

STUDY OF ANTI-TUSSIVE ACTIVITY OF SITOPALADI CHURNA: A POLY-HERBAL FORMULATION*Priyabrata Pattanayak¹, Sangram Kesari Panda², Snehasis Dash², Manaswini Behera², Susanta Kumar Mishra²¹Indira Gandhi Institute of Pharmaceutical Sciences, IRC Village, Bhubaneswar-751015²Jeyepore College of Pharmacy, Jeyepore (K), Orissa, India-764002*Email: Priyabrata2005@gmail.com**ABSTRACT**

“Sitopaladi Churna” is a polyherbal Ayurvedic formulation used as an antitussive, analgesic and antipyretic. The present study reports on the anti-tussive activity of the macerated extract of Sitopaladi Churna by comparison to other marketed formulations as well as reference drug Codeine phosphate using the acetic acid induced cough models in guinea pigs. The standard drug codeine phosphate brought about a reduction of bouts of cough from 15.62±0.38 to 1.0±0.11 (93.60% inhibition), which was significant (P<0.01). The percentage inhibition of bouts of cough for in-house formulation (94.28%) was very significant compared to the standard as well as other marketed formulations. Thus the present study justifies the traditional claims of Sitopaladi Churna in the treatment of cough.

Keywords: Polyherbal Ayurvedic formulation, anti-tussive activity, Sitopaladi Churna.

INTRODUCTION

“Sitopaladi Churna” is a polyherbal Ayurvedic formulation used as an antitussive, analgesic and antipyretic (Kaviraj Sri Ambidatasastri Ayurvedacharya, 1951). According to Ayurvedic physicians cough formation is due to bronchial tract infection or by the production of an intermediate agent released by irritation of mucosa. Though Sitopaladi Churna is claimed to cure cough (Anonymous 1981) but there is no scientific proof to support this claim. The present study reports on the anti-tussive activity of the macerated extract of Sitopaladi Churna by comparison to other marketed formulations as well as reference drug Codeine phosphate using the acetic acid induced cough models in guinea pigs.

MATERIALS AND METHODS**Materials**

All the chemicals used in the experiment were of analytical grade. Acetic acid used in the experiment was procured from Nice Chemical Ltd. Cochin, India.

Plant materials

Sitopaladi Churna consists of Cane sugar, *Bambusa bambos* (Silicacious concretion), *Piper longum* (Piperaceae, dried fruit), *Elettaria cardamomum* (dried seed), *Cinnamomum zeylanicum* (Stem bark). All these ingredients were procured from the local market of Jeyepore, Koraput, Odissa, India and all the plant material were authenticated by Mr. S.R. Dash H.O.D Dept of Botany Vikram Dev College Jeyepore, Koraput Odisa. Voucher specimens (JCP/09/LAB-5/34) of the same have been deposited in the museum of Dept. of Pharmacognosy, Jeyepore College of Pharmaceutical Sciences for future reference.

Preparation of Sitopaladi Churna

In-house formulation of Sitopaladi Churna was prepared as per Ayurvedic Formulary of India. All ingredients are

powdered individually in a pulverizer and pass through 80# sieve. Each ingredients *Piper longum* (48gm), *Elettaria cardamomum* (24 gm), *Cinnamomum zeylanicum* (12 gm), *Bambusa bambos* (96gm) and Cane sugar (192 gms) were weight separately, mixed together to obtain a homogeneous blend.

Marketed samples

Three marketed samples of various brands of Sitopaladi Churna i.e. DABUR (Dabur India Ltd. Rajasthan, Formulation D), BAIDYANATH (Baidyanath ayurved bhawan pvt ltd. Nagpur, Formulation B) and ZANDU(Gujarat, Formulation Z) were collected and chosen for comparison of anti-tussive activity with the in-house preparation(Formulation I).

Animals

Healthy guinea pigs of both sexes (500±150gm) were used in the study. Animals were maintained at 25-27⁰C with free access to laboratory guinea pig pellets (supplemented with greens) and filtered tap water. The study was conducted after obtaining institutional animal ethical committee clearance (Regd no.-HP1/07/60/IAEC/0013 of date 07-05-2007).

Plant Extract

The extraction of different formulations was prepared by maceration method. 50gm of each of the formulation was taken and macerated with 300ml of water and shaken for 48 hours. The solvent was then removed under reduced pressure to get the crude extracts.

Evaluation of Anti-Tussive activity

Cough was induced by exposure to the aerosol of citric acid (7.5% w/v) introduced through a small opening at the side of the chamber using an ultrasonic nebulizer (Microlux, Italy) for 5 minutes. The frequency of cough during following 5 minutes was recorded. Coughs could easily be distinguished from sneeze and the difference in



sound as well as in behavior of the animals. The animals showing 15 ± 5 bouts of cough³ were selected for the study.

The day before the test they were placed individually in histamine chamber for 5 minutes for acclimatization. The selected animals were randomly assigned to 6 groups with six animals in each group. After an hour of rest the first group of animals was administered normal saline, second group received codeine phosphate (0.25gm/kg body weight, positive control), and the third, fourth, fifth and sixth group animals received the macerated extract of the poly herbal formulations (MEPF) I, B, D, Z respectively at a concentration of 2.5 gm/kg body weight in saline respectively. The drugs were administered orally.

