PLASTICITY OF MOTOR CONTROL SYSTEMS DEMONSTRATED BY YOGA TRAINING

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Abstract: The static motor performance was tested in two groups with 20 subjects in each (age range 17 to 22 years, and 5 females in each group). Tests were carried out at the beginning and end of a 10 day period. The test required being able to insert and hold a metal stylus within holes of varying sizes for 15 sec. Accidental contacts between the stylus and the sides of the holes, were registered on a counter as errors. During the 10 days one group (the yoga group) practised asanas (physical postures), pranayama (voluntary regulation of breathing), meditation, devotional sessions, and tratakas (visual focussing exercises). The control group followed their usual routine. At the end of 10 days the yoga group showed a significant reduction in number of errors (Wilcoxon paired signed ranks test), while the control group did not change. Our earlier study showed a similar improvement in children (9 - 13 years). It was interesting to note the same degree of plasticity in motor control systems in young adults. The implications for rehabilitation programmes have been discussed.

Key words: yogic practices, steadiness, motor control system, plasticity.

INTRODUCTION

At the beginning of a race, athletes have to remain motionless, yet ready for activity. This static motor performance is essential for various activities.

We have already established (1), that after 10 days of training in yoga, school children (in the age range of 9-13 years), show considerable improvement in static motor performance, whereas a control group, which did not practise yoga, did not change.

The present study was carried out to determine whether this ability to improve after 10 days of yoga training, would also be seen in teenagers and young adults.

METHOD

Subjects

There were 2 groups with 20 college students in each. Their ages ranged from 17 to 22 years, with 5 females in each group. One group, i.e. the yoga group (mean age ± S.D. 18.2 ± 1.4 years) received 10 days training in yoga. During the 10 day period the 'control' group (mean age ± S.D. 17.9 ± 1.8 years) who were from the same college carried on with their usual routine. According to the ethical guidelines of the Indian Council of Medical Research, New Delhi, and the signed informed consent was taken from all the subjects.

Testing procedure

Hand steadiness was tested with the conventionally used appartus (2). it was fabricated for us by Anand Agencies, Pune, India. This apparatus consists of a metal plate with nine holes of decreasing size. The largest being 8 mm in diameter, while the smallest is 2 mm in diameter. Subjects were asked to keep their arm extended without support, and insert a metal stylus to a depth of about 2cms in each hole, and maintain it there for 15sec, before withdrawing it. Accidental contact of the stylus with the sides of the plates are to be avoided. The stylus is connected to the plate in series, with an electronic counter which registers contacts between the stylus and the plate as errors.

Design of the Study

The steadiness test was performed for both groups at the beginning, and again at the end of the 10 day period. The values were tested for significant difference using the non-parametric Wilcoxon paired signed ranks test (two tailed).

Yoga training

The 'Yoga' group had come to the Vivekananda Kendra Yoga Research Foundation, Bangalore, for a 10-day residential camp. The yogic practices took up approximately 8 hours each day, and consisted of asanas (physical postures), pranayama (voluntary regulation of breathing), meditation, devotional sessions, tratakas (visual focusing exercise to improve eyesight as well as concentration), and lectures on the theory and philosophy of yoga.

Table 1: Number of errors made during a steadiness test in 2 groups of subjects, initially and at the end of a 10 day period ("Final")

Group	Number of errors	
	Initial	Final
Control (n=20)	128.0 ± 8.0	128.5 ± 11.2
Yoga (n=20)	123.0 ± 4.2	100.9* ± 9.3

RESULTS

Both groups had approximately the same number of errors on the initial testing (Table 1). At the subsequent testing, 10 days later, the yoga group had a significantly lower number of errors ($P < 0.02$, Wilcoxon paired signed ranks test, two tailed), whereas the control group showed no change (Table 1).

DISCUSSION

The present study reports a 17.9% decrease in errors after yoga training suggestive of improved static motor performance. In our earlier study (1), we had found a similar decrease (17.1%) in errors made by school children after 10 days of yoga training.

Also, our preliminary results (unpublished), on a group of 25 adults (which had no matched 'control' group), also revealed a 14% reduction in errors recorded by the steadiness test, after 14 days of yoga training.

This improvement in static motor performance can be attributed to better eye-hand co-ordination, improved fine motor control, concentration and also an overall state of well being and relaxation.

We have already reported (3), that 9 months of yogic practices improve the general mental ability, psychomotor co-ordination, and intelligent and social behaviour of mentally retarded children. The present results, though preliminary, suggest that considerable plasticity and scope for improvement in motor performance is still present in teenagers and young adults. This offers interesting scope for extending motor rehabilitation programmes to these age groups.

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