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Insomnia among hospitalized elderly patients: Prevalence, clinical characteristics and risk factors

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Abstract

Insomnia can determine an increase in falls and accidents, hospitalization and nursing home placement. The aims of our study are to evaluate prevalence, clinical characteristics and predictors of sleep disorders in elderly inpatients admitted to a Geriatric Acute Care Ward. This longitudinal observational study consecutively recruited patients aged 65 and older admitted to a Geriatric Acute Care Unit between January the 1st 2007 and June 31st 2007. During the 3rd day of length of stay (LOS), patients were asked if they suffered with sleep disorders. Patients reporting sleep disturbances during the first 3 days of LOS were included in the study. Patients were evaluated for insomnia, comorbidity, self-rated health, functional status, cognitive impairment and pain. Of the 280 subjects investigated, 80 referred sleep disorders during LOS with a prevalence of 36.7%. Patients with sleep problems scored significantly worse on the cumulative index rating scale (CIRS) severity index ($p = 0.007$), on the numeric rating scale (NRS) ($p = 0.01$) and on the activities of daily living (ADL) scale ($p < 0.001$). The CIRS severity index resulted the best predictor for insomnia related to hospitalization (OR 7.9, SE 0.85, $p = 0.01$). The knowledge of insomnia predictors might help in planning preventive strategies to improve patients' global health status and quality of life.

1. Introduction

Age is usually associated with high frequency of sleep disturbances even if sleep problems are not a normal part of aging. Difficulty in initiating and maintaining sleep is common in the elderly, who often presents also day time drowsiness (Ramesh and Roberts, 2002). Insomnia is defined as a subjective report of insufficient or non-restorative sleep (Nabil and Gammack, 2006).

Insomnia can determine, through impaired function and chronic fatigue, an increase in falls and accidents (Foley et al., 1995), hospitalization and nursing home placement (Pollak et al., 1990). Cricco et al. (2001) reported that chronic insomnia independently increases the risk of cognitive decline in older adults. Different prevalence of insomnia was reported by previous studies among the general population: 32.2% in the metropolitan area of Los Angeles, 13.4% in the Republic of San Marino, 25% in Austria, 26.2% in Switzerland, 12% in Sweden and 11.7% among new outpatients visiting general hospitals in Japan (Ishigooka et al., 1999). Foley et al. (1999) reported that the annual incidence of insomnia is approximately 5% in older outpatients.

During hospitalization the prevalence of sleep deprivation seems to increase, but, to our knowledge, there is a lack of investigation carried out on elderly subjects admitted to geriatric or internal medicine wards; the majority of understanding about patients' sleep patterns in hospital settings is based on researches conducted in intensive care units (ICU) among adults.

Some authors (Meissner et al., 1998) reported a prevalence rate of insomnia of 34% in elderly patients requiring hospital admission. Another recent study conducted among nursing home residents reported a sleep disturbance prevalence of 27% (Alessi et al., 2005).

During hospitalization the prevalence of sleep deprivation seems to increase, but, to our knowledge, there is a lack of investigations carried out on elderly subjects admitted to geriatric or internal medicine wards; the majority of understanding about patients' sleep patterns in hospital settings is based on researches conducted in ICU among adults (Tranmer et al., 2003).

In hospitals, multiple factors could interfere with night sleep such as environmental factors, circadian dysregulation and, obviously, the acute clinical problems. Moreover sleep complaints could persist several months post-discharge (Griffiths and Peerson, 2005).

The aims of our study are to evaluate prevalence, clinical characteristics and predictors of sleep disorders in elderly inpatients admitted to an Acute Geriatric Ward.

2. Patients and methods

2.1. The study pool

The study was conducted in accordance with the Declaration of Helsinki and it was approved by the local ethical committee. All patients gave written informed consent before enrollment.

This longitudinal observational study consecutively recruited patients aged 65 and older admitted to an acute geriatric unit of a University teaching Hospital between January the 1st 2007 and June 31st 2007. During the 3rd day of LOS two doctors with a 5-year experience in clinical evaluations asked patients if they were suffering with sleep disorders. Patients reporting sleep disturbances during the first 3 days of LOS were included in the study.

