Sleep Problems in a Very Old Population: Drug Use and Clinical Correlates

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Background. Complaints of disturbed or dissatisfied sleep are common among older people. This study aimed to evaluate the prevalence of sleep problems in very old persons and its relation to physical and mental health and drug use.

Methods. This is a cross-sectional analysis of sleep problems in a population of old persons living in Stockholm, Sweden. There were 641 subjects aged 81+ years; 77.8% were women, 91.4% were noninstitutionalized, and 68.6% lived alone. All persons underwent a comprehensive medical and psychiatric interview and examination. Sleep problems were assessed using the Clinical Psychopathological Rating Scale (CPRS). Covariates included chronic medical conditions, depression, dementia, pain, self-rated health, activities of daily living, use of hypnotics-sedatives, use of other psychotropic drugs, and use of nonpsychotropic drugs.

Results. More than one third of subjects were identified with sleep problems. They were more common among women and persons using a higher number of drugs. Poor self-rated health, depression, and pain were related to the presence of sleep problems. Among persons with sleep problems and depression, only 19.2% used antidepressants, and 46.2% used hypnotics-sedatives. Among persons with sleep problems and pain, 65.2% used analgesics, and 47.0% used hypnotics-sedatives. One or more chronic diseases, use of hypnotics-sedatives, use of other psychotropic drugs, and use of nonpsychotropic drugs were also related to sleep problems. After multivariate analysis, factors significantly related to sleep problems were female gender, depression, pain, and hypnotic-sedative use.

Conclusions. Sleep problems were common in this very old population. These results suggest the importance of carefully assessing an older person’s complaints to accurately diagnose and effectively treat sleep problems.

DISTURBED or unsatisfactory sleep is a common complaint with advancing age (1–4). This is described as trouble getting to sleep, trouble staying asleep, and early morning awakenings. Potential causes of sleep problems in old people are multifactorial, resulting from the interplay of physiological, medical, psychiatric, psychosocial, and pharmacologic events.

Age-related changes in sleep are thought to reflect altered circadian rhythm and homeostatic mechanisms demonstrated through polysomnographic changes; old people spend more time in bed but less time asleep and are more easily aroused from sleep than younger people (1,5). Acute and chronic medical conditions and pain have been known to disrupt sleep (6–9). Of the various factors contributing to sleep problems, depression has been consistently identified (2–4,8). Dementing illnesses have also been noted to cause changes in sleep-wake patterns that result in disturbances in sleep and night-time behavior (10). Isolation, retirement, and poor self-rated health have been considered as correlates of poor sleep (3,4,6,11,12).

Drugs such as antihypertensives and central nervous system stimulants cause disruption of sleep and sedation (13). Hypnotics-sedatives, exemplified by the benzodiazepines, are one of the most widely prescribed drugs for elders (14). Hypnotic-sedative use results in residual sedation as well as rebound insomnia following discontinuation and when used chronically exacerbates existing sleep problems (15,16). Sleep problems, on the other hand, are symptomatically treated with hypnotics-sedatives resulting in excessive use of these drugs (17).

Because the fastest growing segment of the elderly population is the 80 years and older group (18), we thought it important to evaluate the burden of declined quality of sleep in this age group. This study aims to determine the prevalence of sleep problems in very old persons and to characterize its relation to drug use and physical and mental health factors.

Methods

Data were derived from the Kungsholmen project in Stockholm, Sweden, full details of which have been described elsewhere (19). Briefly, all individuals born in 1912 or earlier and living in Kungsholmen, Stockholm were invited to take part in the study. Of the 2,368 individuals eligible for the study, 1,810 participated. Baseline study was conducted in 1987–1989 and consisted of a screening and a clinical phase. The subjects underwent a health interview and Mini-Mental State Examination (MMSE) to screen for dementia. The clinical phase was conducted to obtain a diagnosis of Alzheimer’s disease or other causes of dementia. Subjects
with an MMSE score of ≤23 and a sample of sex- and age-matched subjects with an MMSE score of ≥24 were extensively evaluated with a comprehensive clinical examination and structured health interview. The clinical examination included a medical history, physical and neurological examinations, and laboratory and neuropsychological evaluation. The diagnosis of dementia was based on the Diagnostic and Statistical Manual of Mental Disorders (DSM) III-R criteria (20).

The population was followed prospectively and reexamined approximately every 3 years. Data presented here are from the second follow-up (1994–1996) of the study. A total of 683 subjects were reexamined in 1994–1996, as a result of dropouts due to death, 791 (43.7%), refusal, 301 (16.6%), and relocation, 35 (1.9%).

There were 641 (93.8%) subjects with available information on sleep. The mean age was 86.6 years (range 81–100), 77.8% were women, and 91.4% lived in their own homes. More than half (53.0%) were widowed, 68.6% lived alone, and 53.2% had ≤7 years of education. Subjects who were not able to complete the interview were slightly older, had a lower mean MMSE score, 7.1 versus 23.8 (not able to complete the interview were slightly older, had a lower mean MMSE score, 7.1 versus 23.8 (p = .000), and 88.1% had dementia. There was no difference in gender, living arrangement, education, and type of housing.

