



# INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare &amp; Pharmascope Foundation

Journal Home Page: [www.pharmascope.org/ijrps](http://www.pharmascope.org/ijrps)

## Effectiveness of oral administration of peppermint and coriander extracts on cognition in Scopolamine induced rat model of amnesia

Jasira Sirajudheen<sup>1</sup>, Sai Sailesh Kumar Goothy<sup>\*2</sup>, Mukkadan J K<sup>3</sup><sup>1</sup>Department of Physiology, PK Das Institute of Medical Sciences, Palakkad, Kerala, India<sup>2</sup>Department of Physiology, R D Gardi Medical College, Ujjain, Madhya Pradesh, India<sup>3</sup>Little Flower Medical Research Centre, Angamaly, Kerala, India

### Article History:

Received on: 25 Feb 2020

Revised on: 27 Mar 2020

Accepted on: 30 Mar 2020

### Keywords:

Memory boosting,  
Memory regaining,  
Peppermint extract,  
Coriander extract

### ABSTRACT

Herbs and spices have been shown to be very effective in the management of the neurological disorders. They have neuroprotective actions that prevent the deterioration of the memory and other cognitive functions in the neurological diseases. Peppermint (*mentha × piperita*, also known as *M. balsamea* wild) is a hybrid mint, a cross between water mint and spearmint. Peppermint consists of several medicinal components and research was testified safety of consumption of the peppermint. The study compared the memory-boosting and regaining effects of oral administration of peppermint and coriander extracts. 36 male and female Wistar albino rats were assigned into three groups randomly that is control, coriander and peppermint groups, respectively. A control group (n=6) received neither peppermint nor coriander administered (milk was administered). Peppermint group (n=6) received peppermint extract. Coriander group (n=6) received coriander extract. Amnesia rat model was prepared by the administration of as intraperitoneal injection of scopolamine. The R-maze and T-maze tasks was conducted as mentioned in the literature. Mean trials of acquisition is significantly less ( $P < 0.01$ ) in the peppermint group. The number of mean trials of retention is significantly less ( $P < 0.01$ ) in the peppermint group. The mean trials for retention of the coriander group is significantly ( $P < 0.05$ ) less than the peppermint group. The study results support a positive impact of coriander and peppermint on cognition. The study recommends further detailed studies to support the administration of these extracts in the management of neurological diseases that deteriorates cognition.



### \*Corresponding Author

Name: Sai Sailesh Kumar Goothy

Phone: 7382075279

Email: [dr.saisailesh@gmail.com](mailto:dr.saisailesh@gmail.com)

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11i3.2632>

Production and Hosted by

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### INTRODUCTION

Herbs and spices have been shown to be very effective in the management of the neurological disorders. They have neuroprotective actions that prevent the deterioration of the memory and other cognitive functions in the neurological diseases (Morinushi *et al.*, 2000). Peppermint (*mentha × piperita*, also known as *M. balsamea* wild) is a hybrid mint, a cross between water mint and spearmint. Peppermint consists of several medicinal components and research was testified safety of consumption of the peppermint. Several studies support the positive impact of peppermint on the cognitive functions (Johnson *et al.*, 2011; Smith *et al.*, 2012; John-

son *et al.*, 2013).

Pharmacological studies in animals have shown that coriander has multiple beneficial effects. Coriander sativum have been used as a drug for indigestion, against worms, rheumatism and pain in the joint. The oil produced from this plant was effective against the bacteria. It also have a reversal of memory deficits. The leaf extract of the plant exerted an anti-anxiety effect on mice in the elevated plus-maze and open field tests. The plant leaves was found to be effective in preventing the effects of the lead (Moattar and Takhesh, 2011; Chithra and Leelamma, 2000). Though the studies exist that observed the memory-enhancing effects of peppermint and coriander separately, the comparative studies were scanty. Hence, the study recommends further detailed studies to support the administration of these extracts in the management of neurological diseases that deteriorates cognition.

## METHODOLOGY

### Animals

36 male and female Wistar albino rats were randomly assigned into three groups.

### A control group (n=6)

Neither peppermint nor coriander administered (milk was administered)

### Peppermint group (n=6)

Peppermint extract was administered for (Jasira *et al.*, 2013).

### Coriander group (n=6)

Coriander extract was administered for (Jasira *et al.*, 2013).

### Amnesia rat model

Amnesia rat model was prepared by the administration of as intraperitoneal injection at a dose of 1 mg / Kg of scopolamine (Buscopan® tablets powdered and mixed with 50 ml sterile 0.9% normal saline) (Jasira *et al.*, 2013).

### T-maze

The T-maze task was conducted as mentioned in the literature (Jasira *et al.*, 2013).

### Radial arm maze

The T-maze task was conducted as mentioned in the literature (Jasira *et al.*, 2013).

### Ethical Consideration

The study protocol was approved by the Ethical Committee of Little Flower Medical Research Centre,

Angamaly, Kerala, India. All the study procedures were as per the guidelines of CPCSEA.

### Statistical analysis

Data was analyzed using SPSS 16.0 version. Student T-Test and One Way Anova Test are used for the data analysis. A p-value less than 0.05 was considered as significant.

