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EVALUATION OF CARMINATIVE POTENTIAL OF SOME INDIAN SPICES

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ABSTRACT

Spices are important ingredients in our daily diet although they are used in small quantities. It was occupied an important place in the culinary preparations of several ancient and modern kitchens from time immemorial. In the present study sixteen Indian spices were selected and homogenized and dried under shade and thus mass obtained was powdered, weighed and subjected for the evaluation of carminative and antacid profile of the drug. The spices showed significant results for carminative properties and antacid effect ($P < 0.05$) at different doses and the results obtained were comparable to that of standard $NaHCO_3$. The results of the present study suggest that extract of selected Spices significantly neutralized acid and showed resistance against change in pH and also illustrate good carminative potential. The extract of spices has shown to possess significant carminative and antacid property.

KEYWORDS: Spices, Traditional uses, Phytochemical, Carminative potential, Antacid.

INTRODUCTION

Herbal medicines are unique and play a vital role in the indigenous system of medicine all over the world and India is no exception wherein a number of medicinal plants are used as the source of raw drugs in the Indian system of medicine (Sastry, 2000). People today are more concerned about the side effects and the cost effectiveness of drugs and have began to rely more firmly upon herbs which are comparatively less exploited for their nutritive and medicinal qualities. Herbal medicines have been practiced worldwide since time immemorial and are now recognized by WHO as an essential building block for primary health care.

According to the International Organization for Standardization of Spices "Spices and Condiments" are defined as "such natural plant or vegetable products or mixtures thereof in whole or ground form which are used for imparting flavour, aroma and piquancy to and for seasoning foods" (Prakash,1990). A spice is a dried seed, fruit, root, bark or vegetative substance used in nutritionally insignificant quantities as a food additive for the purpose of flavouring and sometimes as a preservative by killing or preventing the growth of harmful bacteria (Turner, 2004). Spices depending on the origin and active principle present are classified as pungent spices – pepper, ginger, chillies and mustard; aromatic fruits – cardamom, nutmeg, mace, fenugreek, aniseed, caraway, dill, celery, cumin, coriander, etc.; aromatic barks – cinnamon and cassia; phenolic spices containing eugenol – clove and pimento; and colored spices – paprika, saffron and turmeric (Manay. and Shadaskarswamy, 1999). The human stomach secretes hydrochloric acid which is necessary for the digestion of food. When the stomach contains an excessive amount of hydrochloric acid, then the condition is called as hyperacidity or acid dyspepsia.

Common symptoms associated with dyspepsia are typical feeling of restlessness, feeling of nausea, actual vomiting, sour belching with an aftertaste of the already-eaten food, stiffness in the stomach, which is called as atomic dyspepsia, lack of desire for any other type of food indigestion constipation. Today, there are different types of medicines available to treat stomach acidity. Spices have long been recognized for their digestive stimulant action. Sixteen spices are also employed in medicinal preparations against digestive disorders in traditional and Indian systems of medicine. (Khanum *et al*., 2001). So, In this present study sixteen well known Indian spices were selected and their bioactive constituents are studied. They are screened for their carminative potential. Carminatives are the agents which induces the expulsion of gas from the stomach or intestines. Spices are well recognized to stimulate gastric function. They are believed to intensify salivary flow and gastric juice secretions, and help in digestion. Carminatives are often mixtures of essential oils and herbal spices with a tradition in folk medicine for this use. Exhaustive literature survey revealed that the potential of spices as antacid and carminative has not been exploited. Following this as a guiding factor in present research endeavor we here tried to evaluate scientifically the carminative and antacid properties of

spices employing carbondioxide evolution method and Rossette Rice test.

MATERIALS AND METHODS

Collection of Indian spices

Sixteen well-known and commonly used Indian spices, namely Mustard, Poppy seed, Fenugreek, Clove, Asafoetida, Fennel, Coriander, Cumin, Trachyspermumcopticum, Mint, Garlic, Turmeric, Cardamom, Ginger, Cinnamon and Pepper were identified and all the selected spices are procured from the local market in Thanjavur, Tamil Nadu, South India. They were categorized in to dry and wet spices. Different parts of as a spices used and their vernacular and common name, medicinal uses are enumerated. (Table-1)

Phytochemical screening

Chemical tests were carried out on the alcoholic extract and on the powdered specimens using standard procedures to identify the constituents as described by Sofowara, Trease and Evans and Harborne.1998.

