

Short Communication

Microbiological Analysis Of Street vended Fresh Squeezed Carrot And Kinnow- Mandarin Juices In Patiala City, India.

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ABSTRACT

Fresh squeezed juices of Kinnow-mandarin and carrots, sold by street vendors in Patiala city were analyzed for their microbiological qualities during the months of October through March. The total viable counts of all samples (150) were approximately Log 6 with loads of total faecal coliform and total Staphylococcal counts. Qualitative analysis showed the presence of coagulase positive *S.aureus* in forty-five samples of carrot juices (30%) and eighteen samples of kinnow-mandarin juices (12%). There was no significant difference between carrot and kinnow-mandarin juice samples in total viable counts, total staphylococcal counts or total coliform counts. However *S.enteridis* was detected in three samples of carrot juices obtained from two different areas of the city. Our results demonstrate the hygienic quality of two most popular types of street vended fruit juices-(fresh squeezed carrot and kinnow –mandarin)their risk to the consumers and suggest the urgent need for government participation in developing suitable intervention measures to improve microbial quality of juices.

Key words: Carrot juices, Kinnow-mandarin juices, salmonella, coagulase positive *S.aureus*, street vendors

Fresh fruits and vegetable juices are recognized as an emerging cause of food borne illness (Parish 1997). A major contributing factor in these raw agricultural commodities are contamination by animal or human waste and consumption without a processing step that will kill or remove associated bacterial pathogens. While a single piece of contaminated produce may infect a single person, contaminated produce that is co-mingled, juiced and served may infect many individuals. One potential source of entry of microorganisms into fruits and vegetables is by environmental exposure with uptake occurring through either specific morphological structures in the plant and or through breaks in tissues that occur as a result of punctures, wounds, cuts and splits. These insults to the fruit or vegetable can occur during growing or harvesting, additionally processing conditions and improper handling contribute substantially to the entry of bacterial pathogens into the product, especially in juices prepared from the fruits or vegetables.

Fresh squeezed or pressed juices made from fruits and vegetables have a very high consumer preference both in terms of taste and health effects throughout the world, however, in the

current past, such juices, especially unpasteurized juices have been shown to be a potential source of bacterial pathogens notably, *Salmonella*, *E.Coli* O 157:H7, (Buchanan etal 1999, Ryu et al 1998, Uljas et al 1998, Zhuang et al, 1995).

In India, especially in the metropolitan and other big cities a huge section of the population of all income and age groups consume fresh pressed and squeezed juices, most of these juices are sold by street vendors. In Patiala, a principal city of Punjab, approximately 94% of the population, including tourists comprising of all age and income groups prefer and consume fresh squeezed /pressed juices particularly, carrot and citrus, especially Kinnow as the latter are produced in considerable amounts during the months of October through March. Although no documented outbreaks related to the consumption of juices exist in India, unofficial reports confirm that such incidents have actually increased in the past couple of years. In view of the threat posed by the bacterial pathogens in juices and the flourishing demands of such street vended juices, the present work was undertaken to assess the microbiological quality of carrot and kinnow juices sold as fresh pressed or

squeezed form by street vendors during the months of October through March.

Collection of samples:

For collection of samples, the whole of Patiala city was divided into ten zones, samples were collected from shops in each of these zones having a sale of at least 100 glasses of juice per day. All samples (150) were collected in sterile containers held at 4°C and analyzed within 2 hours from procurement, 5ml portions of juice samples were removed aseptically for pH measurements. Portions of juices measuring 25ml were diluted as 1: 10 with 250ml of Sterile Butterfields phosphate buffer which were subsequently diluted tenfold with the same. Appropriate dilutions were then enumerated for Total aerobic plate counts using Tryptone Soya agar, Coliforms using Violet Red Bile agar, *Staphylococcus aureus* using Baird –Parker agar. Presence of faecal coliforms were determined using Brilliant Green Lactose Bile broth (44.5°C/48hrs.), followed by confirmation of gas positive tubes using Eosin methylene Blue agar. Inoculated plates were incubated at requisite time-temperature combinations [FAO 1979, USFDA BAM, 2001] For detecting the presence of *Salmonella*, portions of juices were pre-enriched with Universal preenrichment broth, inoculated in Rappaport Vassilidis semisolid agar and enumerated on Xylose –Lysine Deoxycholate agar; presumptive isolates of *Salmonella* were sent to the National Centre for *Escherichia Coli* and *Salmonella*, Central Research Institute, Kasauli, India for serotyping and further confirmation. Presence of *Shigella* was assessed by streaking a loopful of enrichment broth onto plates of Salmonella-Shigella agar and XLD agar- colonies exhibiting typical characteristics of *Shigella* were isolated and confirmed by biochemical tests.

