

Effect of phototherapy on cognition, sleep and behaviour in patients with Dementia of Alzheimer Type

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Objective: To throw light on the effect of phototherapy on disorders of cognition, sleep pattern and behaviour in Dementia of Alzheimer Type (DAT). *Methods:* 12 patients were chosen. They were introduced into a crossover design in which they were subjected to 3 successive phototherapy modalities (morning bright light MBL 3000 lux, evening bright light EBL 3000 lux and morning dim light MDL 360 lux), each for one week with one week baseline and one week interval between each. Mini-Mental State Examination (MMSE), the Overt Agitation Severity Scale (OASS) and a Sleep diary for sleep disturbance were used to assess the study subjects. *Results:* It was found that phototherapy has significantly improved cognition, sleep pattern and behaviour in DAT patients. There was significant superior effect of MBL over EBL and MDL on scores of MMSE of patients. MBL has also significant superior effect on sleep pattern (Significant increase in Total Sleep TST Time and Nocturnal Sleep Time NST and significant decrease in Diurnal Sleep Time DST). Agitated behaviour showed significant equal improvement on both MBL and EBL but not on MDL. *Conclusion:* phototherapy specially MBL could be an alternative non pharmacological method in the management of cognitive, behavioural and sleep disturbances in DAT. Changing environmental lightening as a part of external biological clock synchronizers might help.

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Introduction*

Various types of cognitive, behavioural and sleep disorders are commonly associated with aging. In elderly patients with dementia, the sleep pattern is often severely disrupted and displays an irregular sleep-wake rhythm with frequent awakenings during night and naps in the daytime (Lemonie et al., 2001). Moreover, such sleep disturbance are frequently accompanied by behavioural disturbance like agitation, restlessness, and even pacing which often cause caregiver stress and may precipitate institutionalisation of the patient (Satlin et al., 1992). "Sun downing" a syndrome of recurring confusion and increased agitation in the late afternoon or early evening, is common among patients with Alzheimer disease in nursing homes (McGaffigan and Bliwise, 1997). Physical factors, such as polakiuria, sleep apnoea and nocturnal myoclonus and psychological factors such as neurosis and depression, have been considered to be important aetiological factors for sleep disorders in elderly peoples (Smallwood, 1983). Fragmented sleep-wake cycles and sun downing are characterised by inappropriately timed rest and activity, suggested that these syndromes may be mediated by abnormalities of the circadian time keeping system in Alzheimer disease (Satlin 1992, Mishima et al., 2000). The hypothesis of disordered circadian pacemaker (supra-chiasmatic nucleus SCN)

in some patients with Alzheimer disease is supported by chronobiological studies of sleep and endocrine measures (Prinze et al., 1984) and by neuro-pathology studies reporting cell loss in the SCN (Swaab et al., 1985, Lucassen et al., 1998). A possible reduction of the external circadian rhythm synchronisers due to changes in the patient's physical and mental ability and in his or in her social environment may also underlie disturbed biological rhythms. Among the various external synchronizers of the circadian rhythm, social stimulation coming from human interaction has been considered to be important (Okawa et al., 1991, Mishima et al., 1994). Bright light has been confirmed as a powerful synchronizer for the human circadian rhythm. It is also suggested that elderly patients with dementia living at home were exposed to significantly less bright light than healthy control subjects (Ancoli-Israel et al., 2002, Campell et al., 1988). An apparent increase in sun downing behaviour was reported in nursing home patients during the winter months (Satlin, et al., 1992). Beside its well

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