TREATMENT OF DISEASE WITHOUT THE USE OF DRUGS. II — THE RELATIONSHIP BETWEEN THOUGHT CONTROL AND GALVANIC SKIN RESISTANCE

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SYNOPSIS

A new technique of voluntarily increasing the human palmar skin resistance (GSR) to a magnitude of over 600 K ohms is reported. The technique involves a form of mental exercise which leads to a wakeful mind free of spontaneous discursive thoughts. Increase in palmar GSR which is known to be inversely related to the level of arousal in an individual is dependent on the ease of obtaining this state of mind. It is suggested that individuals could lower their levels of arousal by using this mental exercise to produce an increase in their palmar GSRs.

INTRODUCTION

The resistance of the human skin to an electric current (GSR) has been shown by numerous investigators to be inversely related to the level of arousal. States of relaxation and sleep are known to be associated with an increase in GSR (Darrow, 1936; Malmo, 1958; Hawkins, Puryear, Wallace, Deal & Thomas, 1962) while states of activation such as task performing, exposure to noise and sleep deprivation lead to a decrease in GSR (Duffy & Lacey, 1946; Schlosberg, 1954; Malmo, 1959; Silverman, Cohen & Shmavonian, 1959; Liederman & Shapiro, 1964; Raskin, Kotses & Bever, 1969). The frequency of the fluctuations in skin resistance (spontaneous GSR) has also been used for defining the liability or stress level of an individual (Katkin, 1966; Katkin & McCubbin, 1969; Mundy-Castle & McKiever, 1953; Stern, 1966). Of recent interest were reports of a relationship between GSR and transcendental meditation (TM). Wallace (1970) and Wallace and Benson (1972) reported marked increases in GSR of subjects performing TM. The magnitude and steepness of the increase is greater than the pattern of skin resistance change during sleep. Orme-Johnson (1973) showed that with the practice of TM subjects exhibit decrease in spontaneous GSR and a faster habituation to change in GSR caused by sonic stimulation.

While experimenting on the correlation between palmar GSR and mental mood the author came to the conclusion that increase in palmar skin resistance is related to the process of thought control. With subsequent experimenting it was subjectively agreed by the subjects that rise in palmar skin resistance is inversely related to the number or train of thoughts that arise from the mind e.g. a greater and faster rise in GSR was recorded when subjects experienced a faster onset of a calm wakeful mind free from discursive thoughts. The following experiment was devised and carried out to show that a relationship exists between GSR and thought control.

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MATERIALS AND METHOD

SUBJECTS

Subjects were student volunteers and were divided into two groups, a control group consisting of six (3 males and 3 females) and an experimental group consisting of fourteen (8 males and 6 females). All the subjects were healthy individuals and their average age was 23 years.

PROCEDURE

Two palmar surfaces one at the mid-point of the distal phalange of subjects' index finger and the other at the mid-point of the distal phalange of subjects' middle finger were rubbed with Grass electrode cream type EC2. 9mm cup-shaped Grass Polygraph silver electrode (E5) filled with the cream were attached to the rubbed surface of each finger using a thin strip of sticky tape. The electrodes were connected to the blue and yellow binding post of the 7P1 input cable of the Grass Polygraph model 7C. The machine input selector was positioned at PGR. With this lead connection and machine setting the blue terminal is automatically grounded and a constant current of 10 microamperes is passed through the applied electrodes. The PGR calibration and balance were carried out as given in the polygraph instruction manual. Subjects in the experimental group were then asked to relax and close their eyes, sit squarely with spine and head erect and try to obtain a 'thought-free' mind. Skin resistance was recorded during the 15 minutes attempt. This recording of skin resistance served as a control of the particular subject (see Table 1). Subjects while still attached to the machine, were then asked to perform the following body visualisation exercise. Imagine looking at oneself from behind. Starting from the head picture one's hair, one's shirt collar and how the shirt continues into the left and right sleeves and terminate at one's arms. Follow one's arms to one's hand and notice how they were placed on one's laps or arm rests. Imagine one's trunk and follow it to one's feet as described for the upper limbs. This visualisation exercise was repeated 20 times. One round of the exercise lasted for about 45 seconds and the 20 rounds usually take 15 minutes to complete. GSR was measured during this visualisation exercise and the reading of this first attempt was recorded (see Table 1). Following the first attempt subjects practised at home 15 minutes daily of body visualisation. Their GSRs during the visualisation exercise were measured and recorded at the weekly appointments. Figure 1 shows two recordings of GSR of a subject taken before during and after the performance of the mental exercise one recorded on the third and the other on the last appointment.