An hour after drug administration, they were subjected to citric acid aerosol⁴ exposure again and the number of bouts in 5min before and after were recorded as mentioned above. The percentage inhibition of cough was calculated using the formula, % cough inhibition = $100 - (V_{\text{after}} / V_{\text{before}}) \times 100$.

Where V is the number of bouts during 5min

Statistical analysis

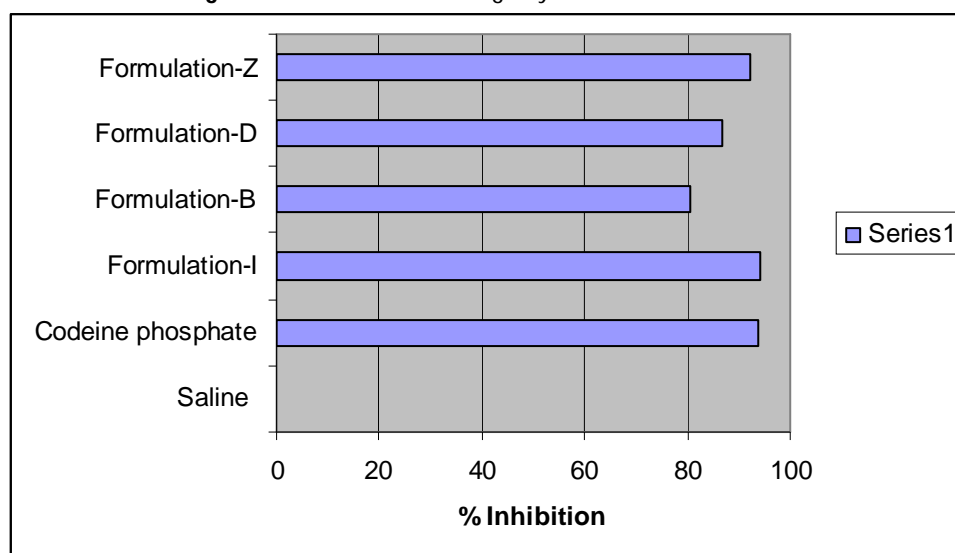
The values are expressed as Mean \pm SEM. Statistical significance was calculated by using one-way ANOVA followed by Dunnet's t test. P< 0.05 was considered to be significant.

Table 1: Effect of Different MEPF on Citric acid induced cough

Groups	Dose(gm) per kg body weight	Frequency of cough		
		Before	After	% Inhibition
Saline	10ml	16.2 \pm 0.23	16.98 \pm 0.1*	NI
Codeine phosphate	0.25	15.62 \pm 0.38	1.0 \pm 0.11**	93.60
Formulation-I	2.5	17.12 \pm 0.41	0.98 \pm 0.84**	94.28
Formulation-B	2.5	15.2 \pm 0.32	2.98 \pm 0.62	80.40
Formulation-D	2.5	16.21 \pm 0.33	2.13 \pm 0.67	86.86
Formulation-Z	2.5	15.4 \pm 0.22	1.21 \pm 0.33**	92.15

Values are Mean (n=6) \pm SEM, ** P<0.01, NI= No Inhibition.

Figure 1: % Inhibition of cough by different formulations



RESULTS AND DISCUSSION

In the Citric acid induced cough model in conscious guinea pigs, it was established that the poly-herbal formulations shows significant anti-tussive activity (Table 1). The animals which were found to exhibit a cough response with the frequency of 16 ± 1.5 were qualified for the test. The standard drug codeine phosphate brought about a reduction of bouts of cough from 15.62 ± 0.38 to

1.0 ± 0.11 (93.60% inhibition), which was significant (P<0.01). The dose⁵ of the extracts was extrapolated from human dose of the formulations as suggested by Ayurvedic text. All the extracts showed significant inhibition (Fig 1) at a dose of 2.5gm/kg body weight. The percentage inhibition of bouts of cough for in-house formulation (94.28%) was very significant compared to the standard as well as other marketed formulations.



Citric acid induced cough model in conscious guinea pigs has been used as a sensitive model for evaluation of some of centrally acting opioid antitussive like codeine and morphine⁴. Evidences from recent studies on cough induced by citric acid and its reversal by capsazepine (cap receptor antagonist) indicate that the effect of citric acid is mediated through cap receptor. Citric acid can produce its effect on cough receptors either by direct action or by the production of an intermediate agent released by the mucosa⁶. Studies on some poly-herbal formulation which contain *cardamomum*⁷, *Piper longum*⁸ has CNS activity. Based on this it appears that the poly-herbal formulation brings about its anti-tussive effect by central action probably mediated by both opioid system and GABA-ergic system.

CONCLUSION

The present study justifies the traditional claims of Sitopaladi Churna in the treatment of cough. Confirmatory studies using specific antagonists in the same experimental model and study of action of the extracts on central nervous system would establish this mechanism conclusively.

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