Data Collection

The subjects or reliable informants for those judged not to be capable of reliably responding, were interviewed using a structured protocol about the participant’s sociodemographic, medical, and social history. For subjects living in institutions, information was obtained from nursing home personnel and medical records.

The housing variable was categorized into (i) noninstitution, consisting of homes, sheltered accommodation (individual apartments with communal facilities, like kitchen, and professional but nonmedically skilled caregivers), and old people’s home; and (ii) institution, consisting of special care units (accommodation for demented persons with communal facilities and staffed by a medically skilled caregiver), nursing homes, and geriatric wards. Education was dichotomized as 8 years or more and 7 years or less.

A sleep problem was identified using the Comprehensive Psychopathological Rating Scale (CPRS) (21). The CPRS is a structured instrument that rates a wide range of psychiatric signs and symptoms on a six-point scale. A score of 2 or more indicates significant pathology. A sleep problem was considered when there was a subjective feeling of reduced duration or depth of sleep compared to the subject’s own normal pattern when well (21).

The other variables utilized were measured as follows. Physical health factors included the presence of a chronic condition and limitation in performing activities of daily living (ADLs) using Katz index of ADL (22). Subjects were asked about the presence of any chronic condition, and this was classified according to major disease categories: cardiovascular, respiratory, neurological, gastrointestinal, musculoskeletal, endocrinological, urogenital, tumors, and others. Limitation in ADLs was considered when a subject needed help or was unable to perform one or more ADLs.

Measures of mental health included the presence of dementia, depression, pain, and self-rated health. DSM IV criteria were used for the diagnosis of depression, and CPRS was used to evaluate the presence of pain (21,23). Self-rated health was assessed by asking a single item (“Do you feel healthy?”) and was categorized as healthy/good or not healthy/poor.

The information on drugs was evaluated by asking subjects or informants about prescription and nonprescription drugs. Drug use was defined as drugs taken regularly at the time of interview and drugs taken as needed during the 2 weeks preceding the interview. This was confirmed by inspecting actual prescriptions and drug containers. Therapeutic categories of drugs were based on the Anatomical Therapeutic Chemical (ATC) classification system (24).

The ethics committee of the Karolinska Institute has approved the Kungsholmen project. Written informed consent was obtained from each participant or close relative (proxy) with the right to refuse participation at any stage and part of the project.

Data Analysis

Statistical analyses were performed using the Statistical Product and Service Solutions (SPSS) (25). Chi-square tests for categorical variables and Student’s t tests for continuous variables were used to determine the differences in the proportions of, or between, subjects with and without sleep problems. Crude and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were estimated using logistic regression. The adjustment variables were age, housing, living arrangement, and civil status.

RESULTS

The sociodemographic characteristics of the population with and without sleep problems are presented in Table 1.

Table 1. Sociodemographic Description* of Sample Population

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>With Sleep Problem</th>
<th>Without Sleep Problem</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>86.6 (3.8)</td>
<td>86.9 (4.0)</td>
<td>.343</td>
</tr>
<tr>
<td>Drug Use, mean (SD)</td>
<td>5.1 (2.9)</td>
<td>4.3 (3.1)</td>
<td>.003</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td>Women</td>
<td>107 (75.4)</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>Men</td>
<td>35 (24.6)</td>
<td></td>
</tr>
<tr>
<td>Housing, n (%)</td>
<td>Noninstitution</td>
<td>309 (61.9)</td>
<td>.769</td>
</tr>
<tr>
<td></td>
<td>Institution</td>
<td>37 (67.3)</td>
<td></td>
</tr>
<tr>
<td>Living Arrangement, n (%)</td>
<td></td>
<td>37 (67.3)</td>
<td>.657</td>
</tr>
<tr>
<td>Alone</td>
<td>283 (64.3)</td>
<td>157 (35.7)</td>
<td></td>
</tr>
<tr>
<td>With others</td>
<td>133 (66.2)</td>
<td>68 (33.8)</td>
<td>.740</td>
</tr>
<tr>
<td>Education, n (%)</td>
<td>≥7 years</td>
<td>219 (64.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥8 years</td>
<td>197 (65.9)</td>
<td></td>
</tr>
<tr>
<td>Civil Status, n (%)</td>
<td>Single</td>
<td>334 (80.3)</td>
<td>.917</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>82 (65.6)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Analyses are chi-square tests of differences between proportions or Student’s t test of differences between means.

*Missing data on education on two women.

†Includes divorced and widowed.
More than one third of the sample was identified as having sleep problems. Sleep problems were more likely to be reported by women. Subjects with sleep problems were more likely to use one or more drugs (98.2% vs 91.8%, \( p = .001 \)) and a higher number of drugs compared to those without problems.

