SHORT COMMUNICATIONS

Studies on Shankha Bhasma - I Antacid activity evaluation of Shankha Bhasma

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Shankha bhasma is known to have antacid property. In the present study, the shankha bhasma is prepared by traditional method and at the same time an attempt has been made on substitution of the marana process by heating in a muffle furnace. The antacid activity was evaluated by preliminary antacid test, acid neutralizing capacity test, Rosset-Rice test and Reheis test. It was observed that bhasma (300 mg) prepared by both the methods comply with Preliminary Antacid Test U.S.P. The bhasma prepared by traditional method (TM) and furnace (MF) neutralized 9.5 mEq and 7.05 mEq of acid respectively. The superior antacid properties of TM shows significance of Marana process.

SHANKHA bhasma is a popular Ayurvedic formulation indicated for acidity and indigestion.[1,3] The aim of the present study is to analyse the significance of Marana process and to evaluate the bhasma generally prescribed as 300 mg.[1], but unitary dose of an antacid should be defined taking into consideration the neutralizing capacity and neutralization rate[2]. As the preparation of bhasmas involves complex processes including Shodhana (process of purification) and Marana (actual preparation of bhasma with calcination of metal or mineral), many process variables are likely to affect product composition, its antacid activity and in turn the unitary dose. The antacid activity was evaluated on the basis of Preliminary Antacid and Antacid Efficacy tests.

Shankhas (Vamavarti) were procured from the market and their quality was confirmed through an experienced manufacturer of bhasma. HCl, NaOH and other chemicals were laboratory grade and were procured commercially. The assembly for preparation for bhasma include dola-yantra (a hanging apparatus consisting of an earthen pot containing lime juice in which shankha pieces in cloth were suspended), gajaputa (a cubical pit having length, breadth and depth equal to 2.5 ft. in which heating was carried out) and sharavasamputa (two shallow earthen plates) and cow dung cakes[1].

Shankha bhasma was prepared by Shodhana[1] in which small pieces of shankha (550 g) were bundled in a piece of cloth and subjected to Svedana (boiling) in a dola yantra with lime juice (sufficient quantity) for three hours. When cooled, the shankha pieces were washed with warm water and then subjected to marana process in which shodhita shankha were placed in sharavasamputa and after Sandhilepa (sealing of Sharavasamputa with clay smeared cloth) gajaputa was given. This process was repeated twice.

During marana process the temperature around the sharavasamputa as read with a thermocouple was around 800°, hence, sharavasamputa containing shodhita shankha was placed in a muffle furnace at 800° for two hours.

The bhasmas were evaluated as per requirements in the Ayurvedic text[1] viz varitaratva in which a small quantity of the bhasma was spread on cold and still water, it should float on the surface.

Table 1 : Antacid activity of Shankha Bhasma

Product	A.N.C. Total mEq	Rosset-Rice Test Time to reach pH 3	AUC of pH-Time curve	Reheis Test
TM 300 mg	9.51 ± 0.94	40 ± 2.44 min.	263.29 ± 33.90	pH < 3
TM 150 mg	—	2 min.	8.15 ± 0.38	pH < 3
MF 300 mg	7.05 ± 0.14	—	—	pH < 3

TM : Traditional Method
MF : Furnace Method
ANC : Acid Neutralising Capacity
AUC : Area Under Curve

In rekhapurita, a small quantity of bhasma was taken between the index finger and thumb and spread, it should be so fine as to get easily in to the finger lines.

Evaluation as an antacid was carried out using Preliminary Antacid Test (PAT)[3], Acid Neutralizing Capacity (ANC)[3], Rosset-Rice Test (RRT)[2,4] and Reheis Test (RT)[5].

As per the U.S.P., an antacid preparation has to comply with Preliminary Anatcid Test and Acid Neutrilization Capacity test. During PAT the product should raise the pH above 3.5 within 10 min. TM and MF have achieved pH 12.23 and 7.70 respectively at the end of 10 minutes during PAT and hence these products can be labeled as antacids and subjected to further evaluation. In ANC testing, number of mEq. of acid neutralized by the bhasmas was calculated as per USP[3].

