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A survey to assess the quality of sleep in Italian medical women

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Summary. The aim of our study was to investigate the quality of sleep in medical women – in the form of the assessed level of arousal to new or emotional relevant stimuli, as measured through the APS (Arousal Predisposition Scale) – as well as the subjective quality of sleep, as measured through the PSQI (Pittsburgh Sleep Quality Index) in a group of medical women, members of the AIDM (*Associazione Italiana Donne Medico*, 'Medical Women's Italian Association'), using an anonymous online survey (Monkey Survey). 517 medical women – mean age 52,34 ± 11,59 – answered the questionnaire. The global PSQI score was 6,89 ± 3,5; there was no correlation with age (r = -0.05; p = 0.294), place of residence (p = 0.255) and years of work (r = -0.009; p = 0.294); the PSQI was significantly higher in women working in hospitals (7.31 ± 3.63) than in those working in outpatient clinics (6.52 ± 3.39) (p = 0.012*). The average APS score was 38.99 ± 4.63; a weak correlation between APS and PSQI was identified (r 0.111; p = 0.01**). *Conclusions.* 75% of medical women who answered the questionnaire are 'bad' sleepers (PSQI ≥5). Although the susceptibility to activation (APS) was high, the correlation with the responders' sleep quality was very weak. Working in hospital seems to be correlated with a low quality of sleep, while a decrease in arousability was found when subjects were no longer under pressure due to their work.

Keywords. Sleep disorders, medical women, Arousal Predisposition Scale, Pittsburgh Sleep Quality Index.

Objectives

According to the National Sleep Foundation, the need for sleep in the United States varies across individuals, also changing with age. Adults (26-64) should sleep for 7-9 hours, while in older adults (>65) sleep ranges between 7 and 8 hours.[1]

In the US, approximately more than one third of the adult population report sleeping <7 hours per night; 70% report that they don't sleep enough at least one night a month; and 11% report insufficient sleep every single night.[2,3]

In the general population, the prevalence rates for sleep disorders vary greatly, depending on the definition used. Nearly one third of the general population complain of insomnia, but only 6% to 15% of them have received a diagnosis.[4]

Poor quality sleep is associated with a negative impact on health. After a good night's sleep, people are less tired, and function better; conversely, they feel worse and function poorly when they don't sleep well. A lack of sleep can lead to a range of cognitive, attention and emotional deficits.[5] Poor sleep quality has been reported among healthcare professionals. Long working hours, night call duty and rotating shifts are an implicit feature of the hospital medical practice staff, as well as a critical issue for the healthcare system, because they may result in excessive daytime sleepiness, impaired judgment, and poor neurocognitive and psychomotor performance. Poor quality sleep not only leads to health problems for the medical staff, but is also associated with lower performance rates and a higher risk of medical errors, which may jeopardize the patient's safety.[6-9] Women are more likely than men to report having poor satisfaction with their sleep quality and suffering from the daytime consequences of sleep disorders.[10]

Medical women must often make a compromise between a career associated with power and influence, emotional responsibilities and family life, and they continue to experience the strain of their dual role as women and physicians.[11,12] This double role may produce a physiological, cognitive and emotional hyper-activation that disrupts normal sleep regulation processes.

The aim of our work was to measure the tendency toward insomnia in the form of assessed level of arousal to new or emotional relevant stimuli measured through the APS (Arousal Predisposition Scale)[13] and the subjective quality of sleep measured through the PSQI (Pittsburgh Sleep Quality Index)[14,15] in a group of medical women, members of AIDM (*Associazione Italiana Donne Medico*, 'Italian Medical Women Association'). The secondary objective of the study was to determine if age, place of residence, years of work, workplace and working conditions could affect sleep quality.

Participants

A 36-question online survey was developed and distributed online, through Monkey Survey. Answers were collected anonymously. Participants were recruited through AIDM.

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Measurements

The questionnaire consisted of three parts: the first contained the respondent's personal data: age, place of residence (North, Central or South Italy), type of occupation (hospital or outpatient office), years of work, retired or still working; the second part contained items to measure the APS score,[11] evaluating the predisposition to respond with greater arousal to new or emotionally relevant stimuli and to return more slowly to baseline levels. The score scale ranges from a minimum of 10 to a maximum of 50. Higher scores represent a higher cognitive hyperarousal.

