		<0.001	<0.001
Interest in job	Bad	750	23.7	9.1	691	33.7	12.9
	Good	3755	14.3	5.6	2348	24.9	10.8
	p		<0.001	<0.001		<0.001	NS
Job under time pressure	Yes	1223	18.2	6.4	636	31.4	13.7
	No	3327	15.1	5.4	2424	25.1	10.7
	p		<0.05	NS		<0.01	<0.05

Table IV Quantitative assessment according to perceived quality of sleep

		Sleep disturbances		No Sleep disturbances	p	Whole population
		Mean (SD)	Mean (SD)	Mean (SD)		
Length of sleep (hours)	Men	7.0 (1.2)	7.5 (0.9)	<0.001	7.3 (1.0)	
	Women	7.4 (1.1)	7.7 (1.1)	<0.001	7.2 (1.2)	
Time before falling asleep (minutes)	Men	34.1 (34.2)	13.9 (14.6)	<0.001	16.0 (18.6)	
	Women	35.7 (35.7)	15.4 (16.9)	<0.001	19.0 (22.6)	
Frequency of nights with one long wakeful period (per month)	Men	7.2 (9.4)	1.1 (3.7)	<0.001	1.7 (5.0)	
	Women	9.7 (10.7)	1.3 (4.0)	<0.001	2.7 (6.5)	

#### QUANTITATIVE ASSESSMENT OF SLEEP AMONG NON-USERS OF SLEEPING TABLETS

Duration of sleep was studied on the subsample of 7005 subjects who did not take any sleeping tablets. Among these 62.0% were men and 38% women. Mean age was 38.8(10.9) years in men and 37.4(11.4) years in women. This group did not differ in origin, occupational status, or educational achievement from the whole population. The length of sleep was 7.3(1.0) hours and 7.2(1.2) hours for women and men respectively; sleep latency was 16.0(18.6) minutes and 19.0(22.6) minutes; monthly number of nights disturbed by at least one long period of wakefulness was 2.7(6.6) and 2.7(6.3). The three quantitative indicators were different according to stated sleep disorders. In both sexes, the length of sleep was shorter and the sleep latency longer in the group reporting sleep disorders, while the total time was not significantly different. The monthly number of nights with at least one long period of wakefulness was higher in the group with sleep disorders.

## Discussion

The purpose of this study was to evaluate the relationships between working conditions and sleep quality. The difficulties in evaluating sleep have been shown by many investigators. When compared with objective evaluation by electroencephalograph recording, the various sleep parameters have been observed to be poorly concordant with the subjective assessment of the subjects.<sup>10 11</sup> The total duration of sleep has been shown to be undervalued by patients suffering from insomnia. The number of wakings was found to be underestimated or overestimated in different studies.<sup>11</sup> Similarly the subjective sleep latency has given contradictory results.<sup>11</sup> With these limitations in mind, information on sleep was obtained by interview in our study. The information collected was thus related to two main aspects of sleep: first, self perceived quality, which is a different perspective from the objective parameters; and second, the related sleeping tablet consumption, which was found to be more reliable. This latter aspect is of importance in France, where the consumption of psychotropic drugs was five times higher in 1989 than in 1970.<sup>7</sup>

Although the participants, who were living in the Paris area and working in small and medium sized firms, were obviously not representative of the French working population, the wide spectrum of employments and the random selection of the sample gives an interesting picture of the drug consumption and sleeping problems in a French wage earning population. The frequency of sleep disturbances in this survey—16% among men and 26% among women—was lower than was found in some previous studies, in which sleep disturbances ranged from 35% to 52%.<sup>13–15</sup>

The consumption of sleeping tablets was high, especially among women (11% among women, 6% among men). Nevertheless, this consumption was lower than in the general French population, where estimations based on drug sales are 16.0% and 12.7% respectively for women and men.<sup>16</sup> In our report, consumption could be underestimated by the subject; however, the estimation of actual consumption might be better than the sales statistics since people do not necessarily consume all the pills they purchase.

These differences may be explained by the populations studied. The age range was from 18 to 65 years in our population. In the other studies, it ranged from 18 to 80 years and more. It has already been established that sleep disturbances increased with age. In contrast to other studies, all subjects included here were workers. In fact, it was reported that employment was negatively associated with psychotropic drug use.<sup>17</sup> Women reported insomnia more frequently than men, as in other studies.<sup>14 15</sup> Subjects with less education had more sleep disturbances. This finding on educational achievement is also consistent with other epidemiological results.<sup>14</sup> On the other hand, no relationship was found between sleep quality and alcohol, tobacco and coffee consumption, as in a previous study on rotating shift workers.<sup>3</sup>

Age and gender were the two main factors related to sleeping tablet consumption. Consumption increased considerably with age in both sexes, and women were more likely than men to

report daily or regular use. Studies on gender differences in sleeping tablet use have shown that women are more likely to receive a prescription for a psychotropic drug during a consultation than men. In a study from the National Medical Care Expenditure Survey in the USA, this result was attributed to the fact that women more commonly define themselves as ill and to report medical conditions likely to be treated with psychotropic drugs. The prescription ordered by the physician was not related to gender.<sup>17</sup>

Although this was our main hypothesis, no relation was found between quality of sleep and working conditions such as exposure to noise, assembly line working, or physical workload. It is unlikely that misclassifications and errors of measurement could account for this result, since the data were collected by trained occupational physicians who had responsibility for the companies' employees. It is possible that the mechanical industry, the chemical companies, and the firms without industrial activities in our sample do not have very hard working conditions in this respect. In any case, our data tend to rule out a strong association between their working conditions and sleep disturbances.

On the other hand, working conditions were often perceived as poor by the group with sleep complaints, which emphasizes the effect of the working environment, social integration, and life satisfaction. However, the causal relationship is not clear. It is plausible that a poor atmosphere at work, lack of interest in the job, and constraints introduced by shift work influence the quality of sleep; more reliable indicators concerning the intellectual and psychological demands of jobs are clearly needed. However, the relationship may be the reverse. It is conceivable that subjects suffering from minor or major psychological disorders or difficulties have both a poor quality of sleep and a poor perception of their working conditions. Indirect evidence of such a link was found in our data. Sleep disturbances were associated with short term and especially with long term absenteeism; the latter has been shown to be related to minor psychiatric disorders.<sup>18</sup> Among working subjects, in addition to absenteeism for illness,<sup>19</sup> sleep disturbances could be considered as a health indicator and prove to be useful for the worksite physician in screening for and preventing psychiatric disorders.<sup>8</sup>

In conclusion, physical working conditions, exposure to noise, assembly line work, or physical workload were not related to sleep disorders, whether assessed by self report or by sleeping tablet consumption. On the other hand intellectual and psychological workload as perceived by the workers, and a feeling of poor job satisfaction, were linked to the quality of sleep. Whether this link is causal or reflects a general feeling of dissatisfaction remains to be clarified. In any case, sleeping tablet consumption was high, especially among women and in the older age groups, and sleep complaints were common. Since sleep disturbances have been shown to be predictive of later psychiatric disorders, occupational physicians might have a major role in screening for and preventing these disorders. Further studies should evaluate this potential impact on psychiatric morbidity.

This report was prepared on behalf of the APSAT group: G Bradane, D Deprouw, J Laprugne, I Mahé, P Manillier, J Oeconomos, J Phalente, MJ Ravelonanosy, IG Ravelonansy, F Rousseau, and C Simonet.

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