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A COMPARATIVE STUDY OF THE DRIVING EFFECTS OF DEXTROAMPHETAMINE AND YOGIC MEDITATION ON MUSCLE CONTROL FOR THE PERFORMANCE OF BALANCE ON BALANCE BOARD†

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Abstract : The work is aimed to compare the relative strength of dextroamphetamine and yogic meditation on the performance of 3 different groups of medical students to concentrate on the task to balance on a balance board. Group A subjects were meditators, group B subjects were given orally 5 and 10 mg of dextroamphetamine in a capsule, 1 hr prior to the test. Group C subjects were given same capsule but with lactose in place of the drug (placebo). This last groups served as control for the study.

The balance index calculated taking into account their balance time and error score at each trial of 5 min duration showed that the performance of the group B (drug) had declined with overall percentile fall of 40.6% as compared to the performance of the controls (placebo) whereas, the performance of Group A (meditators) went on steadily and progressively increasing throughout the period of 10 trial days with overall percentile rise of 27.8%.

The results were conclusive to confirm earlier reports that amphetamine is not of use for improvement of task rather, it deteriorates the task performance. Contrary to that, yogic meditation is of merit to achieve concentration for mental as well as physical task.

Key words : dextroamphetamine yogic meditation balance board

INTRODUCTION

Dextroamphamine is known to be one of the most potent drugs stimulating the central nervous system. An oral dose of 10-30 mg induces wakefulness, alertness, decreased sense of fatigue, elevation of mood, self-confidence and to some extent ability to concentrate (1, 2). These effects often lead the student community to carry a notion that the drug may help to increase their capacity to concentrate in their studies, prevention and reversal of fatigue and so may improve their mental performance for the studies. Amphetamine is also claimed to improve physical performance in athletes (3) promote weight loss in obese (4) and the drug is often abused for many such purposes (5). As compared to these, so-called beneficial effects of amphetamine, psychosomatic effects developed by practicing yogic meditation are reported to be far superior to improve the ability for concentration, improvement of memory and improvement of the physical performance through the control over the muscles (6, 7). However, the comparative study of the power of concentration of the mind over the physical performance achieved by these two means viz. drug versus yogic meditation has not been conducted so far. The present work is aimed to compare the relative strength of amphetamine versus yogic meditation on the performance of the individuals with the help of simple test to concentrate and control the balance on

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balance board. Maiti used balance board to explain the attentional mechanism of meditation and yoga-asanas (8).

METHODS

Subjects : The work was carried out in volunteers divided into 3 groups. All the subjects were 1st year medical students of either sex and within the age group of 17-21 years. Each group consisted of 6 subjects. The group A students were trained in kundalini yoga during the elective work carried out in the Department of Physiology and who were still practicing yogic meditation for a period of one year. The group B subjects received orally capsules containing D-amphetamine powder in the dose of 5 mg during initial five days and 10 mg on the last 5 days. Group C subjects received orally same type of capsule but with lactose powder in place drug (placebo). The capsules were administered to the respective groups one hour prior to the trial on balance board. The volunteers of group B had tried earlier Dexedrine tablets (De-amphetamine) to keep them awake at night for study purpose.

Balance Board : The balance board consisted of a plank (80 cms x 60 cms) supported by a narrow wooden rib fixed anteroposteriorly along the midline of the plank so that the board when placed on the floor in balance position, remains at a height of 10 cms from the ground. When the same board was tilted laterally i.e. out of balance, it's border rested on the ground forming a tilting angle of 15°.

Experimental schedule : On the first day, the subjects were allowed to get acquainted to balance their body while seated in sukhasana posture on the balance board. From next day onwards, the experiments were carried out to account each subject's ability to balance their body on the balance board for a period of 5 min. Each subject was allowed to have two trials per day. The work was carried out for 10 consecutive days.

The assessment of the performance on the balance board was quantified by measuring following parameters: *Error score* was visually monitored by counting the number of contact of the platform board to the ground at either side. *Balance time* was recorded by counting the time in seconds during which the subject could maintain the balance on the balance board. Attempts if lasted for less than 5 seconds, its balance time was not accounted. The performance was calculated by applying the following arbitrary formula.

$$\text{Balance index (BI)} = \frac{Tb + Thb}{Er + 60}$$

Tb - sum of all the Balance Times (in sec)

Thb - Highest Balance Time (in sec)
Er - error score

Applying this formula the optimal balance index i.e. the balance maintained for continuous 5 mins without committing a single error will amount to 10.

A strict vigilance has been kept on the volunteers particularly on those belonging to group B, by observing change in their behaviour as well as any complaints made by the subjects - that could be accounted as side effects of the drug. Debarring initial excitement and slight increase in heart rate that too at the end of the trial, no substantial complaint was recorded during the course of the study so also during the followup period of 2 weeks or so.

