BRIEF REPORTS

Timing of Sleep and Wakefulness in Alzheimer’s Disease Patients Residing at Home

Donald L. Bliwise, Jared R. Tinklenberg, and Jerome A. Yesavage

Introduction

Dysfunction of the circadian timing system has long been suspected in Alzheimer’s disease (AD) because such patients frequently, though not inevitably, have sleep disturbance (Bliwise 1989). Despite such sleep disruption, some studies of various physiological phenomena typically showing diurnal variation (e.g., body temperature, cortisol, prolactin, melatonin) have had difficulty showing differences between AD patients and controls (Prinz et al 1984; Touitou 1982; Christie et al 1983), perhaps owing to selection bias in patients studied (Witting et al 1990). More recently, Campbell et al (1988) reported the existence of an earlier acrophase in the body temperature cycle in male AD patients relative to age-matched, nondemented controls. This finding contrasts with the data of Slatkin et al (1991) who reported a delayed acrophase in the rest/activity cycle in AD patients. Here we present data on the timing of sleep/wakefulness in AD patients in their home as recorded by caregivers in a 1-week sleep log. To the best of our knowledge, no data currently exist on the timing of sleep and wakefulness in a group of well-characterized AD patients in their natural environments.

Methods

Subjects

Subjects were 54 AD patients (36 men, 19 women) and 30 nondemented elderly controls (10 men, 20 women). Patients were significantly younger than controls (63.7 versus 73.8, \( t = 5.85, p < 0.001 \)). At the time of this data collection, all AD patients met National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) criteria for probable (n = 43) or possible (n = 11) AD. Four of the former have now come to autopsy and are confirmed. Global Deterioration Scale scores (Reisberg et al 1982) were available on 28 of the patients. The mean rating on this scale was 5.3 (SD = 1.4) indicating a moderate to severe level of cognitive decline in the sample. Mean Mini Mental State Exam (Folstein et al 1975) at time of sleep log was 15.0 (SD = 8.6) (n = 51). Controls were members of an aged cohort of community volunteers recruited for studies of sleep and aging (Bliwise et al 1987). All had MMSE scores of 28 or higher. None of the patients or controls used a psychoactive medication during the week of the sleep log or in the preceding month.

Procedures

Caregivers of AD patients, all of whom resided at home, were asked to complete a 1-week sleep log charting the daily bed times, wake-up times, and amount of sleep of each patient for each night. Daily naps were also recorded. Caregiv-
ers were not asked to record their own sleep in order to increase compliance and relative accuracy of the reports about the patients. Control subjects completed the sleep log on their own. On the basis of the 7 days of data, we computed a 1-week mean for each of the nocturnal sleep variables as well as for the number and duration of the daily naps. We then compared data from the AD patients and controls with t-tests performed separately by gender. Differences between patients’ and controls’ within-subjects variance in bedtimes and wake-up times were compared with an F-test.

Results

Results are shown in Table 1 and confirm earlier bedtimes in both male and female AD patients relative to the controls. Wake-up times did not differentiate the groups but longer nocturnal sleep times of 1.5–2.0 hrs were estimated by caregivers of the AD patients. Controls reported longer nap durations than were present in the AD patients, though in the women with AD, a trend toward a greater number of brief bouts of daytime sleep was observed.

Within-subjects variance in bedtimes did not distinguish male and female patients from controls. There was also no difference in within-subjects variance in wake-up times in women. Male AD patients, however, showed significantly greater variability in wake-up times relative to male controls (F = 3.12, df = 33,10, p < 0.05).

Discussion

Although the present findings could be construed as providing some support for Campbell et al.’s finding of an earlier acrophase in the body temperature cycle in AD patients (Campbell et al 1988; Gillin et al 1989), it may well be that caregivers select or steer the demented patient to bed at an earlier hour simply for expediency. Sleep disturbance in demented patients is known to be a major factor in their institutionalization (Pollak et al 1990), and an earlier simply represent an attempt by provide themselves with an oven.

In addition to projected changes in AD, some alternaterecalled amplitude of these rhythms speculated to exist (Bliwise 1981) tendencies for daytime sleep have AD patients, even to some extent the extent of their cognitive impat et al 1982a, 1982b). In this respec narginning appear somewhat unusual on male and female controls than do our AD patients. One p nation of this phenomenon is the controls, who are in generally go lead relatively active and busy life the day, naps to compensate for their nocturnal sleep durations. Clear understanding of 24-hr sleep/wake cycles in elderly persons in a naturalistic setting the full range of social functions (Monk et al 1990).

The current results overlap with existing literature on sleep patterns and elderly controls. For greater day-to-day variability in male AD patients is consistent with stantial intersubject and intrasubject rest-activity patterns demonstrated by et al 1990). Similarly, the apper times of the elderly controls are several other studies suggested admired elderly individuals residual nap patterns at typical bedtimes at 11:00 PM or later at 10 PM (Tune 1969; Webb 1981).

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Table 1. Comparison of Sleep Log Data in Patients and Controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male AD patients (n = 36)</th>
<th>Male controls (n = 10)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedtime</td>
<td>10:07 PM (65 min)</td>
<td>11:18 PM (46 min)</td>
<td>3.08</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Wake-up time</td>
<td>7:00 AM (71 min)</td>
<td>6:46 AM (46 min)</td>
<td>0.93</td>
<td>NS</td>
</tr>
<tr>
<td>Total nocturnal sleep time</td>
<td>8.8 hr (1.2 hr)</td>
<td>7.0 hr (0.8 hr)</td>
<td>4.47</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Mean daily nap time</td>
<td>0.60 min (0.85 min)</td>
<td>18.3 min (25.7 min)</td>
<td>2.18</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>Mean daily nap no.</td>
<td>0.62 (0.70)</td>
<td>0.60 (0.56)</td>
<td>0.08</td>
<td>NS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Female AD patients (n = 19)</th>
<th>Female controls (n = 20)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedtime</td>
<td>10:05 PM (55 min)</td>
<td>11:30 PM (54 min)</td>
<td>4.27</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Wake-up time</td>
<td>6:42 AM (53 min)</td>
<td>6:54 AM (66 min)</td>
<td>0.59</td>
<td>NS</td>
</tr>
<tr>
<td>Total nocturnal sleep time</td>
<td>8.5 hr (1.1 hr)</td>
<td>7.1 hr (1.4 hr)</td>
<td>2.98</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Mean daily nap time</td>
<td>0.68 min (0.70 min)</td>
<td>20.0 min (26.3 min)</td>
<td>3.28</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Mean daily nap no.</td>
<td>0.77 (0.87)</td>
<td>0.39 (0.40)</td>
<td>1.67</td>
<td>NS</td>
</tr>
</tbody>
</table>

References

Beysse DJ, Reynolds CF III, Monk TH
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Sleep patterns of demented patients is known
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(46 min) 3.08 p < 0.001
(46 min) 9.03 NS
(3.8 hr) 4.47 p < 0.001
(25.7 min) 2.18 p < 0.05
(0.56) 0.89 NS

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