

## Bacterial and fungal contamination of chillie powder available in local markets

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Contamination of bacteria and fungi in three kinds of chillie powder (ayaung-tin; akyan & ahlaw; n=70) available in local markets were tested by standard microbiological methods from May 2001 to April 2002. From chillie powder (ayaung-tin), coliforms (88%), faecal coliforms (48%) and fungi (68%) were isolated from the tested 25 samples. From chillie powder (akyan), coliforms (85.7%), faecal coliforms (42.9%) and fungi (57.14%) were isolated from the tested 21 specimens. Moreover, from baked chillie powder (ahlaw), coliforms (79.1%), faecal coliforms (50.0%) and fungi (54.16%) were isolated out of 24 samples. Bacterial species identified were *Escherichia coli*, *Enterobacter* species, *Klebsiella* species, *Serratia* species, *Citrobacter* species and *Alcaligenes* species.

### INTRODUCTION

One of the major health problems is the large number of gastrointestinal cases and outbreaks throughout the year contributing highly to the overall morbidity rate in many parts of the world. Typhoid and paratyphoid fever; bacillary dysentery and bacterial food poisoning still play major causes of morbidity as reported by South East Asian Medical Information Centre, 2001 [1-4]. The major reasons are: malnutrition, parasitic infestations and presumably *Salmonella* spp., *Shigella* spp., enteropathogenic *Escherichia coli* (EPEC) and *Vibrio cholerae* are the major potential bacterial infections. In Myanmar, chillie is one of the major items used in various preparations of food and is usually eaten raw in many cases. The role of bacteria in chillie needs to be explored and this study aimed to determine the presence of bacteria in different chillie powder available from local markets.

### MATERIALS AND METHODS

#### *Sample collection*

A total of 70 samples of chillie powder were

chosen in 3 forms (a) akyan (b) ayaungtin and (c) ahlaw and collected from different local markets from North Dagon, Tamwe, Pabedan, Dagon and Latha townships.

#### *Determination of coliforms and faecal coliforms*

It was processed according to the method of WHO [6].

#### *Determination of bacterial pathogens*

Bacterial isolation was done by the standard method as described by WHO, 1981 [6]. Isolation of Enterobacteriaceae was done by direct inoculation onto MacConkey agar, (MA), Salmonella-Shigella (SS) agar and followed by enrichment media Selenite F broth; Micrococcaceae by Mannitol salt agar and Nutrient agar; Pseudomonadaceae by Ashdown agar. *Salmonella*, *Shigella*, *Escherichia coli* and other Enterobacteriaceae were isolated by the method of Ewing, 1986 [7]. Fungal isolation was done on Sabouraud Dextrose Agar and *Candida albicans* was confirmed by germ tube test. Biochemical tests and serotyping were done whenever necessary.

## RESULTS

### *Determination of coliforms and faecal coliforms*

Distribution of coliforms and faecal coliforms from different kinds of chillie are shown in Fig. 1. Almost all chillie types were contaminated with coliforms; 88% in ayaungtin, 85.7% in akyan, 79.1% in ahlaw powder. Also faecal coliforms were found in 52% of ayaungtin, 42.9% of akyan and 50% in ahlaw powder.

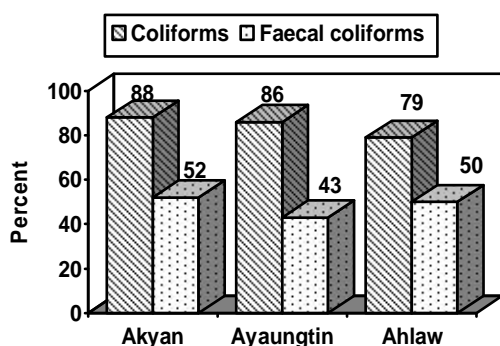


Fig. 1. Distribution of coliforms and faecal coliforms in different kinds of chillie powder

### *Bacterial count in different chillie powders*

The bacterial count of coliforms ranged from 240 to >1800 MPN/100gm in ayaungtin, 12 to >1800 MPN/100gm in akyan, 7 to >1800 MPN/100 gm in ahlaw powder. Faecal coliform counts were found in 4 to >1800 MPN/180gm of ayaungtin, 4- 240 MPN/100 gm of akyan and 7 to >1800 MPN/100 gm in ahlaw powder (Table 1).