The third part of the questionnaire included 19 self-rated questions to assess the subjective sleep quality during the previous month,[12,13] as measured through the Pittsburgh Sleep Quality Index (PSQI). The 19 self-rated questions are grouped, in order to obtain the seven components of PSQI, each of which has a range of 0-3 (0 = no difficulty, 3 = severe difficulty): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. The seven component scores are added together to determine the Global PSQI, with a range of 0-21. Cut-off score (differentiating 'good' from 'bad' sleepers) is 5. Higher scores indicate more severe sleep complaints. We also examined each of the PSQI component separately. The reliability of the scale in this sample was found to be high, with a α (Cronbach's alpha) = 0.75.

Statistical analysis

The continuous variables are expressed as mean values ± standard deviation (SD), and the nominal variables as absolute numbers and percentages. The data were statistically analyzed using the statistical software package for Windows 'Statistics Package for Social Sciences' (SSPS v. 21).

T-test or ANOVA test were used to compare the personal data. Quantitative data was given as percentage (%) and qualitative data as mean ± standard deviation (SD). The bi-variate correlations between psychometric and continuous variables were analyzed using Pearson's test. A statistically analysis value of $p < 0.05$ was accepted to be significant for a 95% confidence interval.

Results

The study involved 517 members of AIDM. The study was conducted in January 2020. Of the 517 medical women answering the questionnaire, 212 (41%) lived in North Italy, 48 (9.3%) in Central Italy and 256 (49.7%) in South Italy. Their age ranged from 24 to 72 years, with a mean of 52.34 ± 11.59; the age of the medical women living in the North was 51.74 ± 12.26; in the South was 53.98 ± 10.38; while in Central Italy was 45.83 ± 12.44 (T-test North vs Center p = 0.003*; T-test North vs South p = 0.033*; T-test Center vs South p <0.01*). Fifty-one point six percent (260/504) of medical women worked in outpatient clinics, while 48.4% (244/504) in hospitals.

Table 1. Demographic data

Women doctors answered the survey (n.)		517
Mean age ± SD		52.34 ± 11.59
Place of stay	Northern Italy n. (%)	212 (41)
	Central Italy n. (%)	48 (9.3)
	Southern Italy n. (%)	256 (49.7)
Workplace	Hospital n. (%)	260 (51.6)
	Outpatients clinic n. (%)	244 (48.4)
Years of work	<6 years	41 (7.98)
	6-10 years	52 (10.1)
	11-15 years	57 (11.1)
	16-20years	41 (7.98)
	>20 years	323 (62.74)
Retired n. (%)		55 (9.3)
Still working n. (%)		449 (90.7)

SD: standard deviation.

Most of the participants, 62.74% (323/514) had been working as a physician for more than 20 years; 7.98% (41/514) for 16-20 years; 11.1% (57/514) for 11-15 years, 10.1% (52/514) for 6-10 and 7.98% (41/514) for less than 6 years; only 1 subject did not work at the time of the survey; 2 participants didn't answer. 55/504 medical women (9.3%) were retired at the time of the survey. Demographic data are summarized in Table 1.

The mean PSQI was 6.89 ± 3.5; no significant difference was found for the global PSQI of medical women living in North (6.83 ± 3.53), Central (7.70 ± 3.46) and South Italy (6.77 ± 3.54) (p = 0.255). The PSQI was significantly higher in medical women working in a hospital (7.31 ± 3.63) than in those working in an outpatient office (6.52 ± 3.39) (p = 0.012*). No significant correlation was found between PSQI and age (r = -0.047; p = 0.294) and years of work (r = -0.009; p = 0.294). No difference in PSQI was observed between retired (no. 54; PSQI = 6.78 ± 3.6) and still working medical women (no. 443; PSQI = 6.90 ± 3.6) (p = 0.806) (Table 2).

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Table 2. Global PSQI and APS in the subgroups

		Global PSQI Mean ± SD	APS Mean ± SD
Total		6.89 ± 3.5	38.99 ± 4.63
Age (r of Pearson)		r = 0.05 p = 0.213	r = 0.09 p = 0.043*
Place of stay	North	6.83 ± 3.53	38.76 ± 4.5
	Centrum	7.70 ± 3.46	30.0 ± 5.2
	South	6.77 ± 3.54	39.14 ± 4.6
		p = 0.255	p = 0.146
Years of work (r of Pearson)		r = 0.20 p = 0.649	r = -0.045 p = 0.378
Workplace	Hospital	7.31 ± 3.63	39.22 ± 4.58
	Outpatients clinic	6.52 ± 3.39	38.86 ± 4.6
		p = 0.012*	p = 0 .379
Retired		6.78 ± 3.6	37.59 ± 4.4
Still working		6.90 ± 3.6	39.14 ± 4.62
		p = 0.806	p = 0.020*

PSQI: Pittsburgh Sleep Quality Index, APS: Arousal Predisposition Scale, SD: standard deviation.

