Original article:

Study of effects Withania somnifera in Albino rats on learning & memory using Cook's Pole Climbing Apparatus

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ABSTRACT:

INTRODUCTION : Recently, in the medical world both abroad and in India, there has been a spurt of interest in alternative approaches to health care, especially Ayurveda. Withania somnifera is commonly prescribed by ayurvedic physicians as a central nervous system sedative. Its root is known to possess central depressant properties.

MATERIALS AND METHODS: The study was conducted in Albino (Wistar) rats of either sex weighing between 100-150 grams. They were housed in the Central Animal House, JJM Medical College, Davangere under standard conditions of temperature 25.2°C & 12/12 hrs light, dark cycle, with standard rodent pellets and tap water given ad libitum. All the experiments were performed between 0900-1400 hrs. Food but not water was with-held 12 hrs before experimentation.

RESULTS : The mean values of control group and standard drug Piracetam treated groups with that Of test compound Withania somnifera treated groups III, IV & V. The Withania somnifera groups took less number of days i.e., training scores (19.8, 19.6 & 15 respectively during the learning trial), Retention scores (4.00, 3.00 & 1.66 respectively during relearning trial) and their retention indices were 0.79, 8.44 & 0.89 respectively. They also took less time to learn to climb the pole during learning & relearning trials.

CONCLUSION : During the course of the present study, it was established that the powdered root of Withania somnifera from a standard source exerted a dose-dependent nootropic effect in rats using Cook's pole climbing apparatus.

INTRODUCTION

Recently, in the medical world both abroad and in India, there has been a spurt of interest in alternative approaches to health care, especially Ayurveda. In India Ayurveda, the science of life is well established along with the Allopathic system of Western medicine, it is a holistic medicine which has its origins in the rich, glorious past of Indian traditional medicine.[7]Withania somnifera is commonly prescribed by ayurvedic physicians as a central nervous system sedative. Its root is known to possess central depressant properties.[1,2]

Studies have been conducted in vitro to test the Methanolic extract of the root of Withania somnifera for its GABAergic activity and the results of these studies have shown that Withania somnifera has an anxiolytic property, which is mediated through the GABAergic mechanism, primarily through the barbiturate site on the macromolecular ionophore complex.[3] The extract increased the chloride

influx in the absence of GABA and this was blocked by bicuculline & picrotoxin and enhanced by diazepam'[1]. Also, Singh R.H and Malviya have clinically tried this drug in patients of anxiety and in improvement of certain mental functions.

Hence, it was decided to conduct studies to confirm anxiolytic effect of Withania somnifera.

With this background present study was planned to study effects Withania somnifera in Albino rats on learning & memory using Cook's Pole Climbing Apparatus.

MATERIALS AND METHODS

The study was conducted in Albino (Wistar) rats of either sex weighing between 100-150 grams. They were housed in the Central Animal House, JJM Medical College, Davangere under standard conditions of temperature 25.2°C & 12/12 hrs light, dark cycle, with standard rodent pellets and tap water given ad libitum. All the experiments were performed between 0900-1400 hrs. Food but not water was with-held 12 hrs before experimentation. Institutional Animal Ethics Committee clearance was obtained before carrying out the study. The entire study was conducted between July 2001-Jan 2002.

Cook's Pole Climbing Apparatus (Plate-2):2'

The effect of drugs on memory by testing its effects on conditioned avoidance response (CAR) in experimental animals is a standard screening procedure for assessment of CNS activity. This effect was tested using the Cook's pole climbing apparatus which was first described by Cook & Weidley in 1957. The apparatus consists of a wooden chamber with a metal grid floor through which an electric shock can be delivered to a rat placed on it. A wooden pole is provided in the chamber so that the rat can avoid the shock by climbing on to it. An external panel provides the timer, buzzer and connections for electrical stimulation. The animals are introduced into the cage via the front transparent sliding door from where they can be visualized.

RESULTS

Effects on Learning and Memory by using Cook's pole climbing apparatus. The results were summarized in tables 1,2,3,4,5,6 & 7 and shown in figures.