Carminative potential of some selected Indian spices

Spices were homogenized and dried under shade and thus mass obtained was powdered, weighed and subjected for the evaluation of carminative and antacid properties of the drug .For the evaluation of carminative profile 2.5gm of spices extract were placed in the Erlenmeyer flask containing 100 ml of distilled water and 100 ml of NaOH (1M, previously standardized by oxalic acid) and was poured into a balloon. The balloon was secured immediately around the neck of the flask. Flask was agitated slowly with the help of magnetic stirrer followed by greater agitation for next 30 min, and was allowed to stand overnight. The evolved carbon dioxide gas was allowed to pass into a balloon containing excess sodium hydroxide where it was absorbed and converted into equivalent amount of sodium carbonate.

The resulting mixture consisting of excess sodium hydroxide and sodium carbonate was titrated with standard HCL using phenolphthalein indicator to get first endpoint and in continuation to this the second endpoint was observed using methyl Orange indicator. The same process was carried out with 0.1gm of standard sodium bicarbonate. The difference in milliliters between the first &second endpoints was used to calculate the carbon dioxide content per gram of sample. Mass of carbon dioxide produced by the drug sample and standard was calculated using the Following formula:

Vol. of titrant x molarity of std. acid x mol. Wt. of CO_2 = mass of CO_2 in gm.

Determination of antacid potential

Three different quantities i.e. 2.5, 5 and 7.5 gm of the drug extract of selected spices were taken for antacid evaluation using Rossett-Rice method and the results obtained were compared with standard sodium bicarbonate. The method adopted herein simulated the acidic environment of stomach and records the change in pH with the time followed by administration of the different doses of crude extract of spices such as *Allium sativum Ferula asafetida Carum roxburghianum* and *Zingiber officinalis* and standard sodium bicarbonate were recorded respectively. A jacketed reaction vessel made up of borosilicate glass containing 70ml HCl and 30ml of water approximating the acidity of the gastric contents, was heated till the temperature of this simulated fluid reached to 37oC. Immediately 2.5 gm of *Allium sativum Ferula asafetida Carum roxburghianum* and *Zingiber officinalis* extract was added separately. Simultaneously pH meter and recorder were turned on and a pump caliberated to add 0.1N HCl at a rate of 4ml/min was activated. The flow rate simulates the normal acid secretion rate. The pH was noted & the Rosette-Rice time was determined. The procedure was repeated for 5 and 7.5 gm of *Allium sativum Ferula asafetida Carum roxburghianum* and *Zingiber officinalis* and 0.8 gm of sodium bicarbonate respectively. The time during which the pH maintained 3-5 is the duration of effective pH control and termed as Rosette-Rice time. Rossett-Rice curve was prepared for drug extract and standard.[5,6]

RESULTS

Table 1: Traditional uses of spices.

S. no.	Botanical name	Family	Common/ English name	Tamil name	Parts used	Traditional uses
1	*Brassica juncea* (L)	Brassicaceae	Mustard	Kadugu	Seed	Cardiac pain
2	*Papaver somniferum* (L)	Papaveraceae	Poppy seed	Kasakasa	Seed	Stomachache
3	*Carum roxburghianum* (L)	Fabaceae	Fenugreek	Venthayam	Seed	Cough
4	*Syzygium aromaticum* (L)	Myrtaceae	Clove	Kirambu	Flower bud	Toothache
5	*Ferula asafoetida* (L)	Apiaceae	Asafoetida	Perungayam	Resin	Anesthetic
6	*Foeniculum vulgare* (L)	Apiaceae	Fennel	Perunjeragam	Fruit	Stomachache
7	*Coriandarum sativum* (L)	Apiaceae	Coriander	Kothamalli	Leaf	Fever
8	*Cuminum cyminum* (L)	Apiaceae	Cumin	Seeragam	Fruits	Cold
9	*Trachyspermum copticum* (L)	Apiaceae	Ajwain	Omum	Fruits	Cough,Digestion
10	*Mentha piperita* (L)	Lamiaceae	Mint	Puthina	Leaf	Cold,Asthma

