

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Effect of Shankhapushpi On Memory of Rats

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### ABSTRACT

Convolvulus Pluricaulis, also called Shankhapushpi is a herb, that has been extensively used for its pharmacological and therapeutic effects. The plant contains alkaloids shankhapushpine. Dietary feeding of this plant found to increase protein synthesis in the hippocampus, thus enhancing memory and learning in experimental animals. Convolvulus Pluricaulis (CP) has been found to augment both cognitive function and memory enhancing effect in Alzheimer's disease, which is the most common cause of dementia in the aged population. Despite advances in research, available therapeutic options are limited, thus increasing the demand for new drugs. To study and compare the effect of Shankhapushpi with Piracetam on memory of rats. After due written permission for the study, the nootropic activity of Shankhapushpi using the ethanol extract of Shankhapushpi and its ethyl acetate and aqueous fractions was evaluated for their effect on elevated Y-maze compared with Piracetam. It is seen from the study that there is enhancement in memory with Piracetam after giving the medication for 10 days. But there is no significant difference in memory of the control group and group treated with Shankhapushpi. Hence, it can be said that there is no much of memory enhancement effect with Shankhapushpi after 10 days of treatment. From the findings of the present study, when Shankhapushpi is given for ten days, there is no significant change in memory, hence it should not be the choice if one requires immediate results. Further studies on Shankhapushpi for longer duration of treatment should be compared with Piracetam, as necessitated in this field, to understand the exact mechanism of action and extend the results.

**Keywords:** Shankhapushpi, Convolvulus Pluricaulis (CP), Elevated Y-maze, Memory.

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## INTRODUCTION

Convolvulus Pluricaulis, also called Shankhapushpi is a herb, that has been extensively used for its pharmacological and therapeutic effects. The plant contains alkaloids shankhapushpine. Dietary feeding of this plant found to increase protein synthesis in the hippocampus, thus enhancing memory and learning in experimental animals. Convolvulus Pluricaulis (CP) has been found to augment both cognitive function and memory enhancing effect in Alzheimer's disease, which is the most common cause of dementia in the aged population. (1,2) AD is characterized by deposition of the senile plaques mainly composed of beta-amyloid fragment and neurofibrillary tangles. Despite advances in research, available therapeutic options are limited, thus increasing the demand for new drugs. Nootropics, popularly referred to as smart drugs are substances which boost human cognitive ability. The Greek, Noos- mind, Tropos- growth. (3)

As Prof. Priyavrat Sharma, published by Chaukhamba Bharti Academy, Varanasi INDIA, Shankhapushpi is composed of glucose, sucrose, glycosides, alkaloids and various acids etc, are found in the plant. Shankhapushpi is a morning glory like perennial that grows on the plains of India. It has been widely used in Ayurvedic medicine to treat the nervous system, the same way kava and valerian are prescribed by American herbalists. It is only recently that Shankhapushpi has been brought to American stores for medicinal use. Herbalists believe that Shankhapushpi calms the nerve by regulating the body's production of stress hormones, adrenaline and cortisol. When these hormones are out of balance it is easy to become hyper-alert and anxious.

Primarily, Shankhapushpi is used as a brain tonic. It is one of the best and prominent natural medicines that help in improving memory. The whole plant is used in medical treatment. (4,5,6)

Cristina Sarich in a study with Shankhapushpi found that, the herb can help to eliminate anxiety, (7) stress related disorder, insomnia and numerous neurodegenerative diseases including dementia and Alzheimer's disease. The active ingredients of this herb include:

Glycosides and Flavonoids - they occur naturally in fruits and vegetables. There are more than 4000 different flavonoids, with all of them having beneficial effects on the human body. They strengthen the immune system.

Coumarins - these natural chemical compounds have anti-fungal and anti-tumor activities.

Alkaloids - alkaloids of many herbs, including Shankhapushpi, have very useful physiological effects.

Shankhapushpi is an Ayurvedic drug used for its action on the central nervous system, especially for boosting memory and improving intellect. Quantum of information gained from Ayurvedic and other Sanskrit literature revealed the existence of four different plant species under the name of Shankhapushpi, which is used in various Ayurvedic prescriptions, singly or in combination with herbs.