Exclusion criteria were: a LOS in hospital less than 4 days; patients unable to communicate because of severe speech disorders (aphasia, dysarthria) and/or severe hearing loss; patients suffering from moderate to severe cognitive impairment as defined through the Short Portable Mental Status Questionnaire (SPMSQ) (Pfeiffer, 1975). The SPMSQ is a 10-question, reliable and easy to use test to evaluate the cognitive function in elderly people. Patients with SPMSQ score ranging from 3 to 4, 5 to 7, and 8 to 10 were considered suffering from mild, moderate and severe cognitive impairment, respectively.

Using predefined forms, for each patient who met the inclusion criteria the following variables were gathered: demographic data (name, age, gender, marital status, living condition—e.g. whether the patient

was living alone, with a spouse, with his or her own children, relatives, with paid personnel or in a nursing homes), the main disease causing hospital admission, the related illnesses, according to the International Classification of Diseases, Ninth Revision Clinical Modification (ICD-9-CM) and the concomitant diseases through the CIRS with both the index of severity (CIRS 1) and the index of comorbidity (CIRS 2) (Linn et al., 1968).

Moreover, we performed the acute physiology and chronic health evaluation, II version (APACHE II) (Knaus et al., 1985), another valid tool for the risk assessment in patients of wide range of age. The APACHE II final score is the sum of three different scores: age points, chronic health points and acute physiology score points.

Functional status was assessed through ADL (Katz et al., 1963). Disability performing activities of daily living was defined as the need of assistance in one or more of the following ADL: bathing, dressing, transferring/mobility in bed, continence, toileting and eating. Patients with ADL score ≥ 1 were considered functionally dependent.

The presence of pain was evaluated through the numeric rating scale (NRS). NRS is a numeric scale ranging from 0 to 10 (0 = no pain, 10 = unbearable pain), widely used and validated in older patients (Jensen et al., 1986, Farrar et al., 2001 and Gilron et al., 2005).

We also investigated the general health status perceived by the patient through the SRH scale (Mossey and Shapiro, 1982). It is defined by responses to a single question such as: "Compared to others your own age, how do rate your health? Excellent, good, poor, bad?"

We evaluate the presence and the severity of insomnia through the insomnia severity index (ISI) (Morin, 1993). ISI is a brief self-report instrument measuring the patient's perception of his insomnia which was validated as an outcome measure for insomnia research (Bastien et al., 2001). It targets the subjective symptoms and consequences of insomnia as well as the degree of concerns or distress caused by those difficulties. The ISI comprises 7 items assessing the severity of sleep-onset and sleep maintenance difficulties (both nocturnal and early morning awakenings), satisfaction with current sleep pattern, interference with daily functioning, noticeability of impairment due to sleep problem and degree of distress or concern caused by sleep problem. Each item is rated on a 0–4 scale and the total score range from 0 to 28. A higher score suggests more severe insomnia (0–7: no clinically significant insomnia; 8–14 sub-threshold insomnia; 15–21 clinical insomnia – moderate severity; 22–28 clinical insomnia – severe). We performed the ISI during the 3rd day after the admission in the geriatric ward (in order to minimize sleep disturbance due to the beginning of hospitalization) and the day before the discharge.

We investigated irritability, anxiety and depression of the patients' sample through a composite index of the irritability, depression and anxiety scale (IDAS) (Snaith et al., 1978) and the hospital, anxiety and depression scale (HADS) (Zigmond and Snaith, 1983). The IDAS is a suitable scale for the self-assessment of irritability in the clinical situation, measuring both outwardly and inwardly directed irritability. The HADS is a self-assessment scale and demonstrated its validity for detecting states of depression and anxiety related to hospitalization in many acute settings (Sukantarat et al., 2007).

We utilized the 24-item disturbance due to hospital noise scale (DDHNS) and the 5-point items for other environmental and personal stress. The 24-item DDHNS self-report measure widely used in different clinical settings to evaluate the hospital noise-induced sleep disturbances. Patients were instructed to rate sounds from the previous night as being: not at all disturbing (0), somewhat disturbing (1) moderately disturbing (2) quite a bit disturbing (3) or extremely disturbing (4) (Topf, 1985). In the 5-point items scale, other independent variables, including bed (unfamiliar bed), and light stress (lights) as well as personal stress (e.g. pain and anxiety) were assessed with single self-report items scaled like DDHNS items ranging from 0 = not at all to 4 = extremely disturbing (Topf and Thompson, 2001).