The mean APS was 38.99 ± 4.63; a statistically significant negative correlation was found between APS and age (r = -0.090; p = 0.043*); no significant difference was observed between the mean APSs of women living in North (38.76 ± 4.5), Central (30.0 ± 5.2) and South Italy (39.14 ± 4.6) (p = 0.146) (Table 2). No significant difference was found in the APS of women working in hospitals (39.22 ± 4.58) and in outpatient clinics (38.86 ± 4.6) (p = 0.379). The APS of retired medical women (37.59 ± 4.4) was significantly lower than that of those still working (39.14 ± 4.62) (p = 0.020*). No significant correlation was observed between APS and years of work (r = -0.045; p = 0.318) (Table 2).

A positive correlation was observed between APS and global PSQI (r = 0.111; p = 0.01*). Table 3 summarizes the results of the PSQI components in the subgroups. The quality of sleep (PSQI component 1) during the previous month was reported as good or fairly good in 65.2% of participants (336/503), while fairly bad or very bad in 34.8% (179/515).

We found a significant correlation with age (r = -0.099 p = 0.025*); no correlation with the years of work (r = -0.082 p = 0.064); no difference between the medical women living in different regions of Italy (ANOVA, F = p = 0.148).

Medical women working in hospitals reported a significantly worse quality of sleep (1.35 ± 0.81) than those working in outpatient clinics (1.18 ± 0.733) (p = 0.018*).

Table 3. PSQI component 1-7 in the subgroups

		PSQI comp 1	PSQI comp 2	PSQI comp 3	PSQI comp 4	PSQI comp 5	PSQI comp 6	PSQI comp 7
Age		r = -0.099* p = 0.025	r = -0.13 p = 0.772	r = 0.02 p = 0.614	r = 0.024 p = 0.592	r = -0.026 p = 0.559	r = 0.031 p = 0.482	r = -0.11 p = 0.013
Place of stay		p = 0.148	p = 0.117	p = 0.127	p = 0.313	p = 0.233	South vs North p = 0.001** South vs Central p = 0.04* North vs Central p = 0.92	p = 0.298
Years' work		r = 0.082 p = 0.064	r = -0.11 p = 0.802	r = -0.001 p = 0.98	r = 0.062 p = 0.162	r = 0.010 p = 0.826	r = 0.41 p = 0.361	r = 0.045 p = 0.318
Workplace	Hospital	1.35 ± 0.81	1.26 ± 1.04	1.64 ± 0.686	0.5 ± 0.939	1.29 ± 0.625	1.31 ± 0.81	0.93 ± 0.79
	Outpatient clinic	1.18 ± 0.73	1.12 ± 1	1.45 ± 0.759	0.39 ± 0.807	1.19 ± 0.541	1.18 ± 0.73	0.79 ± 0.76
		p = 0.018*	p = 0.132	p = 0.003*	p = 0.158	p = 0.042*	p = 0.018*	p = 0.037*
Retired		1.18 ± 0.73	1.31 ± 0.96	1.35 ± 0.751	0.49 ± 0.83	1.22 ± 0.567	0.56 ± 1	0.61 ± 0.74
Still working		1.35 ± 0.81	1.15 ± 1	1.56 ± 0.727	0.44 ± 0.879	1.24 ± 0.586	0.33 ± 824	0.89 ± 0.788
		p = 0.000**	p = 0.270	p = 0.038*	p = 0.696	p = 0.839	p = 0.07*	p = 0.013**

PSQI: Pittsburgh Sleep Quality Index.

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No differences between retired medical women (1.20 ± 0.74) and those still working (1.28 ± 782) (p = 0.502) were observed.

The mean PSQI component 2 (sleep latency) was 1.17 ± 1.024. We didn't find any correlation with age (r = -0.13; p = 0.772) and years of work (r = -0.011; p = 0.802). No difference between medical women living in different regions of Italy (ANOVA p = 0.117) were present, nor between those working in hospitals (1.26 ± 1.04) and those operating in outpatient clinics (1.12 ± 1) (p = 0.132), nor between retired (1.31 ± 0.96) or still working (1.15 ± 1) (p = 0.270) respondents.