### Aim

- To study and compare the effect of Shankhapushpi with Piracetam on memory of rats.

### Objectives

- To study the effect of Shankhapushpi on memory of rats.
- To study the effect of Piracetam on memory of rats
- To compare the effect of Shankhapushpi and Piracetam on memory of rats.

**Inclusion criteria:** Male Wistar rats weighing approximately 250gm

**Exclusion criteria:** Female Wistar rats

**Apparatus used:** Y-Maze, as mentioned in Practical Manual of Experiment and Clinical Pharmacology by Bikash Medhi and Ajay Prakash that these instruments are used to evaluate exploratory behaviour of rats and

mice. Brain areas involved in this experiment are hippocampus, septum, basal forebrain and prefrontal cortex. Drugs like benzodiazepines, barbiturates, alcohol are tested in Y-maze.



### METHODOLOGY

After due written permission of animal ethics committee for the study, nootropic activity of Shankhapushpi us The ethanol extract of Shankhapushpi and its ethyl acetate and aqueous fractions was evaluated for their using Y-maze was compared with Piracetam. Male Wister rats weighing between 200-250 g were kept in groups of eight in polypropylene cages. (8) Shankhapushpi at a dose of 100 mg/kg was orally administered in one group of animals (8 male Wister rats) .(9) Another group with same number of rats was given syrup Piracetam(200mg/kg). Nootropic activity was compared using Piracetam as the standard.(10) The last group was kept as control.(11) Piracetam- It is nootropic drug , cyclic derivative of GABA neurotransmitter.(12) It is used in the treatment of dementia. In this experiment, 18 male Wister rats were divided into three subgroups, let them adapted to the elevated Y-maze (13), let them find the place where food was kept for the exercise was done for one week and readings were taken, one group was given Shankhapushpi for ten days, one group was given Piracetam for seven days, third group was a control group and was given normal saline. After ten days readings were taken for all the groups.

### OBSERVATIONS

It is seen from the study that, the nootropic activity of Shankhapushpi after one week was measured as 37.5, 35.83, 34.5 on 1<sup>st</sup> 2<sup>nd</sup> & 3<sup>rd</sup> day respectively. Which was as, 41.16, 40, 40.33 on very first week. The control group which was not receiving any drug gives result as 38.33, 37, 36.83 on 3<sup>rd</sup> week, which was 41.16, 41.83, 38.83 on 1<sup>st</sup> week. So it is seen that there is no significant difference in the results after one week.

It is seen from the study that, there is enhancement in memory with Piracetam after giving the medication for 10 days. But there is no significant difference in memory of the control group and group treated with Shankhapushpi. Hence, it can be said that, there is no much of memory enhancement effect with Shankhapushpi after 10 days of treatment.

### DISCUSSION

Nootropics represent a new class of psychotropic agents with selective facilitatory effect on the integrative functions of the CNS, particularly on intellectual performance, learning capacity and memory. (14) A number of drugs like Piracetam and Mentat have now been introduced and used in therapy to ameliorate cognitive deficits. (15) Elevated plus maze (EPM) is widely accepted paradigm to study the learning and memory process in rodents (16). It is seen from the present study that, we have seen the nootropic effect of Shankhapushpi in 10 days and compared its effect with Piracetam and it was observed that Shakhapushpi have no significant effect whereas, Piracetam had mild significant change in memory enhancement. It is probably because their mechanism of action is different.

Similar study was conducted by Nahata A, Patil UK, Dixit VK. Department of Pharmaceutical Sciences, Dr. Hari Singh Gour Vishwavidyalaya, Sagar, M.P. India. (Nat Prod Res.2008 Nov;22,16:1472-1482) In their study, Convolvulus Plauricaulis (Shankhapushpi) on learning and memory in rodents was investigated using Cook & Weidley's Pole Climbing Apparatus. The doses of all extracts of CP significantly improved learning and memory in rats. These doses significantly reversed the amnesia induced by scopolamine. Nootropic activity was compared using piracetam as standard. In the study, they found that CP has exhibited potent memory-enhancing effects in the step-down and shuttle-box avoidance paradigms. In our study, significant enhancement in memory was not seen with CP after 10 days of treatment. It may be because of the duration of the study, which was longer in the mentioned study.

