EVALUATION OF THE MICROBIOLOGICAL QUALITY OF STREET-VENDED JUICES SOLD IN CAIRO.

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SUMMARY

This work has been done to assess how the street-juices, sold by the moved street-vendor, can be of a possible source for pathogenic microorganisms. Evaluation of the microbiological quality of forty-three juices samples, included in four types of juices, as well as ten washing water samples, was done using three different microbiological examination methods including classic selective media, chromogenic media, as well as rapid food-system kits. The results indicated that populations of the total bacterial count ranged from 10^2 to 10^6/ ml while the average counts of mould and yeast in positive samples were 10^3 / ml. Fifty-percent of the examined samples were found to be contaminated with *Staphylococcus aureus*, 40% were positive for the presence of both *Listeria monocytogenes*, *Yersinia enterocolitica*, *Bacillus cereu*s, and *Salmonella typhimurium* however 30% of the investigated juice samples were positive for the presence of *Escherichia coli* 0157:H7. It seems that this contamination is mainly due to poor quality of the used water as well as poor hygienic conditions applied during preparation and serving of the drink. These results may help to clarify the epidemiology of the diseases in the country and draw the attention to issue hygienic regulations for those mobile street-vendors in order to ensure safe street-vended juices.

Keywords: *Mobile street-vendors, juices, microbiological quality, pathogens.*

INTRODUCTION

Juices are well recognized for their mineral and vitamin content and high nutritive value. In many tropical countries, like Egypt, juices are used as thirst quenching aid and thus become the common man's beverages that consumed by the most population. In these countries, most consumers prefer juices of fresh-cut fruits rather than their processed counterparts. The main reason for this is a general belief that fresh fruit juice retains the original nutritional and sensory attributes (Chumber *et al*., 2007; Ghosh *et al*., 2007).

In Egypt, there are two sources to drink juices in streets, the fixed premises (shops) and the moved/mobile carts operated by persons served a such drinks. The mobile street-vendors use large size aluminum / glass containers, that specially made to keep the cold juice throughout the day, to store and vend their products. Sometimes they carry these containers on their backs using leather belt wide surrounds the waist circumference and hanging from a small vessel of the cups, while holding in their left hands a small plastic jug filled with water to wash the cups. Other times they use small carts to move around in streets and public places.

The most popular drinks in Egypt are mango juice prepared by blending mango peel and pulp with sugar, water and Essence. The Indian dates (*Tamarindus indica*) which prepare by soaking the dates in cold water for several hours with the addition of a few hibiscus leaves, left to snap, filtered with addition of some sugar. Licorice (*Glycyrrhiza glabra*) which prepare by mixing the powdered of licorice with carbonate, hand blended with water to become viscous, placed in a small bag of muslin cloth bag for while to become dark in color, then soaked for 6 hours with the desired amount of water and refrigerated. Sobia which prepare by different methods but the main components are, rice, sugar, fresh milk or yogurt, spirit of banana almond, lemon, coconut milk and water.

In Juices that sold by moved street-vendors, the sources of contamination can vary much. However, the potential source of microbial contamination can be caused by the environmental exposure, improper washing of fruits adds bacteria to extracts, use of unclean water for dilution, dressing with ice, and prolonged preservation without refrigeration, unhygienic surroundings often with swarming houseflies, fruit flies and airborne dust as well as lack of personal hygiene can also act as additional sources of contamination.

Such juices have been found to be potential sources of bacterial pathogens notably *E. coli* 0157:H7, species of *Salmonella*, *Shigella,* and *S. aureus* (Buchman *et al*., 1999; Sandeep *et al*., 2004; Barro *et al*., 2006). There have been reports of food borne illness associated with the consumption of juices in India and elsewhere (Mosupye & Holy, 2000; Muinde & Kuria, 2005; Lewis *et al*., 2006; Chumber *et al*., 2007; Ghosh *et al*., 2007). Also, reports are available on the presence of pathogenic or toxin producing microorganisms such as *E. coli* 0157:H7, *Salmonella* sp., *Penicillium expansum*, *Aspergillus* sp., *Byssochlamys* sp., and *Fusarium* sp., in the unprocessed apple, orange and grape fruit juices (Tournasa *et al.*, 2006; Bae *et al*., 2009; Tribst *et al*., 2009; Sant'Ana *et al*., 2010).

