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***In Vitro* Carminative Activity of the Siddha Formulation T. Soolai Kudoram by Acid- Base Titration Method**

Dhivya G.^{1*}, Bharathy K.¹, Rajasri R.¹, Vetha Merlin Kumari H.² and Lakshmi Kantham T.²

¹National Institute of Siddha, Tambaram Sanatorium, Chennai 47, Tamil Nadu, India

²Department of Maruthuvam, National Institute of Siddha, Tambaram Sanatorium, Chennai 47, Tamil Nadu, India

**Corresponding Author*

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Abstract: Changes in our way of living such as consumption of food, being physically inactive leads to dreadful complications in human beings. Dietary factors are progressively recognized to have a major role in activating symptoms in a higher proportion of patients with dyspepsia. Carminatives are the agents which alleviate the symptoms of dyspepsia, particularly when there is postprandial bloating. In Siddha, there is a poly-herbomineral formulation Tablet. Soolai kudoram (TS) used in treating gastro-intestinal ailments. Considering this indication, the study was screened for in vitro carminative activity by acid-base titration method. Each procedure was conducted in triplicates for each test solution. The number of moles of carbon dioxide expelled was calculated and tabulated. The carminative profiling of the test sample was evaluated on basis of the amount of carbon-dioxide evolved from the reaction mixture with varying volume of the test sample. The amount of carbon dioxide (g) produced by the 0.5 g of the TS sample was found to be 5.927 ± 0.6208 , for 1 g of sample it was 8.353 ± 0.6165 and for 2 g of sample it was 10.64 ± 1.017 . It was concluded from the results of the present investigation that the siddha formulation Tablet Soolai kudoram possesses promising carminative activity in the tested medium which was measured as an index of mass of CO₂ released from the medium.

Keywords: Carminative, Siddha, Soolai kudoram, Dyspepsia, In vitro study

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Introduction

Sedentary lifestyles and decreased gastro-intestinal motility often leads to dyspeptic symptoms. Acid peptic disease, reflux esophagitis and upper GI malignancy and drugs are the common causes of dyspepsia (Krishnadass, 2017).

Dyspepsia is pain or discomfort centred in the upper abdomen. In contrast, 'indigestion' is a term commonly used for ill defined symptoms from the upper gastro-intestinal tract. Cluster of symptoms are used to classify dyspepsia: reflux- like

dyspepsia (heartburn predominant dyspepsia), ulcer-like dyspepsia (epigastric pain relieved by food or antacids), dysmotility like dyspepsia (nausea, belching, bloating and premature satiety) (John Macleod, 2013). Carminatives are agents which induce a sensation of intestinal warmth. Also, it produces flatulence and eructation which alleviate the symptoms of indigestion, particularly when there is postprandial bloating (Gunn, 1920; Creamer, 1955). Tablet. Soolai kudoram is a Siddha poly-herbomineral formulation mentioned in the Siddha literature consisting of mercury (Rasam), Sulphur (Gandhagam), Borax (Vengaram), *Terminalia chebula* Retz (Kadukkai), *Terminalia bellerica* (Gaertn.) Roxb. (Thandrikkai), *Phyllanthus emblica* Linn (Nellikai), *Zingiber officinale* Rosc. (Chukku), *Piper nigrum* Linn (Milagu), *Piper longum* Linn (Thippili), *Aconitum napellus* Linn (Karunaabi), Yellow arsenic (Thaalagam), Copper (Thamira parpam) and *Croton tiglium* Linn (Nervalam). It is used in Siddha medicine in treating gastrointestinal ailments (Kuppusamymudaliyar and Utthamarayan, 2009). Due to excessive production of HCl in the stomach, the mucous membrane protecting the inner layer of the stomach wall will rupture and leads to ulcer formation. Furthermore, it will result in the formation of gas in the gut and leads to flatulence. Considering the antiulcer activity, the study was screened for carminative activity. The primary objective of the study was to evaluate the in vitro carminative activity of the formulation Tablet Soolai kudoram.

Materials and Methods

Materials:

Sodium hydroxide, standard HCl, phenolphthalein, methyl orange were obtained from Sigma Aldrich Chemicals (P) Ltd, Chennai, India. All reagents were of analytical grade.

Procurement of the test drug:

The test drug was purchased from GMP certified company IMPCOPS (Indian Medical Practitioners Co-operative Pharmacy and Stores) and used for analysis. Ingredients of the test drug- Tablet Linga

boopathy are- (i) Mercury (Rasam), (ii) Sulphur (Gandhagam), (iii) Borax (Vengaram), (iv) *Terminalia chebula* Retz (Kadukkai), (v) *Terminalia bellerica* (Gaertn.) Roxb. (Thandrikkai), (vi) *Phyllanthus emblica* Linn (Nellikai), (vii) *Zingiber officinale* Rosc. (Chukku), (viii) *Piper nigrum* Linn (Milagu), (ix) *Piper longum* Linn (Thippili), (x) *Aconitum napellus* Linn (Karunaabi), (xi) Yellow arsenic (Thaalagam), (xii) Copper (Thamira parpam), and (xiii) *Croton tiglium* Linn (Nervalam).

