Sleep deprivation and depression

Elsenga, Simon

Summary

The association between depression and sleep disturbances is perhaps as old as mankind. In view of the longstanding experience with this association it is amazing that only some 20 years ago, a few depressed patients attracted attention to the fact that Total Sleep Deprivation (TSD) had antidepressant effects. A large number of studies have followed these observations. The purpose of the studies presented in this thesis was to evaluate the clinical usefulness of TSD and related procedures for psychiatry.

TSD is a procedure in which subjects are not allowed to sleep during an entire night. The length of the sleep deprivation period is commonly between 36 and 40 hours. In addition to TSD other procedures, such as partial sleep deprivation (PSD) have been employed. PSD has been carried out either during the first or the second half of the night. Also, the effects of brief sleep periods during the deprivation period have been evaluated by some investigators. In particular, napping following the nocturnal deprivation period has been of interest to assess whether diurnal sleep influences the antidepressant response to TSD. Finally, shifting of the sleep/wake cycle by either advance or delay of phase has been carried out, albeit only in a few patients.

A summary of the literature is presented in the first chapter. Effects of TSD are described from clinical and physiological points of view. Furthermore, the literature was screened for reports from which percentages of responders and nonresponders to TSD could be deduced. Several points emerged from this analysis. The percentage of those who responded to TSD is 56.2% of 1420 subjects. Included in this percentage are neurotic depressives whose response rate is very low. When these subjects are excluded, the percentage rises to 58.4%. The percentage of responders to TSD exhibits a decreasing trend over time. Responders were more frequent in the earlier than in the more recent studies. This is especially true of those studies in which TSD was applied in combination with psychotropic drugs. As a result, the average percentage of responders dropped to below 50% in reports published during the last 5 years (1986-1990).

It has been recognized from the outset that the first recovery night subsequent to TSD is usually followed by relapse. Several strategies have been undertaken to prevent this relapse. One strategy has been to combine TSD with antidepressant medication. Such an attempt is described in chapter 2. The use of antidepressant medication prevent-

ed the relapse to some extent. The main result of that study was that TSD speeds up the antidepressant response to the antidepressant clomipramine. Another strategy entailed the manipulation of the timing and duration of sleep or wakefulness. The results of these experiments are described in chapter 3. During the recovery night following TSD subjects were partially deprived of sleep for several hours during either the earlier or the later part of the night. The expectation was that PSD in the later part of the night ('late PSD') would prevent relapse. This expectation was based on other studies as well as on a pilot study which had suggested that late PSD was more effective than 'early PSD'. No relapse-preventing effects, however, were observed after either early or late PSD. In this study new data were collected on the time course of depression after recovery sleep. Although the same antidepressant medication was used as in the study of chapter 3, relapse was not prevented. The apparent contradiction between the findings in the two studies was further explored in Chapter 5. The solution proposed is that the absence of relapse after the recovery night is not a general phenomenon but is restricted to the less severe, nonpsychotic, unipolar depressives.

In Chapters 3 and 6 it was found that an antidepressant effect of TSD is associated with a raised nocturnal minimum of rectal temperature, and relapse following recovery sleep is associated with a lowered minimum of rectal temperature.

Notwithstanding the relapse problem, TSD is an effective antidepressant procedure for endogenous depressives. In Chapter 4 the question was raised which patient characteristics might be predictive for a favourable response to TSD. The results show that psychotic depressives consistently respond favourably to continued TSD. Moreover, a positive diurnal variation in depression prior to TSD was associated with a positive response. In addition, it was found that psychotic depressives exhibiting diurnal variation prior to treatment showed rapid improvement after having been subjected to a combination of antidepressant medication and TSD (Chapter 5).

To explain the clinical effects of TSD in depression, it is hypothesized that TSD increases energy expenditure relative to the expenditure during a normal nights' sleep. An increase in energy expenditure results in altered processes of thermogenesis and thermolysis. The covariation between the response to TSD and the alterations of the nocturnal body temperature described in this thesis may reflect a causal link between improvement and the stimulated thermo-energetic processes. Stimulation is essential during the circadian low when energy expenditure is supposed to be low. With regard to this so-called 'critical period' which starts after the early hours of the sleep period, the timing of sleep is critical to obtaining antidepressant effects of sleep deprivation. The clinical results of several sleep/wake schedules are in line with this hypothesis.

During the last decade TSD has become a research tool because of the experimental possibilities of inducing rapid chances in depression. With a few exceptions, TSD has been of only limited usefulness in clinical practice. The TSD paradigm has, however, the merit of being a starting point for new therapeutic and fundamental explorations. The enrichment of the psychiatric armamentarium may lie in the discovery of more appropriate sleep/wake schedules and the development of new models of depression.