### CONCLUSION

From the findings of the present study, when Shankhapushpi is given for ten days, there is no significant change in memory, hence it should not be the choice if one requires immediate results. Further studies on Shankhapushpi for longer duration of treatment should be compared with Piracetam, are necessitated in this field, to understand the exact mechanism of action and extend of results.

### Comparison of time to reach at first week

#### Descriptive Statistics

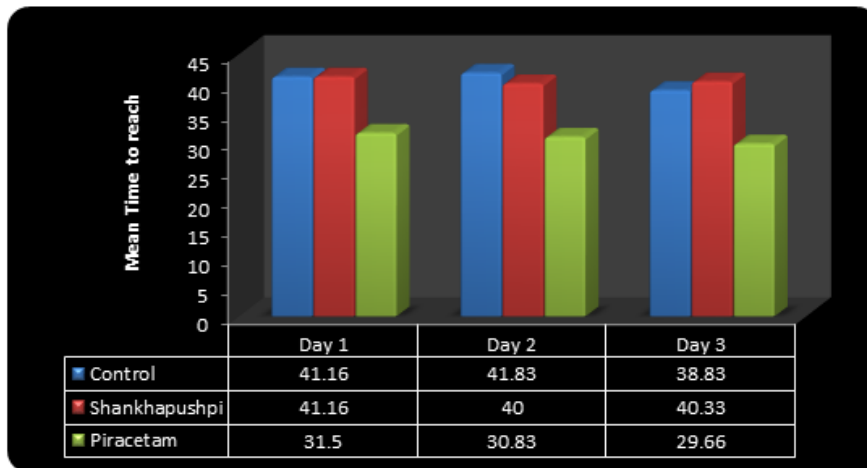
		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Day 1	Control	6	41.16	11.61	4.74	28.97	53.35	29.00	63.00
	Shankhapushpi	6	41.16	10.79	4.40	29.83	52.49	32.00	59.00
	Piracetam	6	31.50	7.96	3.25	23.13	39.86	20.00	40.00
Day 2	Control	6	41.83	12.07	4.92	29.16	54.50	30.00	65.00
	Shankhapushpi	6	40.00	11.50	4.69	27.92	52.07	31.00	58.00
	Piracetam	6	30.83	6.17	2.52	24.35	37.31	22.00	38.00
Day 3	Control	6	38.83	12.31	5.02	25.90	51.76	25.00	62.00
	Shankhapushpi	6	40.33	11.74	4.79	28.01	52.65	30.00	59.00
	Piracetam	6	29.66	6.08	2.48	23.27	36.05	22.00	38.00

#### One way ANOVA

	Source of variation	Sum of Squares	df	Mean Square	F	p-value
Day 1	Between Groups	373.77	2	186.889	1.780	0.203,NS
	Within Groups	1575.16	15	105.01		
	Total	1948.94	17			
Day 2	Between Groups	416.77	2	208.38	1.976	0.173,NS
	Within Groups	1581.66	15	105.44		
	Total	1998.44	17			
Day 3	Between Groups	400.11	2	200.05	1.837	0.193,NS
	Within Groups	1633.50	15	108.90		
	Total	2033.61	17			

**Multiple Comparison: Tukey Test**

	Group		Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
						Lower Bound	Upper Bound
Day 1	Control	Shankhapushpi	0.00	5.91	1.000,NS	-15.36	15.36
		Piracetam	6.00	5.91	0.262,NS	-5.70	25.03
	Shankhapushpi	Piracetam	9.66	5.91	0.262,NS	-5.70	25.03
Day 2	Control	Shankhapushpi	1.83	5.92	0.949,NS	-13.56	17.23
		Piracetam	11.00	5.92	0.186,NS	-4.39	26.39
	Shankhapushpi	Piracetam	9.16	5.92	0.299,NS	-6.23	24.56
Day 3	Control	Shankhapushpi	-1.50	6.02	0.966,NS	-17.14	14.14
		Piracetam	9.16	6.02	0.309,NS	-6.48	24.81
	Shankhapushpi	Piracetam	10.66	6.02	0.213,NS	-4.98	26.31