Isolates of *S.aureus* obtained on Baird –Parker agar were characterized for their production of coagulase, Thermostable DNase activity, catalase and hemolysine production and mannitol fermentation [FAO 1979].

The pH of kinnow and carrot juice was about 3.8 and 4.5 respectively. Quantitative analysis of both juices revealed that the trends for Total viable counts (TVC) were around Log 6 for both juice samples; both kinnow-mandarins and carrots are transported from central markets to retailers and finally to stalls or cart owners (street vendors) who use them for juicing, entry of microorganisms through point in the transport chain may be possible and explain the high load

of bacteria on the surface of both carrots and kinnow mandarin, their presence in juices indicate either improper cleaning of kinnows-mandarins and carrots or absence of such practices before juicings were carried out.

The total faecal coliform counts (TFCC) for both juice samples were approximately Log 5, total staphylococcal counts (TSC) of juice samples of both carrot and kinnows were >Log3 and ranged from Log 5-6 (Table: 1). Forty five samples of carrot juices (30%) and eighteen samples of kinnow-mandarin juice (12%) showed the presence of coagulase positive *S.aureus*, the entry of the latter in juices, may be attributed to contact with the outer surface of kinnow or carrots during juicings, survival and growth of foodborne pathogens on surfaces of fruits and vegetables (on account of favorable pH) have been demonstrated (Banwart, 1989). Although it is unlikely for the introduced *S.aureus* to survive in juices having low pH, it is possible that they may do so in juices having pH values more than 4. The presence of coagulase positive *S.aureus* in both carrot juice and kinnow-mandarin juice indicate severe contamination through handling. The total faecal coliforms counts were found to be around log 5 indicating faecal contamination of the juices, the concomitant presence of *Salmonella enteridis* (in three samples of carrot juices obtained from Area 1 and Area 4) is a cause of concern: it is possible that *Salmonella* may have gained entry through water, commonly used for diluting carrot juices or other ingredients used for coloring carrot juices (e.g.: beet roots), alternately, the possibility of contamination of carrots through improperly treated irrigation water cannot be ruled out; survival and entry of enteropathogens including *Salmonella* have been shown in crops, especially carrots, lettuce etc irrigated with contaminated sewage (WHO, 1998). *Shigella* was not detected in any of the samples.

Citrus juices, especially kinnow-mandarin juices are mostly consumed either as a blend with orange or with carrot juices or without blending since this fruit is abundantly cultivated and is cheaply available; carrots, like wise occupy an important position, both in terms of availability and low cost during the months of October through March. Juices of both are in great demand during this period- as they are nutritious (Anon, 1994) and cheap most of the juices are prepared in fresh pressed or squeezed form and sold by street vendors who are uneducated about the hygienic practices and safety of food products: our results clearly

indicate the poor hygienic quality of these juices

and consumers are placed at a risk of contracting

TABLE:1. Microbiological analysis of fresh squeezed unblended Carrot and kinnow-mandarin juice sold through street shops in Patiala City.

Carrot Juice				Kinnow Juice			
AREA	TVC	TFCC	TSC	AREA	TVC	TFCC	TSC
1	6.20	5.7	5.52	1	6.20	5.32	5.52
2	5.75	4.5	5.12	2	5.75	4.5	5.12
3	6.61	4.8	5.50	3	5.53	4.8	5.50
4	5.09	5.5	5.75	4	6.41	5.5	5.74
5	6.45	4.7	6.38	5	6.02	4.7	4.83
Mean	6.02	5.04	5.65	Mean	5.98	4.96	5.34
S.E(+)	0.274	0.235	0.207	S.E(+)	0.156	0.190	0.162

food borne infections. While the practice of consuming fresh fruit or vegetable juices cannot be stopped on nutritional grounds nor the street vendors prohibited from selling such items since such activities provide them with a source of livelihood, government agencies must adopt measures to educate the vendors about food safety and hygienic practices and enforce adequate guidelines for juices especially unpasteurized juices: such norms, currently do not exist in India.

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