11	*Allium sativum* (L)	Alliaceae	Garlic	Vella poondu	Bulb	Digestion
12	*Curcuma longa* (L)	Zingiberaceae	Turmeric	Manjal	Rhizome	Antibiotic
13	*Elettaria cardamomum* (M)	Zingiberaceae	Cardamom	Elakkai	Fruits	Cough
14	*Zingiber officinale* (R)	Zingiberaceae	Ginger	Injhi	Rhizome	Digestion
15	*Cinnamomum Zeylanicum* (B)	Lauraceae	Cinnamom	Pattai	Bark	Headache
16	*Piper nigrum* (L)	Piperaceae	Pepper	Milagu	Fruits	Fever, Cough

Table 2: Phytochemical analysis of aqueous extract of some Indian spices.

Phytochemical compounds	Alkaloids	Flavonoids	Steroids	Terpenoids	Phenols	Anthroquinones	Tannins	Saponins
Brassica juneca	+	+	+	+	+	+	+	+
Papaver somniferum	-	+	+	-	-	+	-	+
Carum roxburghianum	-	+	-	-	+	-	+	-
Syzygium aromaticum	-	+	+	+	+	-	-	-
Ferula asafoetida	+	+	+	+	+	+	+	+
Foeniculum vulgare	+	+		-	-	+		+
Coriandrum sativum	-	-	+	+	+	-	+	-
Cuminum cyminum	+	-	+	+	+	-	+	-
Traclyspermum copticum	+	+	+	+	+	+	+	+
Mentha piperita	-	-	+	-	-	-	+	-
Allium sativum	+	+	+	+	+	+	+	+
Curcuma longa	-	-	+	-	-	-	+	-
Elettaria cardamomum	+	+	-	+	+	+	-	+
Zingiber officinale	+	+	+	+	+	+	+	+
Piper nigrum	+	-	+	+	+	-	+	-
Cinnamomum zeylanicum	-	-	+	+	-	+	-	+

Tabel 3: Amount of Co_2 produced by different doses of some selected Indian spices.

Doses in Gram	Amount of CO_2 released			
	Allium sativum	***Ferula asafoetida***	***Carum roxburghianum***	***Zingiber officinalis***
1	2.04±0.01	1.08±0.02	1.03±0.09	0.8±0.04
2.5	9.09±0.03	8.21±0.02	7.02±0.03	5.02±0.4
5	14.7±0.04	13.28±0.04	21.06±0.08	11.08±0.2
7.5	21.0±0.06	17.21±0.42	12.45±0.04	15.02±0.11

Table 4: Determination of antacid potential.

Doses in Gram	Time (min)			
	Allium sativum	***Ferula asafoetida***	***Carum roxburghianum***	***Zingiber officinalis***
1	12.04±0.2	9.22±0.4	11.2±0.7	17.0±0.3
2.5	18.46±0.3	12.33±0.7	19.5±11	24.0±0.7
5	22.07±0.2	17.09±0.1	25.6±19	28.2±0.8
7.5	25.1±0.6	23.2±0.8	26.0±0.8	31.2±0.2

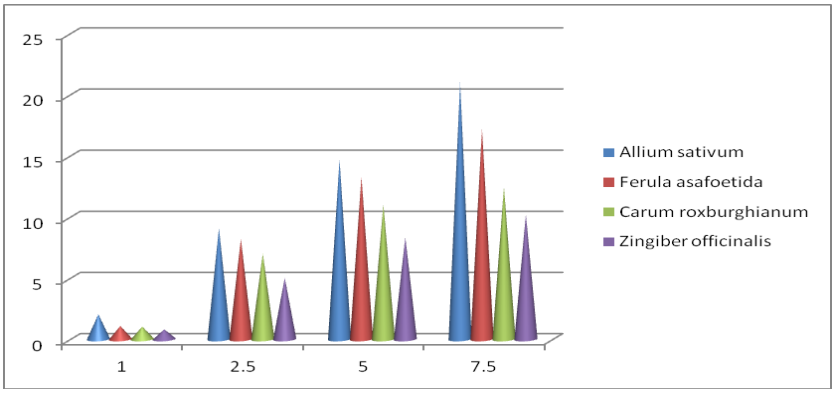

Fig. 1: Amount of co_2 produced by different doses of some selected Indian spices.