After two weeks of daily practice of body visualisation all subjects in the experimental group produced an increase in their GSRs of over 100 K ohms while performing this exercise (see Table 1). They were then introduced to an additional mental exercise of space visualisation. Following five rounds of body visualisation subjects were asked to be aware of the silent void in front of their foreheads and to maintain this awareness at the exclusion of discursive thoughts. Their GSRs during the 1st attempt at body cum void visualisation were recorded (see Table 1). This mental exercise usually lasted 20 minutes and for uniformity subjects restricted their daily home practice to 20 minutes with the help of an alarm clock. Subjects continued their daily practice of body cum void visualisation for the next 10 weeks coming to have their GSRs measured and recorded at the 3rd, 4th, 6th, 8th, 10th and 12th week respectively. Subjects in the control group were treated similarly except that they were not given any mental exercise to perform but told to sit upright on a chair without falling asleep during the corresponding weekly or bi-weekly sessions. Their home practice consist of sitting upright on a chair daily for 20 minutes.

TABLE 1

Visualisation Exercises	Period (in weeks) of participation	GSR recorded (in K ohms) Experimental Group	Control Group
Body Visualisation	0 (Control)	120±20*	130±20*
Body Visualisation	0 (1st attempt)	120±20	120±25
Body Visualisation	1	170±25	130±25
Body Visualisation	2	250±45	130±25
Void Visualisation	2 (1st attempt)	240±50	140±20
Void Visualisation	3	350±45	140±20
Void Visualisation	4	430±70	140±30
Void Visualisation	6	540±40	140±40
Void Visualisation	8	610±35	130±30
Void Visualisation	10	640±35	140±35
Void Visualisation	12	660±45	140±40