**Comparison of time to reach at third week**

**Descriptive Statistics**

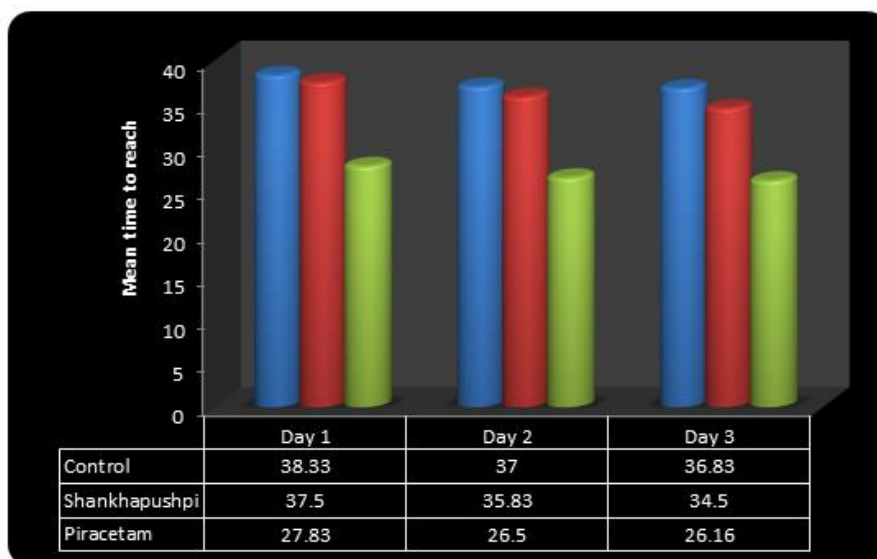
		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Day 1	Control	6	38.33	12.67	5.17	25.03	51.63	24.00	62.00
	Shankhapushpi	6	37.50	12.75	5.20	24.11	50.88	28.00	58.00
	Piracetam	6	27.83	7.57	3.09	19.88	35.78	17.00	38.00
Day 2	Control	6	37.00	11.67	4.76	24.74	49.25	24.00	59.00
	Shankhapushpi	6	35.83	13.15	5.36	22.03	49.63	23.00	54.00
	Piracetam	6	26.50	6.37	2.60	19.80	33.19	18.00	36.00
Day 3	Control	6	36.83	12.28	5.01	23.93	49.72	23.00	60.00
	Shankhapushpi	6	34.50	11.30	4.61	22.63	46.36	25.00	50.00
	Piracetam	6	26.16	6.73	2.74	19.09	33.23	18.00	37.00

**One way ANOVA**

	Source of variation	Sum of Squares	df	Mean Square	F	p-value
Day 1	Between Groups	408.77	2	204.38	1.61	0.232,NS
	Within Groups	1903.66	15	126.91		
	Total	2312.44	17			
Day 2	Between Groups	397.44	2	198.72	1.70	0.216,NS
	Within Groups	1750.33	15	116.68		
	Total	2147.77	17			
Day 3	Between Groups	377.33	2	188.66	1.74	0.208,NS
	Within Groups	1621.16	15	108.07		
	Total	1998.50	17			

**Multiple Comparison: Tukey Test**

	Group		Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
						Lower Bound	Upper Bound
Day 1	Control	Shankhapushpi	0.83	6.50	0.991,NS	-16.06	17.72
		Piracetam	10.50	6.50	0.270,NS	-6.39	27.39
	Shankhapushpi	Piracetam	9.66	6.50	0.325,NS	-7.22	26.56
Day 2	Control	Shankhapushpi	1.16	6.23	0.981,NS	-15.03	17.36
		Piracetam	10.50	6.23	0.244,NS	-5.69	26.69
	Shankhapushpi	Piracetam	9.33	6.23	0.320,NS	-6.86	25.53
Day 3	Control	Shankhapushpi	2.33	6.00	0.921,NS	-13.25	17.92
		Piracetam	10.66	6.00	0.211,NS	-4.92	26.25
	Shankhapushpi	Piracetam	8.33	6.00	0.371,NS	-7.25	23.92



Statistical analysis was done by using descriptive and inferential statistics using one way ANOVA and Multiple comparison: Tukey test and software used in the analysis were SPSS 17.0 version and EPI-INFO 6.0 version and  $p < 0.05$  is considered as level of significance.

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