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Der Pharmacia Lettre, 2012, 4 (1):234-239
(http://scholarsresearchlibrary.com/archive.html)

Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

Evaluation of antacid and carminative properties of *Cucumis sativus* under simulated conditions

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ABSTRACT

The study was aimed to evaluate the carminative and antacid properties of Cucumis sativus fruit pulp aqueous extract under simulated conditions. Fresh fruit pulp of Cucumis sativus was 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. Carminative & antacid properties of Cucumis sativa was evaluated using carbondioxide evolution method & Rossette Rice test. The Cucumis sativus extract showed significant results for carminative properties & 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 C. sativa significantly neutralized acid and showed resistance against change in pH and also illustrate good carminative potential. The extract of C. sativa, has shown to possess significant carminative and antacid property.

Keywords: *Cucumis Sativus*, Rossette Rice, Carminative, Antacid.

INTRODUCTION

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 atonic dyspepsia, lack of desire for any other type of food indigestion constipation. Today, there are different types of medicines available to treat stomach acidity. They are categorized as either (1) antacids (2) antihistaminic and (3) proton pump inhibitor [1].

Flatulence**:** Gas (flatus), burping, and bloating are all normal conditions. Gas is made in the stomach and intestines as your body breaks down food into energy. Gas and burping may sometimes be embarrassing. Bloating, which is a feeling of fullness in the abdomen, can make

you uncomfortable. Flatulence is the expulsion through the rectum of a mixture of gases that are byproducts of the digestion process of mammals and other animals. The medical term for the mixture of gases is flatus, informally known as a fart, or simply (in American English) gas. The gases are expelled from the rectum in a process colloquially referred to as "passing gas", "breaking wind" or "farting". Flatus is brought to the rectum by the same peristaltic process which causes feces to descend from the large intestine. The noises commonly associated with flatulence are caused by the vibration of the anal sphincter, and occasionally by the closed buttocks. Most people produce about 1-3 pints a day and pass gas about 14 times a day. Flatulence itself, although not life threatening, can definitely cause social embarrassment [2-3]. Carminatives are the agents which induces the expulsion of gas from the stomach or intestines. Carminatives are often mixtures of essential oils and herbal spices with a tradition in folk medicine for this use [4].

The *Cucumis sativus* (cucumber) family Cucurbitaceae is a widely cultivated plant in the entire world especially in Asia, Africa and South America. The main chemical constituents in Cucurbitaceae family are: volatile and fixed oils, saponins, steroids, carotenes, flavones, amino acids, resins, tannins, proteins and proteolytic enzymes. Although several bioactivities like glucose and lipid lowering effects, diuretic, demulcent and anti-helminthic actions have been shown by *Cucumis sativus* (cucumber) [5-8].

Exhaustive literature survey revealed that the potential of *C. Sativus* fruit as antacid & caminative has not been exploited. Following this as a guiding factor in present research endeavor we here tried to evaluate scientifically the carminative & antacid properties of *Cucumis sativus* employing carbondioxide evolution method & Rossette Rice test.

MATERIALS AND METHODS

Fresh *Citrullus lanatus* (Watermelon) was purchased from the market of Jaipur (Rajasthan, India) and botanical authentification was carried out by the taxonomist Prof. K.P. Sharma, Department of Botany, University of Rajasthan (Raj.), India. A voucher specimen number RUBL20686 was prepared and preserved along with the crude drug sample at the herbarium of Department of Botany, University of Rajasthan (Raj.). Fresh fruit pulp was 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.

Carminative activity Studies:

For the evaluation of carminative profile 2.5gm of *Cucumis sativa* extract was placed in the Erlenmeyer flask containing 100 ml of distill water and 100 ml of NaOH {1M, previously standerised by oxalic acid} 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:

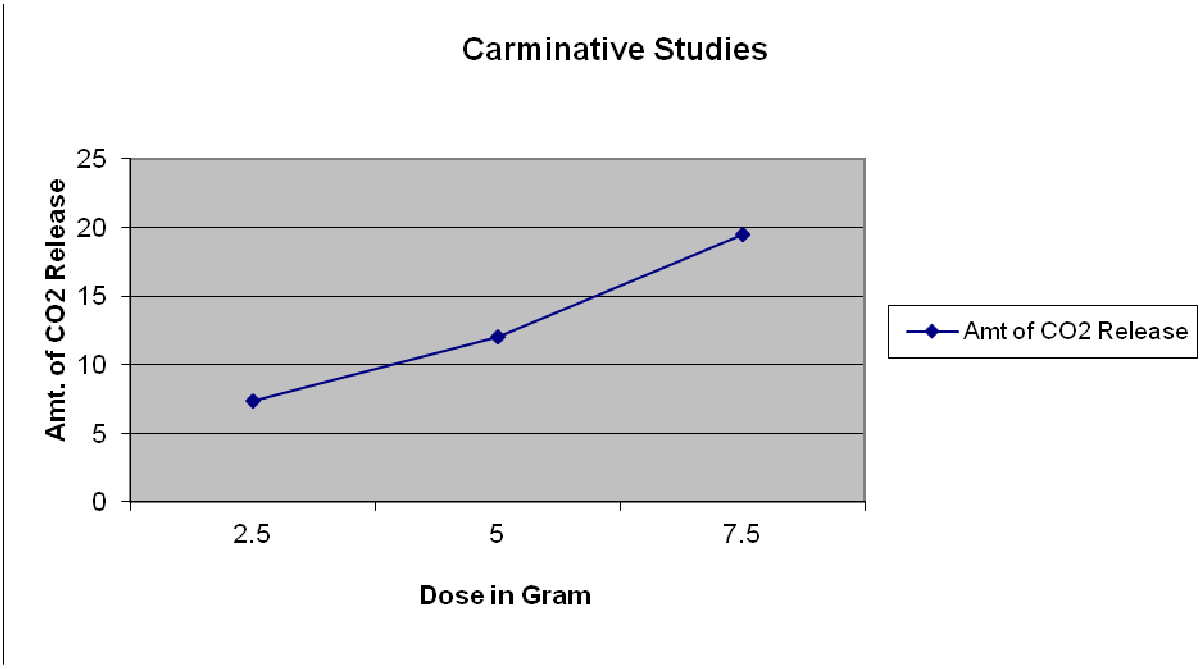
Vol. of titrant x molarity of std. acid x mol. Wt. of CO_2 = mass of CO_2 in gm [9].

Antacid activity studies

For antacid evaluation the drug extract of *C.sativa* was taken and compared with standard using Rossett-Rice method. The method simulates the stomach and records the change in pH with the time followed by administration of a dose of crude extract of *C.sativa* and standard.70ml HCl and 30ml of water was added to the jacketed reaction vessel. This solution approximates the acidity of the gastric contents. When the temperature of this simulated fluid reached to 37^{o}C, the dose of *Cucumis sativa* extract was added. 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 time during which the pH maintained between 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 [10].

RESULTS

Figure: 1 Amount of carbondioxide produced by different doses of *C.sativus*



Carminative activity Studies

The carminative behaviour was evaluated on basis of the amount of cabondioxide produced by the drug extract *C. sativus.* & standard $NaHCO_3$. The amount of cabondioxide {g} produced by the 1 gm extract of *C. . sativus* 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) & 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 (Fig.1). Result Obtained were significant with P<0.05. In conclusion, drug extract of *C. sativa* exhibits promising antacid properties in comparison to standard. All analyses were run in three replicates