The mean sleep duration of participants was 6.24 ± 1.06 hours. Medical women working in hospitals reported a mean sleep duration of 6.08 ± 1.04, while 6.39 ± 1.05 was reported by those working in outpatient clinics (p = 0.001**). No correlation was identified between sleep duration and age (r = 0.02; p = 0.614) and years of work (r = -0.001, p = 0.98). The sleep duration of women living in North Italy was 6.35 ± 0.99, in South Italy was 6.16 ± 1.04, while in Central Italy was 6.13 ± 1.39. These differences were not statistically significant (p = 0.127). Duration of sleep was longer in retired (6.49 ± 0.96) than in still working (6.22 ± 1.05) (p = 0.05*) doctors; the PQSI component 3 is shown in Table 3.

No correlation was observed between PSQI component 4 (habitual sleep efficiency) and age (r = 0.024; p = 0.592), living in different regions of Italy (ANOVA p = 0.313), working in hospitals (0.5 ± 0.939) or in outpatient clinics (0.39 ± 0.807) (p = 0.158), years of work (r = 0.062 p = 0.162), being retired (0.49 ± 0.83) or still working (0.44 ± 0.879) (p = 0.696).

No correlation was observed between PSQI component 5 (sleep disturbances) and age (r=-0.026; p = 0.559), living in different regions of Italy (ANOVA, F, p = 0.233), years of work (r=0.010; p = 0.826); more medical women working in hospitals reported sleep disturbances (1.29 ± 0.625) than those working in outpatient clinics (1.19 ± 0.541) (p = 0.042*); no significant differences could be detected between being retired (1.22 ± 0.567) or still working (1.24 ± 0.586) (p = 0.839).

Eighteen point four percent (93/505) of responders reported taking sleeping medication (PSQI component 6) at least once a week. No correlation was identified between PSQI component 6 and age (r = 0.031; p = 0.482) and years of work (r = 0.41; p = 0.361); more women working in hospitals stated to take sleeping medications (1.35 ± 0.81) than medical women working in outpatient clinics (1.18 ± 0.73 (p = 0.018*); no difference was observed between being retired (0.56 ± 1) and still working (0.33 ± 0.82) (p = 0.070). No difference in taking sleeping medication was identified between medical women living in North (24.6%; 51/207) and Central Italy (23.9%; 11/46) (p = 0.92), while among the medical women living in the South only 12.4% (31/250) reported to take sleeping medications, significantly less than in North (p = 0.001**) and Central Italy (p = 0.04*).

Twenty-four point fifteen percent (100/514) of medical women reported at least an episode of functional dysfunction (PSQI component 7) per week during the previous month. A correlation was identified between PSQI component 7 and age (r = -0.11; p = 0.013*), while no correlation was present with the years of work (r = 0.045; p = 0.318) and living in different regions of Italy (ANOVA p = 0.298); women working in hospitals reported a higher functional dysfunction (0.93 ± 0.79) than medical women working in outpatient clinics (0.79 ± 0.76) (p = 0.037*). Still working medical women reported a higher functional dysfunction (0.89 ± 0.788) than those who had retired (0.61 ± 0.74) (p = 0.013**).

Discussion

In our study, 60% (307/512) of medical women who answered the survey reported sleeping less than 7 hours per night, and 34.8% (179/515) defined their sleep fairly bad or very bad. These results are in agreement with the data reported in the general population, where about one third of the people report suffering from insomnia, and women have a higher prevalence of self-reported difficulty in initiating and maintaining sleep than men.[4,16]

The PSQI is the most commonly used self-reported questionnaire designed to gather information about the subjective nature of people's sleep habits. The best cut-off score (differentiating 'good' from 'bad' sleepers) is 5.[14,15] In our study, 75% (372/493) of responders had a global PSQI ≥5. The highest PSQI scores were reported mainly by medical women working in hospital. This is in agreement with what indicated by other authors, who reported a worse quality of sleep among doctors who perform night call duty, long working hours and burdensome work shifts.[7-9,17]

Insomnia is considered a multifactorial disorder, in which predisposing, precipitating and maintenance factors interact. A high level of psychophysiological arousal (autonomic, cortical, cognitive or emotional) is considered an important factor of predisposition and maintenance of insomnia. In our population, the mean APS of retired women (37.59 ± 4.4) was significantly lower than that of women still working (39.14 ± 4.62) (p = 0.020*), suggesting a decrease in arousal when subjects are no longer under pressure from their work.

