

## Research Article

# A study on the Presence of Sodium Benzoate in Commercially Available Samples of *Dasamoolarishta*- an Ayurvedic Preparation

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## ABSTRACT

Chemical preservation has become an increasingly important practice in herbal medicinal products. *Dasamoolarishta* is one of the most widely used ayurvedic preparations which is a fermented polyherbal formulation. In order to prevent microbial contamination, preservatives like sodium benzoate are added to liquid preparations. The misuse of this preservative has been reported in many food products. Hence the present study was initiated to determine the level of sodium benzoate in six commercially available *Dasamoolarishta*. Sodium benzoate content was analyzed qualitatively and quantitatively by ferric chloride and titrimetric methods respectively. Among six samples four showed sodium benzoate content as 0.28%, 0.43%, 0.15%, and 0.35% respectively, which is above the permissive level of 0.1%.

**Keywords:** *Dasamoolarishta*, microbial contamination, sodium benzoate.

## INTRODUCTION

*Dasamoolarishta* is a fermented herbal formulation. On a commercial scale, chemical preservatives are added to increase its shelf life. Benzoic acid and corresponding salts are generally effective against a wide range of microbes<sup>1</sup>.

Sodium benzoate is a commonly used preservative in liquid pharmaceutical preparations<sup>2</sup>. FDA regulations allow a maximum concentration of 0.1% in a formulation<sup>3</sup>.

Studies showed adverse effects of benzoate on mammalian organ systems<sup>4,5</sup>. Information regarding quantity of sodium benzoate added in the formulations is important to ensure the quality and the safety of the product. This study envisages the determination of sodium benzoate in commercially available *dasamoolarishta*.

## MATERIALS AND METHODS

### Sample Collection

Six commercially available 450mL *Dasamoolarishta* bottles were purchased from retail ayurvedic medical shops and they were labeled as DM1 to DM6. It was ensured that the bottles were properly sealed and devoid of any leakage. Also a

traditionally prepared *Dasamoolarishta* sample without adding sodium benzoate was kept as a control.

### Preliminary qualitative analysis by ferric chloride method

The samples were acidified with HCl and extracted with diethyl ether. The solvent was evaporated on a hot water bath for removing the last traces of solvent under a current of air. This residue was dissolved in small amount of hot water and few drops of 0.5% ferric chloride solution were added. Salmon colored precipitate of ferric benzoate indicated the presence of benzoic acid<sup>6</sup>.

### Estimation of benzoic acid by titrimetric method

Benzoic acid was separated from a known quantity of sample by saturating with NaCl, and acidifying with dilute hydrochloric acid. This sample was extracted with chloroform. The chloroform layer was made mineral acid free and the solvent was removed by evaporation. The residue was dissolved in neutral alcohol and the amount of benzoic acid determined by titration against standard alkali. The amount of benzoic

acid present in the sample was determined using the formula<sup>7</sup>.

$$\text{Benzoic acid (ppm)} = \frac{122 \times \text{titre} \times \text{dilution} \times 1000 \times \text{NaoH}}{\text{Weight of sample}}$$

## RESULTS AND DISCUSSION

The samples DM1, DM3, DM4 and DM6 and positive control showed salmon colored precipitate of ferric benzoate on addition of 0.5 ferric chloride solution into residue obtained on acidification with HCl and extraction with diethyl ether indicating the presence of benzoic acid. DM2, DM5 and the traditionally prepared sample kept as the control did not show any such color. The result of the quantitative estimation of Sodium benzoate in commercial samples of *Dasamoolarishta* is arranged in table 1.

The above result highlights the fact that most of the commercially available *Dasamoolarishta* contain sodium benzoate as a preservative. Among the *Dasamoolarishta* samples checked, sample DM3 showed highest level of sodium benzoate. Samples DM2 and DM5 and the control sample did not show the presence of sodium benzoate.

The previous claim of sodium benzoate as a safe preservative by FDA is being questioned these days. It appears that sodium benzoate forms benzene when in the presence of vitamin C, (US FDA, 2006) and benzene is a confirmed human carcinogen. Consumption of foods containing high levels of benzene can result in symptoms such as vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid or irregular heartbeat, and death. Longer-term exposure impacts the blood through damage to the bone marrow causing a decrease in red blood cells, leading to anemia. The immune system may also be affected, increasing the chances of infection, and leukemia may also occur<sup>8</sup>. Acquired interest is given to preservatives as recent studies have reported serious side effects associated with these

substances. Side effects have been reported after the ingestion of medications containing these preservatives such as the allergic potential and estrogenic potential of parabens<sup>9,10</sup> the genotoxic activity potential of sodium benzoate<sup>11</sup>.

It was also noticed that no information regarding the preservative used in the preparation was labeled anywhere on the formulation bottles. It was also noted that all the manufactures of the analyzed samples have certification of GMP. As the level of sodium benzoate in commercial samples of *arishta* goes above non permissible limits, the level of this preservative in other ayurvedic preparations such as *asavas*, *kasayas* and *lehyas* are highly warranted.

## CONCLUSION

Sodium benzoate is a preservative used to prevent liquid ayurvedic preparations from moulding. Present study showed that the level of sodium benzoate in a major percent of the commercial samples of *Dasamoolarishta* were found to fall outside the permissible level with some exhibiting significantly higher concentrations and this can lead to serious health effects. Also the concentration above the permissible level questions the validity of GMP certificate instated for the afore mentioned products. The ground behind such finding could be due to poor quality control or the effort for extending the shelf life of the products. It is envisaged that the findings will provide some insight on the misuse of chemical preservatives that in turn point to the importance of maintenance of quality standards on the basis of safety rules. The use of sodium benzoate should be regulated and it should be used only as a means to control microbes at concentrations not exceeding the actual need. Consequences to patients' health need to be evaluated, as *Dasamoolarishta* is one among the most widely prescribed ayurvedic formulation to all age groups.

**Table 1: Quantitative estimation of sodium benzoate in the formulations**

S. No.	Sample/ code	Amount of sodium benzoate ( ppm)	% sodium benzoate
1	DM1	2807	0.28
2	DM2	-	-
3	DM3	4390	0.439
4	DM4	1511	0.15
5	DM5	-	-
6	DM6	3527	0.352

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