The practice of the Transcendental Meditation technique was associated with an acute decline in adrenocortical activity. Since increased adrenocortical hormone levels are well established correlates of both acute and chronic stress, the decline seen to result from the practice of Transcendental Meditation has important implications for counteracting stress.—EDITORS

We have studied plasma cortisol concentration in the hypometabolic state induced by Transcendental Meditation (TM), a widely practiced mental technique. Two groups of normal, young adult volunteers were studied: a group of controls and a group of regular TM practitioners. Plasma cortisol was found to decrease significantly in the practitioners during meditation, with the mean concentration falling to its lowest point at the end of the meditation period. No change was found in the controls during relaxation. Base line cortisol levels in both groups were in the low normal range.

We believe that the acute decline in pituitary-adrenal activity—most probably responsible for the decreased plasma cortisol concentration—may uniquely characterize the TM-induced physiologic state with respect to adrenocortical activity among those so far identified in man.

INTRODUCTION

Well over 200 research papers in the past 20 years attest to the ease with which increased pituitary-adrenal activation (“stress”) can be induced by numerous internal and external stimuli (1, 13). Since even pleasant stimuli can increase pituitary-adrenal activity (14), in common with unpleasant or noxious agents, the behavioral role of the adrenocortical system in “defence” against environmentally stressful influences and the associated physiological effects of repeated adrenocortical activation have comprised the primary focus of investigation (8). Few studies, however, have identified conditions in which decreased adrenocortical activation is as readily elicited, although it was shown by Handlon (4) that in certain specific circumstances, such as the viewing of bland nature films, levels of plasma hydroxycorticosteroids in anxious subjects would decrease after 90 minutes, and the ability to lower plasmahydroxycorticosteroids by a specific hypnotic suggestion of tranquility, peace, etc., in both normal and anxious individuals carefully selected for deep hypnotizability has been shown (12, 10). Finally, the existence of a readily elicited, natural physiologic state in man characterized by decreased adrenocortical activity and requiring no specific input or special circumstances for its induction, has been heretofore unknown as far as we are aware.

We have studied the possibility that the physiologic state induced by Transcendental Meditation (TM) might be characterized by lessened adrenocortical activity. TM is an effortless, widely...
practiced, reportedly relaxing (6, 7) mental technique involving no faith, belief, or autosuggestion and requiring no special circumstances except ordinary considerations of comfort (7). This technique has been shown to induce, within 30 minutes, a physiologic state characterized by decreased oxygen consumption, carbon dioxide elimination, and arterial lactate (15); major redistribution of blood flow (5); and a distinctive EEG (15). Regular elicitation of this state (TM is practiced twice daily in the morning and in the evening for 20 minutes by the regular practitioner) has been shown to be of benefit in hypertension (16) and asthma (19). Since these characteristics are consistent with decreased sympathetic activity, it was thought possible that a concomitant decrease may also occur in adrenocortical activity.

METHODS

Plasma cortisol was measured in 22 normal day-active young adult volunteers. Ten controls and 12 regular practitioners were studied. The regular practitioners had been practicing TM from 3–5 years. On an occasion previous to the day of the experiment, each subject was familiarized with the laboratory, its personnel, and the purpose and course of the experiment. Observations were made between 2 and 4 P.M. under uniform conditions of subdued lighting and constant, comfortable room temperature. Subjects were instructed not to eat between their previous evening meal and the time of the experiment. Experimental observations were made for 120 minutes, divided into three 40-minute periods. During the pre-meditation period subjects sat with eyes open; subsequently they were instructed to close their eyes and start meditation, or in the case of the controls, to relax maximally; “relaxation” here does not refer to any specific technique of relaxation but to the subjects’ usual behavior under these circumstances. During the postmeditation period they continued to sit but with eyes open again.

Prior to beginning measurements an arterial catheter was placed percutaneously into a brachial or radial artery. Since venipuncture is associated with sympathetic effects (11), a minimum of two and one-half hours was allowed to elapse between insertion of the catheter and beginning the experimental period. During this time the subject was allowed free movement in and around the laboratory.

Blood samples were taken every 20 minutes (two samples in each of the 40-minute periods) into heparinized syringes from 40-inch extension lines attached to the subject; this arrangement allowed sampling with minimal disturbance to the subject, who was isolated from the blood collecting area by a curtain. Plasma cortisol was measured by the competitive protein binding method of Murphy et al. (9); all samples were analyzed in duplicate. For purposes of statistical analysis, cortisol concentrations were expressed as percent of initial value. Regression analysis with analysis of variance on the coefficients was then applied to the transformed data (2).

RESULTS

Cortisol concentration over the course of the experiment is shown in fig. 1. Plasma cortisol declined significantly (22% after 30 minutes) during the meditation period, and levels remained low in the postmeditation period. The time course of the cortisol decline in meditation and postmeditation periods was found to closely follow an exponential decay law \( (p<.021) \) differing significantly \( (p<.05) \) from a best fit to control group values during relaxation and postrelaxation. Time period was not found to be significantly related to cortisol concentration in controls. Pre-meditation and pre-relaxation concentrations were stable and in the low normal range; intersubject variability was considerably greater in the group of controls compared with practitioners.

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DISCUSSION

Since a close qualitative relationship between ACTH and cortisol secretory episodes exists in normal individuals (17), we believe that the rapid decline of plasma cortisol during TM in the regular practitioners most likely reflects lessened pituitary-adrenal activation and not a nonspecific increase in the metabolic clearance of cortisol; this is additionally supported by the fact that blood flow to the liver, the principal site of cortisol degradation, actually declines markedly during TM (5). It may also be significant that the intersubject variability in the practitioners is small and considerably less than that of the controls, indicating greater temporal synchrony of cortisol secretory events (3).

The TM-induced physiologic state studied here seems to be the only one so far identified in man’s natural repertoire that is closely associated with decreased pituitary-adrenal activity. Therefore, for example, no acute relationship between sleep stages and cortisol secretion seems to exist, and corticosteroid levels tend to rise over the night during sleep (17, 18). Since it seems to be clear that a variety of stressful conditions (particularly those of emotional origin) can exacerbate latent disease conditions, increase susceptibility to infection, and even lower reproductive performance, the implications for health of a state antithetical in its characteristics to the stress syndrome and capable of rapid and easy induction may be profound.

REFERENCES