Temporaly related changes of sleep complaints in traumatic brain injured patients

M Cohen, A Oksenberg, D Snir, M J Stern, Z Groswasser

Abstract
Sleep complaints were obtained from 22 hospitalised patients with traumatic brain injury of recent onset (median 3-5 months after injury) and were compared with those of 77 discharged patients who had sustained brain injury about two to three years (median 29-5 months) previously. A high incidence of sleep complaints was noted in both groups (72-7% and 51-9% respectively). Disorders in initiating and maintaining sleep (DIMS) were the most common complaints among hospitalised patients (81-2%), whereas disorders of excessive somnolence (DOES) were common in discharged patients (72-5%). This difference in the nature of the complaints was apparently due to differences between the two groups in the time elapsed since injury, duration of coma, and immediate environmental conditions. In discharged patients with sleep complaints, neurobehavioural impairments and a poorer occupational outcome were more common than in those discharged patients without sleep complaints. It is suggested that early evaluation and treatment of sleep disturbances must be considered an integral part of the rehabilitation process.

Sleep Disorders Unit and the Department for Rehabilitation of Traumatic Brain Injury, Loewenstein Rehabilitation Hospital, Ra'anana, Israel
Sackler Faculty of Medicine, Tel-Aviv University, Tel-Aviv, Israel
M Cohen
A Oksenberg
D Snir
M J Stern
Z Groswasser
Correspondence to: Dr Cohen
Loewenstein Rehabilitation Hospital, PO Box 3,
Ra'anana 43100, Israel.
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recovered, and those working in sheltered workshops or not working at all were considered poorly rehabilitated.6

Results
Sixteen of the 22 hospitalised patients (72-7%) reported sleep related disturbances. Most common were DIMS reported by 13 of 16 patients (82%). Of these, five had difficulty in initiating sleep, seven in maintaining sleep, and one in both. Eight patients (36%) considered the hospital environment (noise or light or both) an important causative factor. Only four of the 13 patients attributed any importance to pain or tension (two patients each, 15%). Three inpatients (14%) complained of DOES (figure). Of the 77 discharged patients, 40 (52%) reported sleep disturbances, the most common being DOES (29 of 40, 73%). Only three patients (8%) reported DIMS. Eight patients (20%) had other complaints, mainly disturbances of the sleep-wake rhythm (figure).

In both groups, age and duration of coma were not significantly associated with sleep complaints. A relatively higher incidence of sleep complaints was noted among females in both groups. In hospitalised patients, the overall incidence of cognitive and behavioural-affective disturbances was similar in those with sleep complaints and in those without. Dependency in activities of daily living and aphasia were found only in patients reporting sleep problems (table). Occupational outcome could not be determined in this group as they were still hospitalised. Discharged patients reporting sleep complaints had a significantly poorer occupational outcome (p < 0.01, Fisher test) and more behavioural disturbances (p < 0.05, Fisher test) than those without sleep complaints. The most common behavioural-affective disturbances were anxiety and depression; a high incidence of apathy and aggression was also noted, mainly in patients with frontal lobe lesions. Communicative and cognitive disorders tended to be more common in patients with sleep complaints (table).

Discussion
Our findings indicate that sleep complaints are common in patients with recent traumatic brain injury as well as in those who sustained brain injury about two to three years previously. The incidence of such complaints in both groups was far higher that that in the healthy working population.7 The nature of the sleep complaints differed in the two groups. Patients with injury of recent onset had more DIMS while patients with older injuries suffered mostly from DOES. Three factors may account for these differences. Firstly, time since injury: pathophysiological changes in the CNS occurring during the recovery process may alter the nature of the sleep problem. Problems that persist for a long time may also provoke chronic insomnia, which may lead to excessive somnolence, as has been suggested.

Table  Residual functional disabilities and sleep complaints (SC) in traumatic brain injured patients. Figures are numbers (percentages)

<table>
<thead>
<tr>
<th></th>
<th>Motor</th>
<th>Language</th>
<th>Cognition</th>
<th>Behaviour</th>
<th>Unable to work</th>
<th>Dependent in activities of daily living</th>
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</thead>
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<tr>
<td>Hospitalised patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without SC (6)</td>
<td>2 (33)</td>
<td>—</td>
<td>6 (100)</td>
<td>2 (33)</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>With SC (16)</td>
<td>4 (25)</td>
<td>3 (19)</td>
<td>16 (100)</td>
<td>6 (37)</td>
<td>2 (12)</td>
<td></td>
</tr>
<tr>
<td>Total (22)</td>
<td>6 (27)</td>
<td>3 (14)</td>
<td>22 (100)</td>
<td>8 (36)</td>
<td>2 (9)</td>
<td></td>
</tr>
<tr>
<td>Discharged patients</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Without SC (37)</td>
<td>3 (8)</td>
<td>6 (16)</td>
<td>29 (78)</td>
<td>16 (43)*</td>
<td>14 (38)+</td>
<td></td>
</tr>
<tr>
<td>With SC (40)</td>
<td>4 (10)</td>
<td>15 (37)</td>
<td>36 (90)</td>
<td>26 (65)*</td>
<td>27 (68)+</td>
<td></td>
</tr>
<tr>
<td>Total (77)</td>
<td>7 (9)</td>
<td>21 (27)</td>
<td>65 (84)</td>
<td>42 (55)</td>
<td>41 (53)</td>
<td></td>
</tr>
</tbody>
</table>

*Fisher test p < 0.05.
†Fisher test p < 0.01.
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with regard to individuals whose sleep disturbances were due to periodic leg movements during sleep. Secondly, severity of CNS damage: the duration of coma is considered a good measure for assessing the severity of CNS damage. Discharged patients had spent a relatively longer time in coma than hospitalised patients (median duration 6-5 days and 12 days, respectively). This factor may have contributed to the different manifestations of the sleep problems. Both the amount of time elapsed since injury and the duration of coma were suggested by George et al as important factors influencing the sleep-wake patterns of these patients. Thirdly, environmental influence: patients with recent trauma were evaluated while in hospital and subject to unusual noises, tense atmosphere, and loss of privacy, whereas discharged patients were evaluated while already living at home where these factors were generally absent.

Discharged patients with sleep complaints had significantly more behavioural-affective disorders and achieved a lower occupational status than those without sleep complaints. Again various factors may explain this. Firstly, sleep complaints are most probably an expression of physiological sleep alterations related to CNS lesions. Thus patients with a severe lesion may be at a higher risk of both long term sleep problems and high mental function disturbances than those with mildly impaired CNS. Secondly, sleep disturbances by themselves may affect the mental capacity of traumatic brain injured patients. Clinical sleep studies have shown extensively that an alteration in the organisation of the sleep-wake pattern due to various pathological causes may have a detrimental effect on mental performance. The importance of high mental functions to the rehabilitation outcome is well known. Thirdly, anxiety and depression, found in most brain injured patients with behavioural-affective disturbances, are by themselves considered a major cause of insomnia and excessive somnolence.

In summary, our findings show that sleep complaints are common in traumatic brain injured patients. DIMS occur more often in patients with recent injury and DOES in those with injuries sustained two to three years previously. Patients with sleep complaints present more neurobehavioural disturbances and a poorer occupational outcome than those free of such problems. Early diagnosis and treatment of sleep disturbances may largely help in the integrative rehabilitation process and positively influence occupational outcome.

10 Beutler LE, Ware JC, Karacan I, Thornby JI. Differentiating psychological characteristics of patients with sleep apnea and narcolepsy. Sleep 1981;4:59-47.
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