Measures of mental and physical health and drug use in relation to sleep problems are presented in Table 2. Poor self-rated health, depression, and pain were related to the presence of sleep problems. Among persons with sleep problems and depression, only 19.2% were treated with antidepressants, and 46.2% used hypnotics-sedatives. Among those with sleep problems and pain, 63.2% were treated with analgesics, mostly paracetamol, and 47.0% were treated with hypnotics-sedatives. Persons with dementia were less likely to report sleep problems.

The presence of one or more chronic conditions was related to sleep problems. Persons with sleep problems reported a higher number of chronic diseases than those without, 2.6 versus 2.2 (\( p < .001 \)). Those with cardiovascular diseases (63.6% vs 50.0%, \( p < .001 \)) and tumors (22.2% vs 11.8%, \( p = .001 \)) were more likely to have problems with sleep. Also, persons with sleep problems more commonly reported a limitation in at least one ADL.

The use of hypnotics-sedatives, other psychotropics (neuroleptics, anxiolytics, and antidepressants), and nonpsychotropic drugs was related to sleep problems. Benzodiazepines (BZDs) accounted for 78.0% of hypnotics-sedatives, consisting mainly of long-elimination half-life BZDs. Anxiolytics were the most commonly used of the other psychotropics, reported by 20.0% of persons with sleep problems. Of the nonpsychotropic drugs, diuretics were the most commonly used, 44.4%.

Table 3 shows the crude and adjusted OR and 95% CI estimating factors significantly related to sleep problems. Subjects who used hypnotics-sedatives, were women, or experienced depression or pain were more likely to have sleep problems, whereas subjects with dementia were less likely to have sleep problems. The observed association remained unchanged when the analyses were repeated after adjusting for gender, hypnotic-sedative use, chronic condition, and self-rated health among subjects with depression and after adjusting for gender among subjects with dementia.

**DISCUSSION**

Existing studies on sleep problems in elders often involved subjects aged 65+ years and, depending on the methodological approach and definition, report the prevalence to be between 15.8% and 59.3% (2–4,8). Our study involving a population of persons aged 81+ years indicated that sleep problems are common in this age group: more than one third of the population reported having problems with their sleep. Sleep problems were more commonly reported by women and were related to depression, pain, poor self-rated health, chronic medical conditions, limitation in ADLs, and drug use, consistent with results from previous studies (2–4,6,8,9).

Changes in sleep architecture are a common clinical feature of dementia (10). In our study, sleep problems were not related to dementia, similar to a report on old persons living in a community (26). Because our data relied on subjective reporting of sleep problems, this negative association may have been due to impaired comprehension and communication in persons with dementia (27). A previous study on the sleep characteristics of probable Alzheimer’s disease patients reported that sleep disturbance was not related to cognitive impairment but was significantly related to daytime behavioral disturbance (28).

Sleep problems were found to be related to hypnotic-sedative use (6,29). Sleep problems tend to be persistent and lead to longer use of hypnotics-sedatives, resulting in dependence and cognitive and psychomotor impairment (15, 29,30). An important finding in this study was the use of long-elimination half-life BZDs in persons with sleep problems, which raises the question of appropriateness of use and risk of adverse drug events. Long elimination half-life BZD use may result in daytime sedation, falls and fractures, respiratory depression, and confusion in elders (31–33).

Another issue of concern in this study was the use of hyp-
notic-sedatives in persons with both sleep problems and depression. This was similar to a previous study on community living elders evaluating sleep problems with respect to psychiatric diagnoses (29). That study reported that in subjects with sleep problems and depression or dementia, hypnotic use was related to the sleep problem independent of the presence of a psychiatric diagnosis. In our study, more subjects with sleep problems and depression were using hypnotics than antidepressants. The above-mentioned study further reported that, despite hypnotic use being related to the sleep disorder, more than 70% were still not using hypnotics. This was similar to our data where only 46.2% were using hypnotics-sedatives.

Because the cross-sectional nature of this study precludes the establishment of a causal relation, we were unable to assess whether the sleep problem is the reason for, or the consequence of, sedative-hypnotic use. Similarly, it may well be that the sleep problem exists as a precursor for (4) or a result of depression (3,12).

Our findings show evidence for the prevalence of sleep problems in very old persons and its relation to poor physical and mental health and hypnotic-sedative use. Furthermore, sleep problems in persons with depression or pain were not treated adequately and were often treated with hypnotics-sedatives. This study underscores the importance of addressing complaints of disturbed sleep in elders and provides evidence for the public health importance of sleep problems in very old persons. Disturbed sleep is a widespread complaint among elders and is associated with functional impairment and poor quality of life (34,35). It is recommended that a careful assessment of sleep complaints be made based on their role in contributing to or resulting from diseases in order to avoid unnecessary use of drugs and reduce the risk of adverse events.

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