Agitation in the morning: symptom of depression in dementia?

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SUMMARY
Objective To investigate the possible correlations between depression in dementia and agitation in the morning by a prospective naturalistic study.

Methods Data were collected from three independent nursing homes in an urban setting. Trained nursing home staff pre-selected 110 demented and agitated patients with a minimum age of 60 years. Three main groups were formed based on agitation peak either: in the morning, evening or none. Each is respectively: ‘sunrisers’, ‘sundowners’ and ‘constants’. Agitation was assessed by the same staff twice a day for a 2-week timeframe using the CMAI (Cohen-Mansfield Agitation Inventory); MMSE (Mini-Mental State Examination) for dementia re-evaluation and staging; CSDD (Cornell Score for Depression in Dementia) for depression screening.

Results Sixty-three (60%) of all patients were depressive but only 16 patients of them were treated with antidepressants. Forty-four patients were classified as belonging to the ‘sunriser’ group, 38 to the ‘sundowners’ and 23 to the ‘constants’. There were no significant differences in depression between the three groups: $p = 0.798$ for the difference in proportion of depressed or not depressed people; $p = 0.272$ for the difference in raw Cornell-score between agitation in the morning and evening.

Conclusion ‘Sunrising’ appears to play an important role in dementia. In our population agitation was slightly more common in the morning than in the evening, but peak of agitation does not seem to be related to depression in dementia. Our data supports that the diagnosis of depression is still often overlooked in demented and agitated persons. Copyright © 2008 John Wiley & Sons, Ltd.

KEY WORDS — dementia; agitation; depression

INTRODUCTION
Depression is a frequent condition in nursing home residents, its prevalence ranging around 30% (Weyerer et al., 1995). Depressive syndromes are often difficult to diagnose (Nelson, 2001), especially in cognitively impaired elderly persons. The diagnostic procedure has to take into account the specific conditions concerning depression in dementia, i.e. the difficulties in expressing oneself due to lack of insight or executive functions. Therefore the medical awareness for indirect or minor signs and symptoms related to depression should be high. The affective comorbidity worsens the quality of life of a dementia patient (Gonzalez-Salvador et al., 2000). It is discussed controversially if depression in dementia can be treated as efficiently as in cognitively unimpaired elderly persons (Evans et al., 1997; Bains et al., 2002). However, earlier detection and treatment of depression in dementia might be advantageous. Depressive syndromes often show pronounced symptoms in the morning (called ‘low in the morning’, or ‘PMV: Positive Mood Variations’) (Murray, 2007).
Elderly, depressive persons often show agitated behaviour (Cvetkovic-Bosnjak et al., 2000). The goal of our study was to evaluate if agitation in the morning might be associated with depression in dementia.

METHODS

This study was designed in accordance with the ethical committee associated with the Bochum Medical Facility during the summer of 2006. Each of the participants resided in three different nursing homes in Bochum and each were a minimum of 60 years old. All of the residents were pre-screened by the nursing staff for presence of dementia and agitation.

As a second step, cognitive status was evaluated and measured by the first author using the Mini-Mental Status Examination, MMSE (Folstein et al., 1975). According to the resulting score of this test each of the residents were divided into three samples: The first sample consisted of mildly demented patients (MMSE 27–20), the second of moderately demented (MMSE ≤9–>10) and the third of severely demented patients (MMSE ≤10). Additionally, we used the DemTect (Kalbe et al., 2004) for cases with MMSE scores of 24–27 to make sure that only demented patients were included.

