

## Enteric bacterial Contamination of some Myanmar fruit sweets

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Myanmar fruit sweets are widely eaten by our people. In the process of making these sweets, there are many ways by which they can get contaminated. The purpose of the study is to determine the degree of contamination. The percentage isolation of enteric bacteriae was the highest in the sweet-damp types and during the hot-wet season. The enteric bacteriae were isolated more in tamarinds and plums and the least in marian group. The Myanmar fruit sweets may be one of the potentially important vehicle to transmit diarrhoeal pathogens during the hot-wet season in Myanmar. Improvements in the personal and environmental hygiene are needed to prevent contamination during their production.

### INTRODUCTION

Myanmar fruit sweets, packeted in plastics bags are widely eaten by our Myanmar people, especially the girls. A lot of pocket money is often spent on these sweets. Different kinds of fruits such as mangoes, plums, tamarinds and marians, etc are generally used in making these sweets. They come in different variety of tastes : sweet, salty, hot sour, etc. In the process of making them, contamination may occur in a variety of different ways such as improper washing of fruits, using of contaminated utensils, drying fruits in the open where they are liable to become contaminated and handling them with contaminated hands. Furthermore, contamination may also occur through prolong storage. The purpose of the present study is to determine the degree of contamination of these fruit sweets.

### MATERIALS AND METHODS

#### *Sample Collection*

The study was conducted in Yangon between May 1988 and April 1989, during the representative months for the hot-wet, cool-dry and hot-dry seasons. Different brands of Myanmar fruit sweets

were bought randomly from whole sale market as well as from small shops. They were bought and tested weekly on Mondays, Tuesdays and Wednesdays for 8-10 weeks during each season. Before being tested, the fruit content of each packet was noted and were categorized into 4 groups: sweet-damp, sweet-dry, hot-damp and hot-dry. Altogether 162 packets were tested throughout the study.

#### *Determination of faecal coliform(FC)count*

Twenty five gram of the sweet was weighed and 10% suspension was made by using 225 ml of Ringer's solution. Then FC count was determined on that suspension by multiple tube methods as described by ICMSF 1968(1) in which different amounts of Ringer's solution were added to tubes containing Mac Conkey broth. In accordance with the numbers isolated and the number of tubes with positive reaction the most probable number of bacteria presents in the original ringer's solution can then be determined.

#### *Isolation of enteric bacterias from samples*

Ten gram of sweet samples were mixed with 90 ml of peptone water and preincubated at 37°C for 18 hrs. Isolation of *Escherichia coli* was carried out by inoculating the suspension onto Mac Conkey agar (MA). For *Salmonella*

and *Shigella* spp. enrichment media, selenite-F (SF) was used and incubated at 42°C for 18 hrs and subcultured onto *Salmonella Shigella* (SS) media. For *Vibrio* spp. enrichment media, alkaline peptone water (APW-pH 8.4) was used, and incubated at 37°C for 6 hrs and subcultured onto thiosulphate citrate bile sucrose (TCBS) media. All enteric bacteriae were identified by standard procedures. The Chi-square test of significance was used for testing the statistical significance of isolation.

## RESULTS

Table: Percentage isolation of enteric bacteria from Myanmar fruit sweets by season, Yangon, 1988-1989

Season	Sweet characteristic				Total
	Sweet*		Hot*		
	Damp	Dry	Damp	Dry	
hot-wet	60.0	20.0	25.0	16.7	31.5
cool-dry	40.0	6.7	41.7	8.3	24.1
hot-dry	46.7	6.7	0.0	8.3	16.7
total	48.9	11.1	22.2	11.1	

\* n = 15 each for damp and dry types each season  
 - n = 12 each for damp and dry types each season

sweet/damp Vs dry in all 3 seasons,  $p < 0.05$

hot/damp Vs dry in all 3 seasons,  $p > 0.05$

As shown in the Table, the highest percentage isolation of enteric bacteria was from the sweet-damp types in all the 3 seasons. Likewise, the highest isolation by season was during the hot-wet season. In all 3 seasons the percentage isolation was significantly different between the sweet-damp and the sweet-dry types. However, there was no significant difference between the hot-damp and hot-dry types. There was a non-significant descending trend of isolation percentage from hot-wet to

hot-dry season. The pH of the sweet-damp types made of plums, tamarinds, mangoes, lemons and marians was 6.5, 6.3, 4.6, 4.5 and 4.3 respectively. Enteric bacterial isolation was the highest in tamarinds, and the lowest in marians. The FC count ranged from  $0-2.4 \times 10^{10}$ /gm of sweet. The isolated enteric bacteriae were *E. coli*, *Enterobacter* spp., *Klebsiella* spp., *Pseudomonas* spp., *Proteus* spp. and *Citrobacter* spp.

## DISCUSSION

We found that the highest enteric bacterial isolation was in the sweet-damp varieties. The reasons for this is that in these types, there is carbohydrate and moisture to facilitate the growth of bacterias (2). The highest isolation during the hot-wet season may be due to the relatively high humidity during this season which is favourable for bacterial growth. Although the dry varieties of fruit sweets are less hazardous as far as enteric bacterial isolation are concerned, many people prefer the sweet-damp varieties.

The enteric bacterial isolation was the highest in tamarinds and plums and the least in marians. The low isolation rate from marian may be due to the bacteriostatic and bactericidal affects of its low pH (3). The reverse may be true for the high isolation in tamarinds and plums because their pH were higher.

Specific enteric bacterias such as *E. coli*, *Enterobacter* spp., *Klebsiella* spp., *Pseudomonas* spp., *Proteus* spp. and *Citrobacter* spp. were isolated from the fruit sweets. Since *Klebsiella*, various *Proteus*, *Enterobacter* and *Serratia* spp. have been isolated from African children with choleraform diarrhoea (4,5), there is a possibility that diarrhoea may result from consuming sweets harbouring such bacteria. Further, because the highest enteric bacterial isolation coincides with peak diarrhoeal incidence during the

hot-wet season in Myanmar (6), the Myanmar fruit sweets may probably be one of the potentially important vehicles for transmitting diarrhoea during this season.

The study suggests improvements in personal and environmental hygiene to prevent this potentially dangerous contamination of Myanmar fruit sweets during their production.

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