We also investigated patients for previous history of insomnia, duration of hypnotic therapy administered to the patients suffering from insomnia (years) and mean LOS.

2.2. Statistical analysis

The statistical analysis was performed using SPSS, version 16 for Windows. In the univariate analysis we used Chi-square test or the Spearman's Rank Correlation Test to evaluate dichotomous variables and Student's t-test to evaluate continuous variables. Significant variables were then introduced into the multivariate analysis by means of logistic regression model to identify the main predictors of insomnia during hospitalization.

3. Results

During the study period, 218 subjects were investigated for the presence of sleep disorders. Of these, 80 referred sleep disorders during LOS with a prevalence of 36.7%. Seventeen patients showed a new onset of insomnia.

Table 1 summarizes demographic and clinical characteristics of the sample evaluated. Mean age was 79.8 ± 6.5 years with a similar gender distribution (38 women and 42 men). The mean LOS was 12.1 ± 11.2 days.

Table 1.
Patients with sleep problems: demographical and clinical characteristics, n (%), or mean ± S.D.

Parameters	Score
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Parameters	Score
Men	42 (52.5)
Female	38 (47.5)
Bedridden patients	10 (12.5)
Age	79.8 ± 6.5
LOS (in days)	12.1 ± 11.2
CIRS severity index	2.9 ± 0.3
CIRS comorbidity index	3.2 ± 1.5
APACHE II	5.6 ± 0.9
ADL	2.3 ± 0.7
ADL (functions lost)	0.6 ± 1.4

Upon the ISI scale 28 (35%) of our sample presented a non-clinically significant insomnia, 22 (27%) a subclinical insomnia, 17 (21.6%) a moderate insomnia and 13 (16.4%) a severe one. Performing the test, the difference between those affected by a moderate to severe insomnia (30 subjects) and those referring insomnia was statistically significant ($p < 0.001$; $\chi^2 = 13.02$). Table 2 shows the characteristics of insomnia.

Table 2.

Patients with sleep problems: characteristics of insomnia.

Characteristics of insomnia	<i>n</i> (%)
New onset of insomnia	17 (21.3)
Sleep disturbances during hospitalization	30 (37.5)
Non-clinically significant insomnia (0–7 ISI)	28 (35.0)
Subclinical insomnia (8–14 ISI)	22 (27.5)
Moderate insomnia (15–21 ISI)	17 (21.3)
Severe insomnia (22–28 ISI)	13 (16.3)

The mean score rated on the ISI scale during the second night of hospitalization was 8.9 ± 3.7 , while the same score at discharge time was 7.9 ± 4.1 , without statistically significant difference.

Table 3 shows that patients with sleep problems during hospitalization scored significantly worse on CIRS severity index, on NRS and on ADL scales.

Table 3.

Functional differences between patients with and without insomnia, mean ± S.D.

	Insomnia	Non-insomnia	<i>p</i>
CIRS severity index	3.1 ± 0.3	2.9 ± 0.3	0.007
CIRS comorbidity index	3.2 ± 1.5	2.8 ± 1.4	0.080
ADL lost functions	1.6 ± 1.4	0.41 ± 1.1	<0.001
APACHE	9.8 ± 3.2	9.0 ± 3.0	0.200
NRS	2.0 ± 2.8	0.9 ± 2.2	0.010

Poorer self-rated health was associated with the presence of insomnia ($p < 0.05$). Between patients suffering from clinical insomnia and those without sleep disorders 4% and 5% described their health status as excellent; 29% and 9% as good; 29% and 1% as fair; 21% and 2% as poor, respectively.

Depression as rated by the IDAS was significantly related to insomnia and patients affected by severe depression were exposed to a higher risk of developing sleep problems (OR = 3.9).

Among the sleep disturbing factors, as detected through the 24-DDHNS the most frequent items reported were: other patients' noise (35%), alarms (18%), cough (16.2%), visitors' noise (15%), nurses' noise (7%) and toilet's flushing (5%). Table 4 shows the results of the 5-point items scale exploring the other environmental and personal stress.