DISCUSSION

Sixteen well-known and commonly used Indian spices, namely Mustard, Poppy seed, Fenugreek, Clove, Asafoetida, Fennel, Coriander, Cumin, Trachyspermumcopticum, Mint,Garlic, Turmeric, Cardamom, Ginger, Cinnamon and Pepper were identified and were categorized in to dry and wet spices. Different parts of as a spices used and their vernacular and common name, medicinal uses are enumerated (Table-1).

In the present study phytochemicals analysis were carried out in extracts of all the spices. Alkaloids, flavonoids, steroids, saponins Tannin, Terpenoids and phenol were present in all the spices. Alkaloids present in the Brassica juncea, Ferula asafetida, Foeniculum vulgare Cuminum cyminum, Carum roxburghianum, Allium sativum, Elettaria cardamomum, Zingiber officinale, and Piper nigrum. It is absent Papaver somniferum, Carum roxburghianum, Syzygium aromaticum, Coriandrum sativaum, Mentha piperita, Curcuma longo and Cinnamomum zeylanium. Flavonoids present in the Brassica juncea, Papaver somniferum, Syzygium aromaticum, Ferula asafetida, Foeniculum vulgare, Carum roxburghianum, Allium sativum, Zingiber officinale, Elettaria cardamomum. It is absent in the Coriandrum sativaum, Cuminum cyminum, Mentha piperita, Curcuma longo, Piper nigrum, Cinnamomum zeylanium. Steriods present in the Brassica juncea, Ferula asafetida, Foeniculum vulgare Cuminum cyminum, Carum roxburghianum, Allium sativum, Elettaria cardamomum, Zingiber officinale, and Piper nigrum, Papaver somniferum, Carum roxburghianum, Syzygium aromaticum, Coriandrum sativaum, Mentha piperita, Curcuma longo and Cinnamomum zeylanium. It is absent Carum roxburghianum and Elettaria cardamomum, Terpenoids present in the Brassica juncea, Ferula asafetida, Cuminum cyminum, Carum roxburghianum, Syzygium aromaticum, Coriandrum sativaum, Allium sativum, Elettaria cardamomum, Cinnamomum zeylanium. Zingiber officinale, and Piper nigrum. It is absent Papaver somniferum, Carum roxburghianum, Curcuma longo, Foeniculum vulgare and Mentha piperita. Phenols present in the Brassica juncea, Ferula asafetida, Cuminum cyminum, Carum roxburghianum, Syzygium aromaticum, Coriandrum sativaum, Allium sativum, Elettaria cardamomum, Carum roxburghianum, Zingiber officinale, and Piper nigrum. It is absent Papaver somniferum, Curcuma longo, Cinnamomum zeylanium, Foeniculum vulgare and Mentha piperita. Anthroquinones present in the Brassica juncea, Ferula asafetida, Foeniculum vulgare, Carum roxburghianum, Allium sativum, Elettaria cardamomum, Zingiber officinale, and Piper nigrum. It is absent Papaver somniferum, Carum roxburghianum, Syzygium aromaticum, Coriandrum sativaum, Cuminum cyminum, Mentha piperita, Curcuma longo and Piper nigrum. Tannins present in the Brassica juncea, Coriandrum sativaum, Cuminum cyminum, Ferula asafetida, Foeniculum vulgare, Carum roxburghianum, Allium sativum, Zingiber officinale, Curcuma longo, Piper nigrum. It is absent in the Elettaria cardamomum, Papaver somniferum, Mentha piperita, Syzygium aromaticum, Cinnamomum zeylanium. Saponins present in the Brassica juncea, Papaver somniferum, Ferula asafetida, Foeniculum vulgare, Allium sativum, Zingiber officinale, Elettaria cardamomum. It is absent in the Carum roxburghianum, Syzygium aromaticum, Coriandrum sativaum, Cuminum cyminum, Mentha piperita, Curcuma longo, and Piper nigrum. (Table-2).