RESULTS

The day-to-day performance curves of all the 3 groups on the balance board are shown in Fig. 1. On the first 5 days, the change in balance index was marginal in all the groups but the learning curves showed a specific trend in the last 5 days' period. Considering the group C (placebo) as control for the present study, the meditators showed an improved performance with overall percentile rise of 27.8% as compared to the controls. Whereas the subjects of the group B (drug) showed decline in their performance with overall percentile fall of 40.6% at the end of 10 days trial period. Another striking observation to be reported is that the curves of group B & C (drug and placebo) showed marked fluctuations in the learning

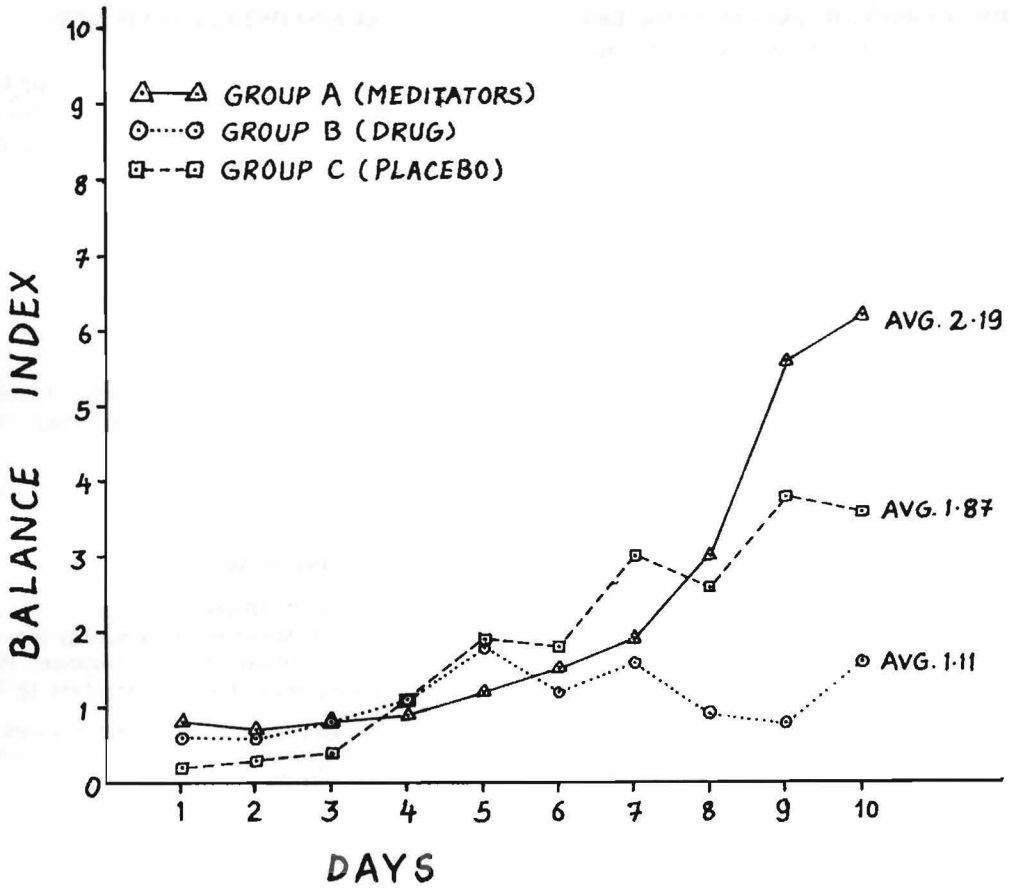

Fig. 1 : The learning curves of balance Index of 3 groups on 10 successive days of training on balance board. Note the detrimental effect of the drug (amphetamine) during last 5 days of training whereas enhanced performance of meditation during the same period.

curve whereas the slop of the curve presented by group A individuals (meditators) was smooth showing progressive and uniform rise in the performance as compared to other two groups.

DISCUSSION

The present study confirms the earlier reports that amphetamine apparently may elevate the mood, self-confidence, ability to concentrate on the task etc. but the task performance may not improve as expected on account of more errors committed under the effects of the drug. In the present work we have shown further that D-amphetamine fails to prolong the concentration of the mind to perform simple task such as maintenance of the balance on the balance board. From this study it is also seen that the detrimental effect of the drug is dose dependent. Administration of 10 mg of the drug in the last 5 days did not improve the task performance rather it further deteriorated while the performance of control groups was still progressively increasing. It is to be noted that the performance of the meditators instead, was shown to be far superior as shown by the smooth and steep rise of the learning curve throughout the 10 days trial period.

The result presented in this study will certainly help to discourage the use and abuse of the drug after being convinced that though amphetamine may

boost the initiative to work, it takes away the task performance. Infact, the permeation of this information to the rest of the students, contributed largely to stop use of the drug in their Hostels. It is emphasized that yogic meditation is of preference if one intends to achieve concentration and control over body and mind in accomplishment of mental as well as physical task.

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