Table 4.

Results of the 5-point items scale exploring environmental stress, *n* (%).

	Never	Sometimes	A little	Sufficient	A lot	Total
Anxiety	51 (63.8)	8 (10)	8 (10)	8 (10)	5 (6.2)	29 (36.2)
Noise	52 (65)	5 (6.3)	2 (2.5)	7 (8.8)	14 (17.5)	28 (35)
Pain	63 (78.8)	3 (3.8)	3 (3.8)	7 (8.8)	4 (5)	17 (22.2)
NBD	65 (81.3)	6 (7.5)	5 (6.3)	2 (2.5)	2 (2.5)	15 (18.7)
Lights	69 (87.3)	4 (5)	4 (5)	2 (2.5)	1 (1.3)	11 (13.7)

NBD = non-familiar bed.

Bedridden patients showed statistically significant increase of sleep disorders compared to patients with a preserved ambulatory status (87.5% versus 12.5%, $p < 0.05$).

Our data suggested that visual or hearing impairment and incontinence were protective factors against insomnia ($p < 0.05$). We did not find any relationship between insomnia and admission's or discharge's diagnosis. Ten percent of patients suffering from insomnia did not show any of the insomnia related factors found for the other patients (CIRS severity index, ADL lost functions, bedridden patients, and pain).

Regression logistic analysis showed significant relationship between CIRS severity index and insomnia ($\beta = 2.07 \pm 0.85$ (\pm S.E.M.), OR = 7.9, $p = 0.01$).

Patients who scored worse on the CIRS severity index had a nearly eightfold higher risk for having insomnia increasing for each CIRS severity index point.

Among subjects with a priory history of insomnia and already assuming hypnotic therapy, the duration of sleep-promoting therapy was significantly longer than those who did not present insomnia during hospitalization (11.8 ± 9.7 years versus 6.5 ± 8.7 years, $p < 0.04$).

4. Discussion

In our study prevalence of referred insomnia was 36.7%. Our prevalence was lower compared to that showed in a previous study conducted in younger medical hospitalized patients (56.5%) (Rocha et al., 2005). Southwell and Wistow (1995) reported that 22% of a large sample of inpatients referred that they did not get as much sleep as they needed in hospital. A possible explanation for this difference could be addressed to the geriatric approach to treat older subjects with individualized strategies to prevent or reduce sleep problems (presence of constant caregiver, attention to sensory inputs, specific care of geriatric problems, appropriate scheduled night-time therapies). As a matter of fact, older persons may be more sensitive to their own personal feelings of pain and to the external environment (Tranmer et al., 2003); natural changes to sleep patterns can be exacerbated by the hospitalization (Koch et al., 2006). Hospital ward exposes patients to many disturbing factors such as hospital noise originating from other patients or visitors, increased light exposure, unfamiliar bed and night-time nursing. The more intensive is the medical care, the more frequent is the sleep disruptions presence (Tranmer et al., 2003). Moreover, hospitalized patients spend much time in bed during the day which is known to interfere with circadian rhythm.

Several studies reported that the sleep experience varies for patients across the hospital stay. In an observational study, Tranmer et al. (2003) found that surgical hospitalized patients presented higher sleep disruptions with progressing LOS, conversely medical hospitalized patients were able to sleep better. We did not find any difference between the two ISI score gathered on the 3rd day of LOS and before the discharge. It could be due to the short period between two examinations and to the extremely variable coping ability of the elderly.

Few studies report the relationship between global daily activities and sleep disorders. Some authors (Foley et al., 1995) demonstrated that an increasing number of physical disabilities and a poorer self-rated health are associated with a higher frequency of overall sleep complaints.

Our findings suggested that a greater number of lost functions at ADL are significantly associated with sleep disorders. A functional compromised elderly patient has a lower ability to react to adverse environmental stress factors. Frail patients might be more worried about the possibility that their needs would not be satisfied by the nurse or medical staff (Lee et al., 2007).