In the present study the carminative behavior was evaluated on basis of the amount of carbondioxide produced by the drug extract *Ferula asafoetida*, *Allium sativum*, *Carum roxburghianum* and *Zingiber officinalis* and standard $NaHCO_3$. The amount of carbondioxide (g) produced by 1 gm extract of *Ferula asafetida* was to be (2.04±0.01) and with 2.5 gm extract it was (9.09±0.03) while for 5gm it was (14.7±0.04) and finally for 7.5 gm the value was (21.0±0.06), Similarly, carbondioxide produced by 1 gm extract of *Allium sativum*, was to be (1.08±0.02) and with 2.5 gm extract it was (8.21±0.02) while for 5gm it was (13.28±0.04) and finally for 7.5 gm the value was (20.21±0.42). Carbondioxide produced by 1 gm extract of *Carum roxburghianum* was to be (1.03±0.09) and with 2.5 gm extract it was (7.02±0.03) while for 5gm it was (21.06±0.08) and finally for 7.5 gm the value was (19.45±0.04), 1 gm extract of *Zingiber officinalis* produced co_2 0.8±0.04 and with 2.5 gm extract it was (5.02±0.4) while for 5gm it was (11.08±0.2) and

finally for 7.5 gm the value was (17.02±0.11) as compared to the standard 1gm $NaHCO_3$ for which result was found as 0.523±0.0001. All analyses were run in three replicates and averaged (Table-3).

Similarly carminative behaviour was evaluated on basis of the amount of carbondioxide produced by the drug extract *Allium sativum, Carum roxburghianum* and *Zingiber officinalis* and standard $NaHCO_3$. The amount of carbondioxide (g) produced by the 1 gm extract of *Allium sativum, Carum roxburghianum* and *Zingiber officinalis* was to be (1.01±.009) and with 2.5 gm extract it was (7.32±0.08) while for 5gm it was (12.04±0.06) and finally for 7.5 gm the value was (19.45±0.05) as compared to the standard 1gm $NaHCO_3$ for which result was found as 0.523±0.001. The drug extract of *Allium sativum, Carum roxburghianum* and *Zingiber officinalis* exhibits promising carminative acid antacid properties in comparison to standard. All analyses were run in three replicates and averaged. The results were termed significant statistically when probability was less than 0.05 (P<0.05) (Carlos *et al*., 2006).

All the four extracts showed carminative property. Among the four spices *Ferula asafoetida*, showed maximum CO_2 production followed by *Allium sativum, Carum roxburghianum* and *Zingiber officinalis* respectively. *Zingiber officinalis* exhibits minimum carminative potential when compared to other 3 spices. In all the four extracts CO_2 production is increased gradually when the concentration of dose increased. 7.5 gm dose exhibits maximum co_2 production in turn posses high carminative value.

Now a day the problem of acidity is very common and the main causes behind this is over strenuous life style, smoking and dependence on junk food. Antacids are agent that neutralizes the stomach acid responsible for dysfunction of stomach. But they are meant to be used only occasionally. They should not be taken continuously for more than two weeks unless under a physician's directions as they produce serious side effects such as Milkalkali syndrome, loss of appetite, mood changes, muscular pain, nervousness, weakness, constipation, stones in kidney etc. An ideal antacid should have adequate of action. The usual cause of flatulence is incomplete digestion of carbohydrates. The symptom of flatulence is also managed by antacid therefore the adverse effect is similar to the of acidity problem. So carminative spices are utilized to improve digestion or to treat dyspepsia or irritable bowel symptoms of ulcerative colitis and act as an antacid property (Carlos *et al*., 2006).

The antacid profile was evaluated in vitro using Rosette-rise test. The Rosette-rise time for 2.5 gm of *Allium sativum* was found to be (7.22±.223) while for 5gm dose it was 9.85±.242 min and for 7.5 gm it was (11.32±.231) compared to standard 0.8gm NaHCO3 which maintained the pH for 1.508±.015 min. Rossett-Rice curve was prepared for drug extract and standard. Assays of all samples were conducted in triplicated and averaged. The results were termed significant statistically when probability was less than 0.05 (P<0.05).

CONCLUSION

Drug extract of selected Indian spices, exhibiting both antacid and carminative activity Therefore it is expected that the spices such as *Ferula asafoetida, Allium sativum, Carum roxburghianum* and *Zingiber officinalis* will be prove as the ultimate remedy in the management of activity and flatulence without side effects. Over all it can be concluded from the present study, that spices contains rich source of phytochemicals constituents and thus providing scientific validity to its traditional consumption by the local populace of south India. Moreover, all spices extract had a good carminative and antacid potential. Future research would be carried out to isolate the bioactive compounds responsible for carminative and an antacid and formulate the drug.

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