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Relationship Between Sleep Habits, Adrenocortical Activity and Personality

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Psychologic stress is known to be associated with both sleep disturbances and increased adrenocortical activity. In this experiment, 2 groups of male medical students were selected as poor or good sleepers on the basis of their responses to a sleep questionnaire. The poor sleepers had significantly greater levels of adrenocortical activity than did the good sleepers throughout the day and night. This difference was related to psychologic characteristics. The general level of activation of the central nervous system, largely reflecting one's personality and life situation, may determine one's usual sleep habits as well as the level of adrenocortical activity.

Psychologic stress is known to be a potent cause of adrenocortical activation. Increased adrenocortical activity under these circumstances is related not simply to a particular type of emotional affect, but rather to the overall level of distress and the effectiveness of psychologic defenses invoked to deal with stressful situations (1,2). In a study involving chronic psychologic stress in the parents of children with leukemia, urinary 17-hydroxycorticosteroid (17-OHCS) excretion was closely related to the effectiveness of their defenses from day to day. This was true even in those subjects who used increased overt emotionality as a relatively efficient, if maladaptive, means of denying awareness of the seriousness of the problem (3, 4). Individual subjects tend to maintain their daily corticosteroid excretion rate within fairly narrow limits. These can be predicted by evaluating their personality characteristics which relate to mechanisms used in tension-relieving activities (5–8).

In a study of women with breast lumps, who were awaiting excisional biopsy in hospital, Katz et al (9) used three criteria derived from interviews to predict the patients' urinary excretion of cortisol metabolites with statistically significant results. The degree of *affective distress*, the first of these criteria, was inferred from the presence of unpleasant affects such as anxiety or despair in the patients. The second criterion was *disruption of function*, derived from descriptions of anorexia, insomnia, change of bowel habits, poor frustra-

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tion tolerance or lack of concentration. The third criterion was *impairment of defensive reserve*, indicating a tendency to be unduly sensitive to additional stresses occurring spontaneously or introduced by the interviewer.

The major difficulties in predicting the level of adrenocortical activity from such criteria were failure to evaluate adequately a subjects' response to a stressful situation in the context of his basic personality style, and describing the type of defense mechanisms invoked rather than their effectiveness in maintaining psychologic homeostasis. Therefore, it seems important to find a more objective measure of the adequacy of defense mechanisms than that derived from subjective impressions formed during an interview.

Katz et al (9) reported that the functions of sleep, appetite and the ability to concentrate were almost always found to be conspicuously disrupted when levels of adrenocortical activity were elevated in women with carcinoma of the breast. It is difficult to compare such functions as appetite, sexual drive or power of concentration in different people. However, sleep habits and degrees of sleep disturbance can be compared by means of detailed subjective reports or electronic monitoring methods in a sleep laboratory.

Psychologic stress is commonly known to be associated with sleep disturbance in animals and in man (10–14). Different psychiatric diagnoses such as anxiety neurosis, psychotic depression or acute schizophrenia have been thought to be associated with specific aspects of sleep disorder, such as difficulty in getting to sleep initially, frequent night awakenings or early-morning awakening. But there is little objective evidence to substantiate this view; rather, it seems that each of these aspects of sleep disturbance can be found in many psychiatric diagnostic groups, with different degrees of severity in individual subjects (10–13, 15). In acute schizophrenia and manic-depressive psychosis, the degree of sleep disturbance, as measured by the total duration of dreaming (REM) and nondreaming (NREM) sleep each night, is highly correlated with clinical rating of psychologic turmoil, regardless of the type (16, 17). In chronic alcoholics, the degree of sleep disturbance, as measured by electronic methods in the sleep laboratory, is closely related to clinical and psychologic rating of the patient's agitation (18).

Because of the widespread association between sleep disturbance and psychologic distress, it is possible that an appropriate measure of sleep disturbance might reflect accurately the overall efficiency of psychologic defenses in coping with conflicts and life stresses, and hence the general level of adrenocortical activity from day to day. Low efficiency in these psychologic coping mechanisms, relative to the subject's ongoing requirements, may lead to continuously elevated levels of central nervous system activity, especially in the hypothalamus. This in turn would be reflected both in increased rates of adrenocortical hormone secretion and in a tendency to experience more disturbed sleep.

The present experiment was designed as an initial test of this hypothesis. It attempted to show that even mild long-term sleep disturbances, reported subjectively by medical students, do reflect psychologic differences and are also related to the general levels of adrenocortical activity in different subjects.

Assessment of Sleep Disturbance

As yet, there is no general agreement on what constitutes abnormally disturbed sleep in a given subject. However, most would agree that prolonged delay in falling