Patient's comorbidity and severity determine more physical symptoms (e.g. dyspnea, pain and cough) and require more frequent interventions by the hospital staff, interfering with the maintenance and the quality of patients' sleep. Foley et al. (1995) reported that two thirds of community dwelling older adults with major comorbidity presented one or more sleep problems compared with approximately one third of the participants without major comorbidity. These results support our findings showing that the comorbidity severity index is the strongest predictor of sleep disorders in hospitalized patients.

Insomnia symptoms are associated with medication use, cognitive impairment, visual and hearing impairments, depression disability and poorer self-reported health status (Vaz Fragoso and Gill, 2007). As reported by Stewart et al. (2006), the association between insomnia and impaired quality of life is most pronounced in older age groups. The results of our study are in agreement with these previous data.

Sleep disturbance is common among patients experiencing depression. Depression is frequent among people over 65 years of age. Risk factors for depression in older people include loss of a spouse, retirement, social isolation, comorbid disease and onset of dementia (Wolkove et al., 2007).

The relationship between depression and sleep difficulties is controversial: older people with chronic insomnia have a higher level of depression and cognitive decline (Foley et al., 1995 and Cricco et al., 2001) and insomnia increases the risk for depressive new onset and relapse (Pigeon et al., 2008); otherwise depressed patients report a poor sleep quality (Foley et al., 1995). Our findings demonstrated a statistically significant association between depressive symptomatology and sleep complaints.

Relationship between insomnia and pain is complex. On one hand insomnia in hospitalized patients contributes to determine a decreased pain tolerance (Snyder-Halpern and Verran, 1987), on the other hand the presence of uncontrolled pain might compromise sleep maintenance and quality (Frighetto et al., 2004). In our study patients with higher NRS score showed more frequent sleep disturbances. Sleep and daytime sleepiness problems are common among opioid-treated primary care patients with chronic pain and seem to be related mainly to depression and pain severity (Zgierska et al., 2007). Patients with chronic pain report more wake after sleep-onset and movements during sleep than insomnia patients without chronic pain. Patients with more pain show more sleep fragmentation, longer sleep latency, lower sleep quality and shorter sleep duration (Call-Schmidt and Richardson, 2003).

We found that the duration of hypnotic therapy was significantly longer for those who presented insomnia during hospitalization than for those who did not. Long-term use of sleep-promoting medications has already been shown to be counter-productive (Koch et al., 2006). Elderly insomnia management should promote appropriate sleep habits before administering hypnotic or sedative medications. It is well known that a low dosage and short-term use are recommended and occasional use minimizes potential withdrawal and side effects (Neubauer, 1999).

Visual impairment is a common and disabling disorder in elderly people. Its prevalence increases from 18% in men and 26% in women of ages 65–69 years to 31% in men and 47% of women of ages ≥80 years (Asplund, 2000). Previous studies reported results different from ours (Asplund, 2005). Visual and hearing impairment are considered risk factors for insomnia, because they increase the patient's isolation and concur to modify his circadian rhythm, but these studies were conducted on community-living elderly. Our hospitalized subjects showed a different trend and these impairments represent a protective factor against insomnia. This might be due to the geriatric approach of our medical and nursing staff that contribute to

maintain patients' vigilance during the day to reduce daily sleeping and maintain their physiological circadian rhythm. This approach should permit a better night-sleep in all the patients. Furthermore patients with visual or hearing impairment can be "protected" by disturbing factors such as environmental noises or excessive lights.

Interestingly incontinence also resulted as another protective factor against insomnia in our patients. We could speculate that the presence of diapers or catheterization results in decreased toileting needs.

Some limitations of this study should be discussed. The study was not designed as a randomized controlled trial and we did not perform a follow-up. The sample size is too small to generalize our findings; we have not collected sleep habits and sleep patterns data during the middle age of our patients; we did not investigate patients for primary insomnia.

Insomnia in hospitalized elderly patients occurs as a result of multiple factors, knowledge of which could help in planning adequate preventing strategies. In our study the presence of severe comorbidity, pain and impaired functional status were significantly and independently associated to insomnia. Appropriate measures, as individualized and as well-timed as possible, that reduce the risk of insomnia will have a remarkably good influence on patients' global health status and quality of life.

Conflict of interest statement

None.

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