## RESULTS

Mean trials of acquisition is significantly less ( $P < 0.01$ ) in the peppermint group. The number of mean trials of retention is significantly less ( $P < 0.01$ ) in the peppermint group (Table 1). The number of mean trials acquisition is not significantly different between the coriander and peppermint groups. The mean trials for retention of the coriander group is significantly ( $P < 0.05$ ) less than the peppermint group (Table 2). The number of trials for the acquisition of groups were compared by one way ANOVA. The significant difference was observed ( $p < 0.001$ ). Then the number of trials for retention of these three groups indicates a significantly different with ( $p < 0.001$ ) between the groups (Table 3). The number of trials for the acquisition of groups were significantly different ( $p < 0.001$ ). Then the number of trials for retention of these three groups was significantly different ( $p < 0.001$ ) between the groups (Table 4). The number of trials for the acquisition of groups were significantly different ( $p < 0.001$ ). Then the number of trials for retention of these three groups were significantly different ( $p < 0.001$ ) between the groups (Table 5). The number of trials for the acquisition of groups were significantly different ( $p < 0.001$ ). Then the number of trials for retention of these three groups was significantly different ( $p < 0.001$ ) between the groups (Table 6).

## DISCUSSION

Though the studies exist that observed the memory-enhancing effects of peppermint and coriander separately, the comparative studies were scanty. Hence, the study recommends further detailed studies to support the administration of these extracts in the management of neurological diseases that deteriorates cognition. There exists plenty of literature that supports the memory-enhancing effects of the peppermint (Akben and Coskun, 2019; Nandy *et al.*, 2018). Further, peppermint has several benefits like antiseptic, antimicrobial properties, etc. It also has an influence on the secretion of hormones (Eccles, 1994; Gustafson, 2015; Robbers and Tyler, 1998). The underlying mechanism in improving cognition may be acting on the neuronal level, which has to

**Table 1: R-maze task- comparison of the number of trials**

Task	Coriander group	Peppermint group	P-value
Acquisition	28.17±5.12	18.67±2.16	0.002**
Retention	19.17±4.54	11.83±2.14	0.005**

(\*\*P&lt;0.01 is significant)

**Table 2: T-maze task- Comparison of the number of trials**

Task	Coriander group	Peppermint group	P-value
Acquisition	7.83±1.33	12.17±2.32	0.097
Retention	5.50±0.84	6.83±1.47	0.016*

(\*\*P&lt;0.05 is significant)

**Table 3: R maze task- Comparison of memory-boosting effects ANOVA**

		ANOVA				
		Sum of Squares	df	Mean Square	F	P-value
acq	Between Groups	741.444	2	370.722	36.827	<.001***
	Within Groups	151.000	15	10.067		
	Total	892.444	17			
retention	Between Groups	318.111	2	159.056	25.839	<.001***
	Within Groups	92.333	15	6.156		
	Total	410.444	17			

(\*\*P&lt;0.001 is significant)

**Table 4: R maze task- Comparison of memory regaining effects**

		ANOVA				
		Sum of Squares	df	Mean Square	F	P-value
acq	Between Groups	1484.111	2	742.056	64.340	<.001
	Within Groups	173.000	15	11.533		
	Total	1657.111	17			
retention	Between Groups	261.333	2	130.667	13.690	<.001
	Within Groups	143.167	15	9.544		
	Total	404.500	17			

**Table 5: T maze task- Comparison of memory-boosting effects**

		ANOVA				
		Sum of Squares	df	Mean Square	F	P-value
acq	Between Groups	160.333	2	80.167	18.312	<.001
	Within Groups	65.667	15	4.378		
	Total	226.000	17			
retention	Between Groups	70.778	2	35.389	13.670	<.001
	Within Groups	38.833	15	2.589		
	Total	109.611	17			

**Table 6: T maze task- Comparison of memory regaining effects**

		Sum	of	df	ANOVA		
		Squares			Mean	F	P-value
					Square		
acq	Between Groups	560.778		2	280.389	47.975	<.001
	Within Groups	87.667		15	5.844		
	Total	648.444		17			
retention	Between Groups	104.333		2	52.167	16.416	<.001
	Within Groups	47.667		15	3.178		
	Total	152.000		17			

be further explored with detailed studies in this area. The other possible mechanism is improving the blood supply to the brain, which makes the brain to function better (Raudenbush *et al.*, 2009). Coriander sativam leaves were found to be effective in preventing the scopolamine-induced changes in memory. The mechanism may be by inhibiting the acetylcholine esterase activity. Long-term administration of coriander leaves was found to be effective in the management of Alzheimer's disease. The present study results are in the same line as earlier studies, as we have observed a positive impact on cognition followed by the oral administration of coriander extract. When coriander and peppermint groups are compared, the memory-boosting and regaining effects of peppermint are significant in R-maze, whereas memory boosting and regaining effects of coriander are significant in T-maze.

## CONCLUSIONS

The study results support memory boosting and regaining effects of coriander and peppermint. The study recommends further detailed studies to support the administration of these extracts in the management of neurological diseases that deteriorates cognition.

## Funding Support

None.

## Conflict of Interest

None.

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