As a third, step agitation was confirmed and evaluated using the Cohen-Mansfield Agitation Inventory, CMAI (German version), (Cohen-Mansfield and Libin, 2004). CMAI assessment was conducted twice daily, early and late shift, by trained caregivers for a period of 14 days. To ensure data integrity and completeness of the questionnaires the first author personally collected all questionnaires at the end of each shift. The abbreviated, validated German version of the CMAI consists of 23 items grouped into the following three subdivisions: physical agitation, verbal agitation and aggression. The agitated patients were allotted to three subgroups on the basis of the circadian rhythm of agitation: ‘sunrisers’, ‘constants’ and ‘sundowners’. ‘Sunrisers’ were more agitated in the morning, ‘constants’ agitated through whole the day and ‘sundowners’ were more agitated in the evening. The assignment to one of these subgroups was done by calculating the difference between the CMAI value in the evening and the CMAI value in the morning and summing up the 14 differences (one for every day). Allotment to the different groups was made depending on our clinical subjective observations: All patients with values lower than −20 during the 2-week observation period were named ‘sunrisers’, those with values from −20 to +20 ‘constants’ and persons with values over +20 ‘sundowners’.

For assessing depression we used the Cornell Scale for Depression in Dementia, CSDD, a 19-item scale (Alexopoulos et al., 1988). It consists of an interview, done by the first author, with the patient and the caregiver. A score of nine or more points indicated depression. Additionally, we documented the use of antidepressant agents for all participants.

Statistical were computed using SPSS for Windows Version 11.5 (SPSS Inc., Chicago, Ill.). Means and standard deviations/relative frequencies were calculated for all variables. For comparisons between groups Pearson-chi-square tests were used for categorical variables. In the case of quantitative variables t-tests were used.

RESULTS

After the pre-screening selection for dementia and agitation took place, a total of 110 residents were included in the study. During the course of the study, five persons were excluded from the trial: two of them due to hospital admission, one because of the legal caretaker’s withdrawal from the study, one due to insufficient proof of dementia and agitation as discovered in the second and third steps of the study, and one because of death during the data collection.

Two of the remaining 105 patients had MMSE scores of 25 and 27. Dementia in these two patients was confirmed by DemTect (scores of 6 and 8).

Table 1 gives an overview about dementia, depression, agitation and other descriptive data of the study population. It is interesting to see that more patients (44 = 41.9%) belonged to the ‘sunriser’ group than to the sundowner group (38 = 36.2%). There was also an unexpected tendency of patients with mild dementia being older than patients with severe dementia (88.4 years vs 84.5 years).

Statistical calculations did not confirm our hypothesis that in dementia agitation in the morning is a sign of depression (Figure 1). There were no significant differences between the three agitation pattern groups: ‘sunrisers’ (1) vs ‘sundowners’ (3) (t-test: p = 0.272), ‘sunrisers’ (1) vs ‘constants’ (2) (t-test: p = 0.734), ‘constants’ (2) vs ‘sundowners’ (3) (t-test: p = 0.148). When using the binary depression classification by Cornell score there were neither significations available (chi-square-test: p = 0.798).

Sixty percent (63 patients) of our population was depressive according to our test results (Tables 2 and 3), however only 25.4% of them received a specific antidepressant therapy (16 patients) (Table 3).
The prevalence of depression is not related to the stage of dementia (Table 2) (chi-square-test: \( p = 0.765 \); data not shown).

There was a tendency towards more agitation in more severely demented patients (Table 1, mean agitation score). This correlation did not reach statistical significance (chi-square test: \( p = 0.193 \)).

There was no general significant correlation between the level of dementia and the level of agitation (t-test: \( p = 0.005 \) between slightly and moderate demented in proportion to the level of agitation; t-test: \( p = 0.015 \) between slightly and severe demented; t-test: \( p = 0.848 \) between moderate and severe; data not shown). Slightly demented people were more agitated in the morning (85.7%; chi-square test: \( p < 0.001 \)) (Table 1).

Tentative change of the cut-off scores for the different circadian agitation groups from /C6/20 to /C6/10 and /C6/30 did not result in significant results for our hypothesis either (chi-square-test: \( p = 0.983 \) for /C6/10 and chi-square-test: \( p = 0.637 \) for /C6/30). Elimination of 18 patients with extreme and moderately inconstant levels of agitation did also not lead to a change of the result (chi-square-test: \( p = 0.675 \)).