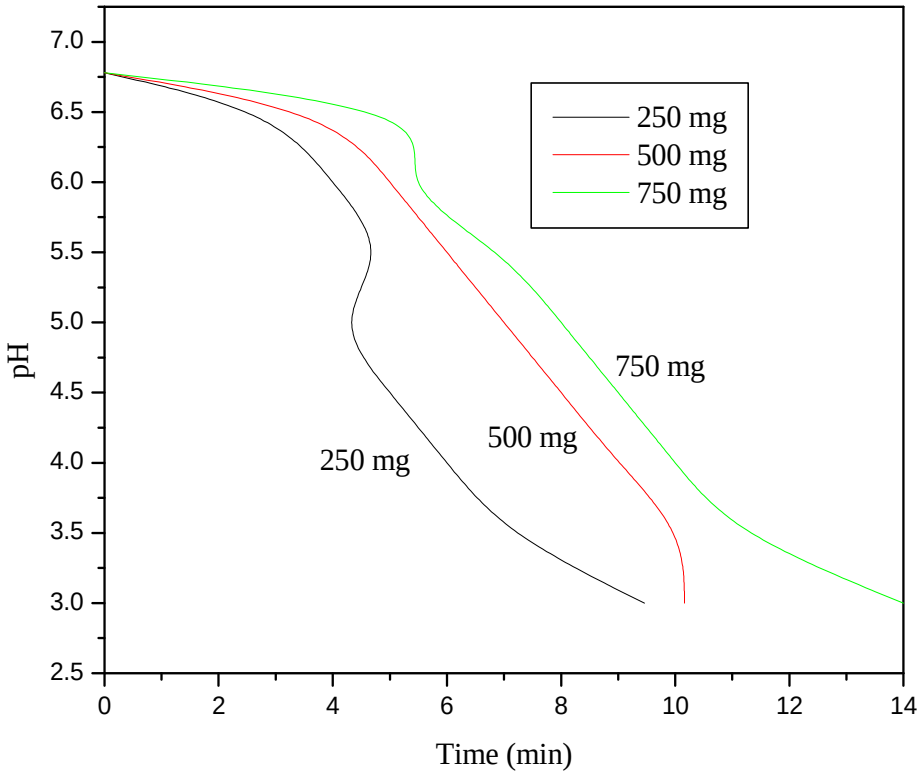
and averaged. Results were presented as mean±SEM. All groups were compared employing one-way analysis of variance (ANOVA) followed by Bonferroni's test. The results were termed significant statistically when probability was less than 0.05 ($P<0.05$).

Antacid activity studies

The antacid profile was evaluated by in vitro test known as Rosette-rise test. of A 2.5 gm 5gm and 7.5 gm dose maintained the pH above 3 for 9.46±0.20, 12.16±0.20 min and 14.16±0.32 (<0.05) respectively as compared to standard 0.8gm $NaHCO_3$ which maintained the pH for 1.508±.015 min. An ideal antacid should have adequate duration of action. This is related to gastric residence time i.e. how long a drug can maintain the pH of stomach above 3. However, the Rossett-Rice dynamic test conditions can be fulfilled by drug extract of *C. sativa* only at doses higher than the standard dose for antacid activity. The drug extract of *C. sativa* showed excellent reactivity towards acid and hence can be considered as good antacid.

Rossette-Rice Curve

Figure 2: The antacid profile of different doses of *C.sativus*



DISCUSSION

Now a day the problem of acidity is very common and the main causes behind this is over straneous 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. Antacids are classified on the basis of how quickly they work and how long they provide relief. An ideal antacid should have adequate duration of action. This is related to gastric

residence time i.e. how long a drug can maintain the pH of stomach above 3 [10-11]. The drug extract of *C. Sativus* showed potent antacid property in terms of Rossette-Rice time. The results of present study indicate that the Rosette-Rice time is dose dependent. However, the Rossett-Rice dynamic test conditions can be fulfilled by drug extract of *C. Sativus* only at doses higher than the standard dose for antacid activity**.** But the higher dose of *C. Sativus* can be safely ingested in view of its safety profile. It is suggested that herbal remedy for acid reflux can be used as the treatment of choice firstly because they cure the symptoms by strengthening the digestive system and secondly they result little or no side effect.

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 that of acidity problem. A carminative herb is an herb or nutritional supplement that is utilized to improve digestion or to treat dyspepsia or irritable bowel symptoms of ulcerative colitis [12]. Results of present study suggested that the drug extract of *C. Sativus* has carminative property even at its lowest dose (2.5 gm). The drug extract of *C. Sativus* proved to have potent carminative effect as well as it produce a large amount of carbon dioxide compared to standard sodium bicarbonate. Drug extract of *C. Sativus* is rich in fibers and other nutrients, exhibiting both antacid and carminative activity. Therefore it is expected that the *C. Sativus* fruit will be prove as the ultimate remedy in the management of acidity & flatulence without side effects.

CONCLUSION

The results of the present study suggest that extract of *C. sativa* significantly neutralized acid and showed resistance against change in pH and also illustrate good carminative potential. The extract of *C. sativa,* has shown to possess significant carminative and antacid property.

Acknowledgements
Authors are highly thankful to technical staff of Department of Pharmacy for their valuable support.

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