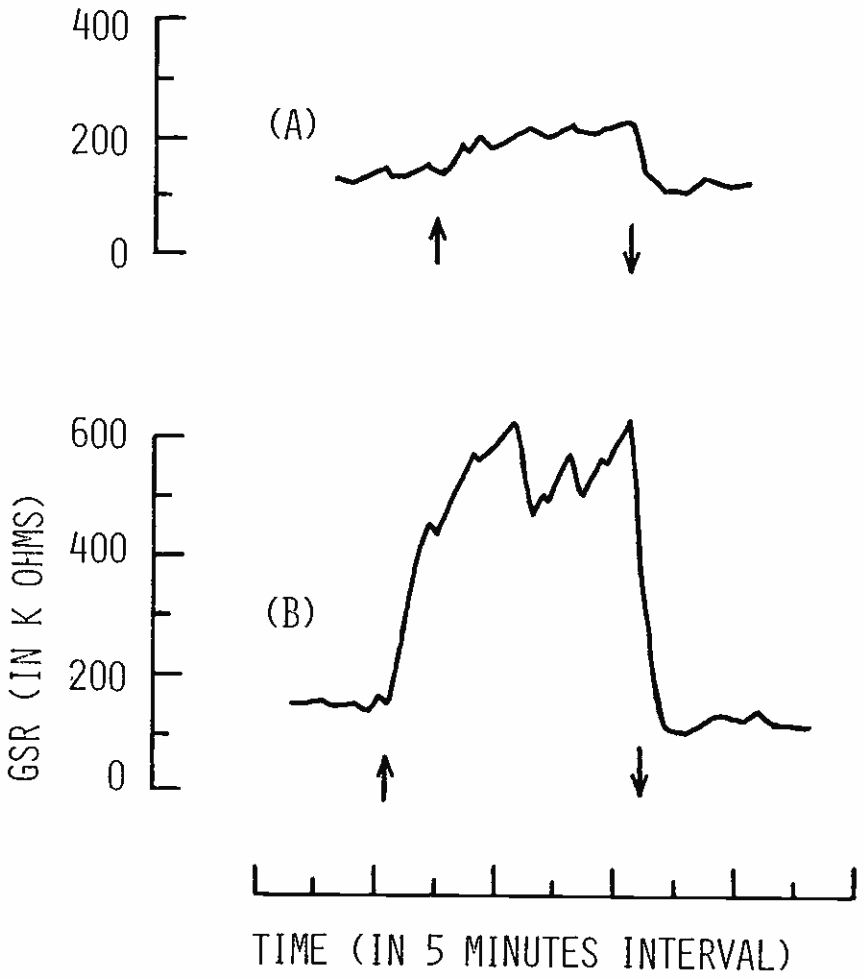
*Value of basal GSR

Values with ± infront are standard deviations. There were significant increases ($p < 0.05$) of GSR at each subsequent weekly or bi-weekly measurement except for the last value (660 K ohms) where the increase was not significant ($p > 0.1$)

RESULTS AND DISCUSSION

From Table 1 it can be seen that with the daily practice of the visualisation exercises GSR of the subjects (measured during the exercises) increased with each subsequent measurement. GSR in excess of 600 K ohms was recorded for all the subjects in the 10th week measurement. There were in all cases close correlation between GSR increases and a subjective feeling of performing well in keeping spontaneous discursive thoughts at bay during the exercises. Palmar GSR is known to be predominently determined by the activity of the sweat glands where an increase in sweating corresponds to a drop in electrical resistance of the palm and vice versa (Thomas & Korr, 1957; Adams & Vaughan, 1965). Since this sudomotor response, mediated mainly by the sympathetic branch of the autonomic nervous system, is under central nervous system control (Venables & Christie, 1973) we suggest that the increase in GSR of our subjects is a direct result of the wakeful 'thought-free' mind induced by the performance of the exercises. Basing on the known relationship between GSR and the level of arousal and on the calm and restful experience felt by the subjects during the exercise we suggest that a state of low arousal probably accompanied the attainment of this mental state.

From this conclusion one question of interest come to mind. Has the physiological state of mind produced by the visualisation exercises any therapeutic value? Dr. Stone and DeLeo (1976) found that Buddhist meditation exercises designed along similar line of mental thought fixiation elicited relaxation response effective in the treatment of mild and moderate hypertension. Similar findings were reported by other investigators who employed the technique of biofeedback and TM (Patel, 1975a and 1975b) and relaxation and yoga (Benson, Rosner, Marzetta & Klemchuk, 1974a and 1974b). It is the belief of the author that individuals suffering from psychosomatic diseases (e.g. migraine, tension headache, anxiety, insomnia) characterised by sustained hightened arousal could lower their level of arousal and obtain relief by learning to increase their GSRs. Work carried out on volunteers suffering from migraine shows positive results. The details of the experiment are discussed in the next paper.



LEGEND

Figure 1 (A) and (B) are GSR tracings of a subject recorded on the 3rd (after 2 weeks participation) and the last appointments respectively. Upward arrows indicate commencement and downward arrows cessation of the visualisation exercises. Portions of the tracing before upward arrows and after downward arrows measure basal GSR. Portions of tracing in-between upward and downward arrows measure the increase of GSR during the visualisation exercises. There were in all cases a rapid return of GSR to basal value following cessation of the exercises.

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