

Studies of Preservative and Coloring Agent in Jam and Jelly

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(Received: 26 October 2016; Accepted: 12 December 2016)

I. Introduction

Jam and Jelly are popular processed foods in which food additives are added¹. Preservatives are added to jam and jelly for preserving, increasing shelf-life and inhibiting the growth of pathogens². Colorings agents are added to enhance original fruit color and to make lucrative.

Sodium benzoate is an antimicrobial agent and used as preservatives in jam, jelly, soft drinks, beverages, cosmetics even in medicines. The US food and Drug Administration (FDA) and the Canadian Health Protection Branch have told sodium benzoate as preservative to be acceptable when its limit in food is 0.1% by weight. Daily intake of sodium benzoate higher than acceptable limit can bring adverse effects on skin such as rash, non-immunological contact urticarial, metabolic acidosis, hyperpnoea and asthma^{3, 4}. Sodium benzoate may decarboxylate after consumption and produces benzene in human body which is carcinogenic.

Yellow 6 is used as a colorant food additive in many food products such as apricot jam, custard powders, citrus marmalade, orange soft drinks, sweets, squashes, margarine, marzipan, packet soups, ice-creams etc⁵. According to European Food Safety Authority (EFSA) acceptable daily intake (ADI) for sunset yellow is 1.0 mg/kg bodyweight per day. Above ADI it can induces allergic reaction, diarrhea, migraines, gastric upset and swelling of the skin, nettle rash vomiting etc⁵.

I. Experimental

Preparation of standard solutions

The primary standard solution of sodium benzoate and yellow 6 (100 mg/L) was prepared in Milli-Q water which was free from ions. The working standard solutions were prepared in concentration 75.0, 50.0, 20.0, 10.0, 5.0, 4.0, and 2.0 mg/L from primary standard solution by dilution with water. Absorbances of these solutions were measured by a double beam UV-visible spectrophotometer at 225 and 484 nm for sodium benzoate and yellow 6 respectively and calibration curves were made.

Preparation of samples

Jam or jelly samples (5.0 g) were taken to obtain 250 mg/L solution which was vortexed for 30 sec and centrifuged. Then the solution was filtered and diluted to obtain 25 mg/L solution. The absorbances of the prepared solutions were measured at 225 and 484 nm from which sodium benzoate and yellow 6 content were determined respectively.

Determination of total carbohydrate

Total carbohydrate in juice solutions were determined performing modified Molisch's method and using the standard calibration curve made for glucose⁶.

Determination of pH value

pH of each sample was determined using Microprocessor pH meter (Model: HANNA pH 211).

II. Results and Discussion

Analysis of samples

Analyses of sodium benzoate and yellow 6 were carried out in 27 samples by UV-visible spectrophotometric method. Among jam samples five samples contained sodium benzoate in the range of 254.5 - 400.4 mg/kg (i.e. 0.25% - 0.40%). All jelly samples were found to contain sodium benzoate in a range of 160 - 289 mg/kg, (approximately 0.16% to 0.28%). The allowable limit of sodium benzoate is 0.1% in jelly^{7, 8}. Out of 15 jelly samples 10 samples contained yellow 6 in the range of 0.011% to 0.014%. However, yellow 6 was not found in any jam samples. According to Health Canada, 2015, the allowable limit of yellow 6 in food is 0.3% by weight⁹.

Total carbohydrate

Carbohydrate content of commercial brand jelly and jam samples is in the range of 50.72-84 g/kg and 9.0 - 17.0 g/kg respectively. High carbohydrates contained jelly causes obesity to the consumers¹⁰.

pH

Due to the presence of naturally occurring organic acid, orange juices usually are acidic and have pH around 3.5⁶. pH of commercial brand orange jelly and mixed fruit jam samples were found to be in the range of 2.65-2.87 and 2.65-2.87 respectively. A lower pH might be due to the presence of acidic additives which can cause acidity in the stomach and erosion of the tooth enamel¹¹. The recovery of the used procedure, which reflects the accuracy of the analytical method, was evaluated by analyzing preservative free sample spiked with 10 mg/L sodium benzoate. The mean recovery of ten measurements obtained by standard addition approach was found to be 110.04 with relative standard deviation 2.40%.

III. Conclusions

Although the number of samples analyzed is still small, the data presented in this study gave a preliminarily outline about the content of food additives in jam and jelly frequently consumed in Bangladesh. Based on these analytical data, it seems that the content levels of yellow 6

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are within the maximum authorized levels. However, sodium benzoate content exceeded the limit.

Acknowledgement

The authors are grateful to International Science Programme (ISP), Uppsala, Sweden and Higher Education Quality Enhancement Project (HEQEP), UGC, Dhaka for financial supports.

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