After completion of data collection an inhomogeneous distribution of depressive patients was observed (Table 1). Therefore, we also only tentatively excluded nursing home (A) hosting a high percentage of depressive patients from the calculation. Still, no significant correlation could be detected (chi-square-test: \( p = 0.713 \)).

DISCUSSION

'Sundowning' as a clinical phenomenon stands for agitation in dementia with a peak in the late afternoon or evening. Its prevalence is estimated to occur in 10–25% of nursing home patients (Martin et al., 2000). Rare and contradictory data exists about the presence

![Graph showing the prevalence rates of depression in dementia for the three patterns of circadian agitation: sunrisers = agitation peak in the morning; constants = no agitation peak; sundowners = agitation peak in the evening.](image-url)
and importance (Gallagher-Thompson et al., 1992) of ‘sunrisers’ as a clinical phenomenon for agitation in dementia with a peak in the morning. It has been speculated this phenomenon might be associated with depression (Pauly, 2001), as a low in the morning can often be observed in depression and as depression can be associated with agitation. The aim of our study was to evaluate the possible association of a ‘sunrising’ phenomenon with depression in dementia. The method of our approach has to be discussed.

As a first step, the trained staff performed a pre-screening for agitation and dementia on all residents at each of the nursing homes. The reliability of knowledgeable persons’ evaluations of demented persons seems to be very high (Ready et al., 2004). Agitation was assessed using the CMAI. This assessment tool is known for its easy applicability and its broad use in psychogeriatric research (Weiner et al., 2002). The cross-sectional design of our study resulted in a discontinuous evaluation of the agitation by several caregivers, which likely improved the objectivity of the assessment.

To our knowledge only sparse data exists regarding the circadian evaluation of agitation. Therefore, we had to define the cut-off scores for the three subgroups ‘sunrisers’, ‘constants’ and ‘sundowners’. Initially we were discussing a limit of ±14 for the ‘constants’. However, to make sure to exclude patients with borderline values from the ‘sunriser’ and ‘sundowner’ groups we started our study after broadening the central ‘constants’ interval to cut off scores of -20 to +20.

We subjectively hold the belief that a correlation existed to our clinical observation. We tentatively changed the cut-off scores and excluded outliers to limit the influence of our subjective agitation group definitions. This did not result in a change of our outcome.

The assessment of agitation was performed only twice a day once during the morning shift (06:00 to 14:00) and once throughout the afternoon shift (14:00 to 22:00). When designing our study we were aware of the possibility that we might potentially miss patients during their maximum agitation around noon. In support of our measurement approach the nursing staff stated that this kind of rhythm is rare. As such we decided in favour of our study model. To ensure data integrity we asked the staff at the end of the shifts to report any special incidents. None were reported. This also retrospectively supports our study design.

However, it is important to point out that we were informed several times that agitation of patients started before the beginning of the morning shift. Some authors describe agitation in the crack of dawn as an uncertain expression of depression (Pollak and Stokes, 1997). With that said, we hold the opinion that we did not miss patients belonging to the ‘sunriser’ group because these agitation periods ranged until the morning shift. In light of the aforementioned data acquisition, it might be advantageous for future...

| Table 2. Prevalence rates of depression in mild, moderate and severe dementia |
|------------------------|------------------------|------------------------|------------------------|------------------------|
|                       | Mild dementia MMSE > 19 | Moderate dementia MMSE > 10 ≤ 19 | Severe dementia MMSE ≤ 10 | Total                   |
| Depression Patients (% for each stage) | 4 (57.1) | 27 (64.3) | 32 (57.1) | 63 (60.0) |
| Total Patients (% for each stage) | 7 (100.0) | 42 (100.0) | 56 (100.0) | 105 (100.0) |


Table 3. Prevalence of patients with and without antidepressant therapy in nursing home A, B and C