The APS score is considered a valid and reliable predictor of the presence of sleep problems and insomnia.[18] LeBlanc et al showed that any one-point increase in APS is associated with a 12% increase in the risk of developing insomnia.[19] Coren reported normative APS data higher

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in women (37.6) than in men (34.5), despite the population studied having a lower mean age (20.1 years).[18]

Mean APS in the population subject of our study was higher (39 ± 4.63) than normative data.

This result would suggest a predisposition to respond with greater activation to new or emotionally relevant stimuli and to return more slowly at baseline levels. However, the correlation with the global PSQI was weak, albeit statistically significant, indicating that the APS is a useful parameter to predict insomnia in our population, in spite of what has been suggested by other authors.[13,18]

Moreover, subjective measures do not clearly correlate with the objective assessment, and previous studies showed that women are more likely than man to complain sleep dissatisfaction.[10]

Medical women working in hospitals reported a shorter sleep duration, a worse quality of sleep, more sleep disturbances and more functional dysfunction during the day, and they take more sleeping medications than those working in outpatients clinics. Conversely, retirement produces an improvement in the quality of sleep: lower PSQI and lower APS, longer duration of sleep and less functional dysfunction, suggesting that sleep quality improves when subjects are no longer under pressure from their work.

We did not identify any significant correlation between age, years of work, place of residence and APS, global PSQI and PSQI component. Although some correlations were statistically significant, their extent was so weak that the effect was insignificant. The only exception is the consumption of sleeping pills, which was lower in medical women living in South Italy (12.4%) than in those living in North (24.6%) and Central Italy (23.9%). This is in agreement with the national report on medicines use in Italy, which shows that the consumption of benzodiazepines is greater in the Northern regions of Italy.[20]

Although 34.8% of women who answered the questionnaire reported a bad sleep quality, only 18.4% reported taking sleeping drugs. It remains to be established whether the low use of drugs against insomnia is due to a poor confidence in the drug itself, or to an inadequate awareness of the detrimental effects of insomnia on one's own health and on the safety of patients' health.

Limits

This study was conducted on medical women only, and our results could not be generalized on the overall medical population. However, many studies reported poor quality sleep in female and male doctors.[6-9]

The subgroup analysis could be invalidated by an excessive selection of the sample, with regard both to the years of work (63% have been working for more than 20 years, and only one doctor was just graduated and not yet working at the time of the questionnaire) and to age (average age 52.34 ± 11.59).

The PSQI is a self-reported questionnaire validated for the Italian language,[19] and the results may be exaggerated or minimized by the persons completing the survey. Objective studies are necessary to confirm the presence or absence of different self-reported sleep disturbances among poor sleepers.

Conclusion

Our study shows that a large majority (75%) of medical women, members of AIDM, reported a poor sleep quality as measured by the PSQI. Although the APS of our sample was high, we did not find it to be a reliable predictor of the presence of sleep problems and insomnia in our population.

Medical women working in hospitals reported a worse sleep quality than those working in outpatient clinics.

It is necessary that medical women become aware that a poor quality of sleep can affect their health, but also their professional performance, and that they try to eliminate the manageable factors to ensure the safety of their health services.

Key messages

- Poor sleep quality has been reported among healthcare professionals. Poor quality sleep not only leads to health problems for the medical staff, but is also associated with lower performance rates and a higher risk of medical errors, which may jeopardize the patient's safety.
- Women are more likely than men to report having poor satisfaction with their sleep quality and suffering from the daytime consequences of sleep disorders.
- The aim of our study was to investigate the quality of sleep in a group of medical women, members of the AIDM (*Associazione Italiana Donne Medico*, 'Medical Women's Italian Association').
- Our study shows that a large majority (75%) of medical women reported a poor sleep quality as measured by the PSQI (Pittsburgh Sleep Quality Index).
- Medical women working in hospitals reported a worse sleep quality than those working in outpatient clinics.

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Ethics approval: the research was conducted in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: all the participants offered written informed consent to reproduce and publish their data.

Authors contribution statement: AV, ES, CE worked out the design and conception of the study, AV and ES were responsible for data collection, analysis and interpretation of the data. AV and BF revised the primary data. AV and CE drafted the final manuscript to equal parts. BF revised the manuscript. All Authors had full access to the data set and read and approved the final version of the manuscript.

Conflict of interest statement: the Authors declare no conflicts of interest.

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