Tables (1,2,3,4 & 5) show the mean values of control group and standard drug Piracetam treated groups with that of test compound Withania somnifera treated groups III, IV & V. The Withania somnifera groups (Ill, IV & V) took less number of days i.e., training scores (19.8, 19.6 & 15 respectively during the learning trial), Retention scores (4.00, 3.00 & 1.66 respectively during relearning trial) and their retention indices were 0.79, 8.44 & 0.89 respectively. They also took less time to learn to climb the pole during learning & relearning trials.

Tables (6&7) and Graphs (1,2,3) show the comparative analysis of mean values of Withania somnifera treated groups (III,IV,&V) with control group (I) and standard drug Piracetam treated group (II) . The Training scores for the Withania somnifera treated groups were low as compared to control group (P-value <0.01) and the time taken to learn to climb the pole (active avoidance) was low as compared to control group (P-value 0.01) indicating significant effect on the acquisition of active avoidance learning49

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During the relearning trial (i. e., when tested after an internal of 15 days), the Withania somnifera treated groups retained the previously learnt active avoidance task which is evidenced by the less number of days (Retention score P-value <0.01) and less time taken to climb the pole (P-value <0.01) after hearing the buzzer indicating significant retention of learnt activity. Accordingly the Retention indices of Withania somnifera treated groups were 0.79±0.02 (P-value <0.01), 0.84±0.02 (P-value <0.01) & 0.89±0.01 (P-value <0.01) respectively indicating significant retention of previously learnt active avoidance task when tested after an internal of 15 days. The effects of Withania somnifera on Training score, Retention score, Retention Index & the time taken to climb the pole during learning & Relearning trials were dose-dependent with maximum response seen at the dose of 280 mg/kg B. W (P-value <0.01). The values were comparable with standard nootropic agent Piracetam.

However, the effects of Withania somnifera on time spent in open arm (%), ratio of the time spent in open to closed arm, the number of entries into open/closed arm with ratio and the number of peeps out of closed arm were seen maximally with Group II (140mg/kg B. W) treated rats.

DISCUSSION

Withania somnifera treated groups (III,IV&V) had a significant effect on the acquisition of active avoidance learning which is evidenced by low training scores (P-value <0.01) the time taken by the rats to learn to climb the pole (active avoidance) was low (P-value <0.01) as compared to the control group. The Withania somnifera treated groups (111,1 V & V) when tested after an interval of 15 days (Relearning trial) retained the previously learnt active avoidance tasks which is evidenced by low retention score (P-value <0.01) and less time taken (P-value <0.01) to climb the pole. Accordingly the retention indices were high (P-value <0.01) indicating significant retention of previously learnt active avoidance task when tested after an interval of 15 days.

Further, the effects of Withania somnifera on Training score, Retention score, Retention Index & Time taken to climb the pole, during Learning & Relearning trials 52 were dose dependent with maximum response seen at the dose of 280mg/kg BW (P-value <0.01,).

The results indicated that Withania somnifera has a significant nootropic activity, comparable qualitatively with that induced by the standard drug Piracetam.

Results summarized from tables 13,14 shows that Withania somnifera treated groups ('III, IV & 1') had a significant effect on exploratory behaviour based tests using elevated plus more which is evidenced by greater amount time spent in open arm (P-value <0.01) and an increase in number of entries into open arm (P <0.01) and ratio of number of entries into open to closed arms (P-value <0.01) indicating significant anxiolytic activity. Also, the number of peeps out of closed arm were more as compared to the control group (P-value <0.01) indicating significant anxiolytic activity. [4,5,6]

Further, the effects of Withania somnifera on Exploratory behaviour based tests were not dose-dependent the maxima/response seen with the dose of 140 mg/kg BW. [7]

CONCLUSION

During the course of the present study, it was established that the powdered root of Withania somnifera from a standard source exerted a

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dose-dependent nootropic effect in rats using Cook's pole climbing apparatus.

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