In vitro carminative activity by acid-base titration technique:

In vitro carminative activity of the siddha formulation was evaluated by modified method of Sharma *et al.* (2012). About 0.5, 1 and 2 g of the Tablet Soolai kudoram in water were placed in conical flask fitted with air-tight nozzle, to this quantity sufficient of distilled water was added. About 100 ml of NaOH (1M, previously standardized to oxalic acid) was poured into a plastic container fitted with aeration tubing system that was connected directly to the reaction vessel containing varying volume of the test sample. The flask was agitated manually for the next 45 min and vigorously for another 30 min and was allowed to stand for overnight. The carbon dioxide gas evolved from the reaction vessel was allowed to pass into a plastic container 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 as indicator to get first endpoint and in continuation to this the second endpoint was enumerated using methyl orange as indicator. The difference in milliliters between the first and second endpoints was used to calculate the carbon dioxide content per gram of sample.

$$\text{Vol. of titrant} \times \text{molarity of std. acid} \times \text{mol. Wt. of CO}_2 = \text{mass of CO}_2 \text{ in g}$$

Where Molarity of the Acid is 0.09184 M; and Mol. Wt. of CO₂ is 44.01 g/mol.

Table 1: Mass of CO₂ evolved by Siddha formulation

Test Sample (g)	Mass of CO ₂ (g)
0.5	5.927 ± 0.6208
1	8.353 ± 0.6165
2	10.64 ± 1.017

Each value represents the mean ± SD (n=3)

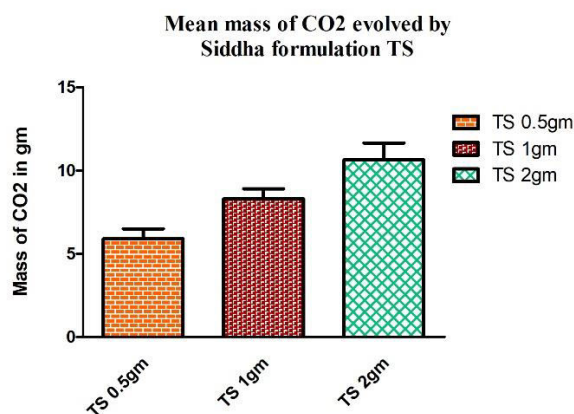


Fig.1: Evolvement of Carbon dioxide from the reaction mixture.

Results

Tests of carminative activity using Acid Base titration technique:

Each procedure was conducted in triplicates for each test solution. The number of moles of carbon dioxide expelled was calculated and tabulated (Table 1).

The carminative profiling of the test sample was evaluated on basis of the amount of carbon dioxide evolved from the reaction mixture with varying volume of the test sample. The amount of carbon dioxide (g) produced by the 0.5 g of the TS sample was found to be 5.927 ± 0.6208 , for 1 g of sample it was 8.353 ± 0.6165 and for 2 g of sample it was 10.64 ± 1.017 (Table 1, Fig. 1).

Discussion

Dyspepsia is the summation of a variety of gastrointestinal symptoms e.g., anorexia, early satiety plus flatulence (Krishnadass, 2017). Usually, flatulence arises when carbohydrates are not properly digested. Because flatulence is controlled by antacid, the adverse effect is homogenous with

that of acid reflux. *Zingiber officinale* Rosc. has carminative, digestive, stomachic, astringent, anti-inflammatory, appetizer due to the presence of beta-philandrene, camphene, zingiberine, gingerol, citral, shogaol, borneol. *Piper nigrum* Linn has carminative, digestive, stomachic, anthelmintic and anti periodic. *Piper longum* Linn has carminative, stomachic, antidiarrheal, anthelmintic, antidyenteric, laxative due to the presence of *Piper longumine*, *Piper longuminine*, piperine, sesamin. *Terminalia chebula*. Retz has carminative, purgative, digestive, laxative, stomachic actions due to the presence of chebulic acid, gallic acid, ascorbic acid and ellagic acid. *Phyllanthus emblica* Linn exhibits digestive, carminative, stomachic, laxative, antipyretic properties due to the rich source of linoleic acid, lupeol, ellagic acid (Virshette *et al.*, 2020). *Terminalia bellerica* (Gaertn.) Roxb. comprises gallo-tannic acid, ellagic acid, gallic acid, termilignan, thannilignan, chebulagic acid. It shows anti ulcer, anti diarrhoeal and anti salmonella activity (Deb *et al.*, 2016). *Croton tiglium* Linn is widely used for constipation, dyspepsia, dysentery, intestinal

inflammation, and other gastrointestinal disorders (Maurya *et al.*, 2015). In Chinese herbal medicine, *Aconitum napellus* Linn tubers and roots are generally preferred for the treatment of rheumatic fever, gastroenteritis, diarrhea, edema, bronchial asthma, and some endocrinal disorders (Gajalakshmi *et al.*, 2011). Mercury extensively used in the siddha system of medicines in several forms. It is therapeutically used as an tonic, diuretic, laxative and in venereal diseases. Borax acts as an astringent, emmenagogue, diuretic, sedative and antiseptic. It is also used in amenorrhoea, skin diseases, puerperal convulsions and cystitis (Rajalakshmi *et al.*, 2013). Sulphur is indicated for dyspepsia, ascities, hepatomegaly, gastric ulcer, diarrhea and eye diseases in Siddha literature (Thiyagarajan.R, 2004). Results of the current study proved that Tablet Soolai kudoram has carminative properties. It also releases a high volume of carbon dioxide. Therefore, it is inferred from the study that Tablet Soolai kudoram has the potential to decrease acidity and flatulence.

Conclusion

It was concluded from the results of the present investigation that the siddha formulation Tablet Soolai kudoram possesses promising carminative activity in the tested medium which was measured as an index of mass of CO₂ released from the medium.

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