### *Bacterial species isolated from different chillie powders*

As shown in Table 2, bacterial species isolated were *Escherichia coli* from 52% of ayaungtin, 42.9% of akyan and 50% of ahlaw powder; and *Enterobacter* species from 24% of ayaungtin, 28.6% of akyan, 12.5% in ahlaw powder and *Klebsiella* spp. from 8% of ayaungtin, 4.8% of akyan, 8.3% of ahlaw powder. Other species identified included *Serratia* spp., and *Citrobacter* species.

### *Fungi isolated from chillie powder*

As shown in Table 2, fungal species were isolated from 68% of ayaungtin, 57.1% of akyan, 54.1% of ahlaw powder respectively.

## DISCUSSION

Food poisoning is a major public health concern worldwide. Mass food production, catering and wide distribution of food would undoubtedly increase the incidence of food poisoning especially if there is improper or unhygienic food handling or preparation. Awareness of emerging infections is also important [8-10]. The food itself provides sufficient nutrients and with adequate moisture, warmth and time lapse between preparation and consumption of food, multiplication of the pathogen will inevitably take place. If chillie is contaminated with bacteria or fungi, food will be a potential media for propagation of pathogens.

Many of the coliforms are inhabitants of the human and animal intestine. Coliform can survive and grow in an environment associated with food processing in which enteric pathogens die or are overgrown. Coliforms other than *Escherichia coli* are good indicators of unsatisfactory processing or sanitation and the presence of large numbers of coliforms in processed foods indicate that the opportunity for proliferation have occurred. Coliforms can persist and grow in improperly cleaned equipment and utensils. They can establish themselves as part of the resident flora of food processing establishments where they are difficult to eliminate. Coliforms may also enter the food product after processing from the hands or garments of food-handlers, or from dirty utensils or surfaces or from unsafe water used.

Coliforms do not necessarily indicate contamination from faecal source. However, it does indicate inadequate processing or post processing contamination, most probably from workers, or from dirty

equipment or from the raw food before processing. The presence of a large number of coliforms does not necessarily indicate an immediate health hazard, but it indicates lack of good sanitary practice. Presence of faecal coliforms indicate faecal-oral contamination. *Escherichia coli* does not usually persist for long in the environment other than the intestine. Thus, the presence of *Esch. coli* in foods generally indicates recent pollution of faecal origin. Recent pollution of faecal origin may be contamination directly by faeces or indirectly by faecally contaminated materials.

One aspect of food-borne infections can be attributed especially to the use of unsafe water in the preparation of foods and washing of the utensils. Other factors that are known to contribute to the risk of a foodborne disease include contamination from infected or colonized food handlers, inadequate boiling temperatures, improper holding temperatures, contaminated equipments and utensils. Thus, food preparation and handling process play a key role in causing food poisoning outbreaks.

Table 1. Bacterial count of coliforms and faecal coliforms in MPN/100g of chillie powder

Chillie powder	Coliforms (MPN/100g)	Faecal coliforms (MPN/100g)
Ayaungtin	240 to >1800	4 to >1800
Akyan	12 to >1800	4 to 240
Ahlaw	7 to >1800	7 to >1800

In this study, isolation of coliforms and faecal coliforms did not markedly decrease when compared with the the raw products. It reflects the situation that the storage might play a key role in contamination (Fig.1). Low isolation of faecal coliforms in chillie (akyan) demonstrated that the bacteria could not easily propagate in that akyan due to the high salt concentration in it (Table 1).

Similar species of bacterial isolates do occur in all three specimens with similar distribution. This showed that these environmental bacteria could easily contaminate the foods (Table 2).

Table 2. Isolation of bacterial and fungi from different kinds of chillie powder showing in percentages

Species	Ayaungtin (n=25)	Akyan (n=21)	Ahlaw (n=24)
<i>Escherichia coli</i>	52.0	42.9	50.0
<i>Enterobacter aerogenes</i>	24.0	28.6	12.5
<i>Klebsiella aerogenes</i>	8.0	4.8	8.3
<i>Citrobacter freundii</i>	4.0	4.8	8.3
Fungi	68.0	57.1	54.1

The general requirements for prevention of food poisoning from microorganisms could be applied to *Bacillus cereus* and *Esch. coli* to be used in well established hygienic principles in the manufacture, preparation, storage and serving food, training of food service personnel; health education, licensing of food service establishments depending on recognized qualifications in food hygiene for their managers and supervisors and compliance with the National Food Regulation.

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