The total mEq. of the acid neutralized by TM is significantly greater than MF (Table 1).

Rosset-Rice test is an *in vitro* method reflecting the efficacy of the dose. According to some studies rate of addition of acid is 2 ml/min.,[6] however, normal acid secretion rate in stomach is equal to about 4 ml of 0.1N HCl/min.[6], and so in the present study acid addition rate was kept at 4 ml/min. While testing, the pH reached to 3.0 within 10 min. for TM and was maintained at that level upto one hour i.e. Rosset-Rice time (Time for which pH remains above 3.0) is greater than one hour. But MF failed to reach pH 3 within 10 minutes and has shown a higher degree of fluctuation, hence, its efficacy study was discontinued. A good antacid should not raise the initial pH above 5.0, which could cause acid rebound effect[2]. In the present study for shankha bhasma, with 300 mg (generally recommended dose) initial pH was very much alkaline and remains above 5 for around 33 min. which may cause problems due to acid rebound effect, hence the dose was reduced to 150 mg to get the initial pH within reach. (Fig. 1).

The area under pH-time profile (AUC upto pH 3) has been considered as a parameter to reflect overall efficiency of an antacid[2]. AUC reduced drastically when unitary dose was halved from 300 mg. Thus reduction in the dose of bhasma so as to avoid the acid rebound effect has significantly decreased its effectiveness as evident from the AUC. Reheis test is a reaction velocity test indicating the time required to raise to pH 3.0 and thereby shows the

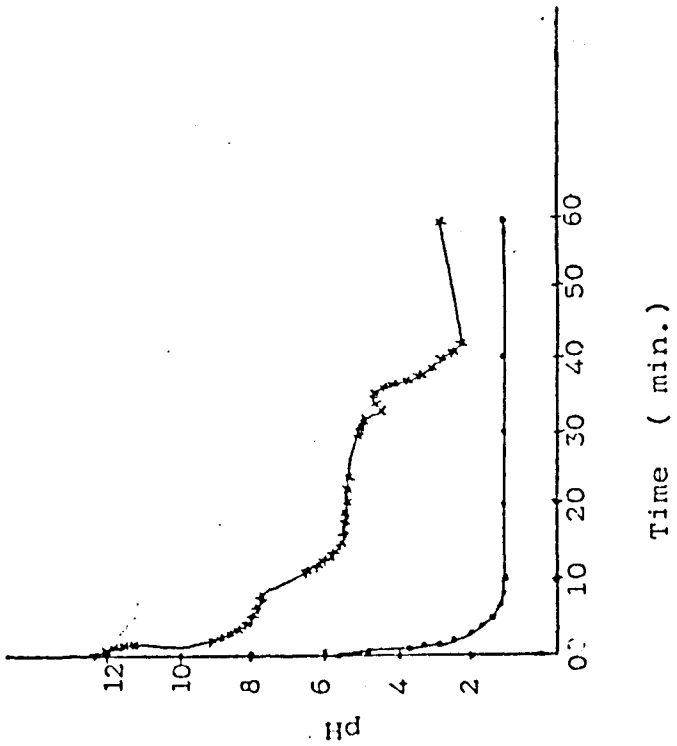

Fig. 1: Rosset Rice Test for Product (TM) Traditional Method

speed of neutralization of the acid by the drug. Here both the products are slow in their rate of neutralization. Thus from the present study we can conclude that, TM shows high risk of acid rebound effect when 300 mg. of bhasma is administered and fails Reheis test and if the dose of TM is reduced to avoid acid rebound effect, the duration of action decreases significantly. Hence bhasma should be formulated further so as to adjust the capacity and rate of acid neutralization. MF has failed Rosset-Rice as well as Reheis test, therefore the heat transfer rate during Marana process is an important factor affecting efficacy of the bhasma which should be analyzed in greater detail.

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