<table>
<thead>
<tr>
<th></th>
<th>Nursing home A</th>
<th>Nursing home B</th>
<th>Nursing home C</th>
<th>Nursing homes together</th>
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</thead>
<tbody>
<tr>
<td>Number of depressed patients</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>without antidepressant therapy/within depressed (percentage within depressed)</td>
<td>18/19 (94.7%)</td>
<td>6/10 (60%)</td>
<td>23/34 (67.6%)</td>
<td>47/63 (74.6%)</td>
</tr>
<tr>
<td>Number of patients with antidepressant therapy/within depressed (percentage within depressed)</td>
<td>1/19 (5.3%)</td>
<td>4/10 (40%)</td>
<td>11/34 (32.4%)</td>
<td>16/63 (25.4%)</td>
</tr>
<tr>
<td>Depressed patients/all patients included in the study (percentage of depressed)</td>
<td>19/20 (95.0%)</td>
<td>10/26 (38.5%)</td>
<td>34/59 (57.6%)</td>
<td>63/105 (60%)</td>
</tr>
</tbody>
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studies to assess during this period of time, in order to optimize the accuracy of results.

The Cornell Scale for Depression was chosen, as it has been shown to have a higher validity in depressed, demented patients than other specific inventories (Lam et al., 2004; Muller-Thomsen et al., 2005).

As depressive patients typically show a marked symptomatology in the morning (Murray, 2007) and—on the other hand—the clinical appearance of late life depression is often shaped by agitation (Cvjetkovic-Bosnjak et al., 2000), we developed the hypothesis that ‘sunrising’ may be a depressive feature. Although we were not able to corroborate this hypothesis by this study, some reflections concerning the interface of dementia, depression and agitation could be of some clinical scientific value. Depression could arise from different aetiologies and proceed in different stages, so that it could be associated with different forms of circadian agitation patterns (Cohen-Mansfield and Libin, 2005). Although these various forms of depression are not easily differentiated in the clinical diagnostic procedure a better differential diagnosis could lead to the conclusion that ‘sunrising’ is a symptom of some, but not all, forms of depression in dementia. Anosognosia, aphasia and other new psychological impairments weaken the capacity of dementia patients to express their emotions. These communicative problems should have the consequence of an enhanced sensitivity for possible affective symptoms on the doctor’s side.

In dementia the affective problems cause an even greater disease burden than do the cognitive symptoms. As such early detection and treatment of depression in dementia may be looked upon as a major task for professionals in the psychogeriatric field.

Agitation is a behavioural problem in dementia. Its effective treatment is often more difficult than the treatment of depression. In our sample the prevalence of depression is extremely high, reaching up to 60% (63 patients). Given the fact that dementia and agitation were the two primary selection criteria for each of the staff members in the three nursing homes one could hypothesize that these figures exemplify a close link to depression in dementia. Another hint for this theory is the observation of decreased agitation by an antidepressant therapy (Ramadan et al., 2000). In our study population only 25.4% (16 patients) of the patients with depression in dementia were treated with an antidepressant agent. This might be a possible hint for an insufficient diagnosis and therapy. However, antidepressant therapy in dementia is a controversial discussion topic (Evans et al., 1997; Bains et al., 2002).

CONCLUSION

In dementia agitation in the morning (‘sunrising’) seems to play an important role. Statistical analysis of our data revealed only a tendency for a higher prevalence of agitation in the morning than in the evening in the study population which did not reach significance. The peak of agitation, either in the morning or in the evening, did not appear to be related to depression in dementia. Sixty-three of 105 demented and agitated patients were depressive (60%), but only 16 received an antidepressive therapy. This perhaps suggests that there are a high number of undiagnosed depressive patients in populations of agitated and demented elderly persons.

Early intervention would help reduce medical costs. Given the world-wide increase in incidences of dementia, and the chronic course of the disease, the socio-economic implications of an appropriate, specific and effective treatment of depression and agitation in dementia cannot be overestimated.

CONFLICT OF INTEREST

None known.

AUTHOR CONTRIBUTIONS


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