In Egypt, there is no accurate information about the cases might occur by the different types of foods or juices. The number of cases, the causative organisms and the implicated food or juice mostly remain unknown. (El-Shenawy *et al*., 2011). Although the infectious dose for these contaminating bacteria in juices is not yet well established, but based on the standards provided for drinking water, the numbers required to cause illness could be low particularly with reference to faecal coliforms and streptococci (Sandeep *et al*., 2004; Barro *et al*., 2006; Chumber *et al*., 2007).

This work has been done to assess in what extent the juice, sold in streets of Cairo province by the moved street-vendors, can be a possible source for some pathogenic microorganisms. Comparison between efficiency of three different microbiological examination methods including classic selective media, chromogenic media, as well as rapid food-system kits for isolation and identification of pathogens from juices was another goal of this work.

MATERIALS AND METHODS

Juices samples:

Fifty-three Samples of juices were randomly collected from 10 locations in Great-Cairo Governorate. All samples were collected from the street-vendors that move around in streets. Sampling was performed weekly during summer season (June to September 2010). All samples were collected aseptically, placed in sterile containers, stored at 4ºC and transferred to the laboratory. All samples were examined the same day.

The microbiological analysis.

Twenty-five ml of each sample was mixed and diluted with buffered peptone water (Himedia 2003), to make the sufficient dilutions for the microbiological analysis. Ten-fold dilutions were prepared and inoculated onto plates of classic selective or Hi-chromogenic media.

The aerobic colony count (ACC) was carried out according to the method described by the (FDA 2002) using plate count agar (M091, Himedia, Mumbai). Plates were incubated at 35± 1Cº for 48 ± 2h. Yeasts and moulds were carried out using the media of acidified potato dextrose agar (M096, Himedia, Mumbai) as recommended by (FDA 2002). Plates were incubated at 22-25º C for 3-5 days. *L. monocytogenes* was detected by mixing 25 ml of the sample with 225ml *Listeria* selective enrichment supplement (M890A, Himedia, Mumbai) as recommended by (Louvett *et al*., 1987). Samples were incubated at 30º C for 7 day. A plate of oxford agar base (M1145, Himedia, Mumbai) supplemented with Listeria supplement was daily streaked from each sample and incubated at 35º C for 48h as recommended by (Curtis *et al*., 1989). Suspected colonies were picked up and propagated for further specific morphological, biochemical tests as recommended by (FDA 2002). Enumeration of *S. aureus* was carried out by spreading 0.l ml of the dilution(s) onto the surface of Baird-Parker media (M043, Himedia, Mumbai) supplemented with egg yolk and potassium telurite solution. Suspected colonies were picked up and propagated for further specific morphological, biochemical tests as recommended by (APHA 1976 and FDA 2002). *B. cereus* was determined by the surface plating technique onto the *B. cereus* Agar (M833 Base, Himedia, Mumbai) supplemented with polymyxin B and egg yolk. The suspected colonies described by (Holbrook & Anderson, 1980) were further tested for identification according to (FDA 2002). Coliform group was determined after the method reported by (FDA 2002) using violet red bile agar (VRBA) (M049, Himedia, Mumbai). Plates were incubated 24h at 32- 35ºC. *E. coli* O157: H7 was detected by spreading dilutions onto plates of sorbitol Mac Conkey agar (M298, Himedia, Mumbai). After incubation at 35º C for 18-24h, the suspected colonies were picked up and propagated for further specific morphological, biochemical tests as recommended by (FDA 2002). For detection of *Salmonellae,* 25 ml were mixed with 225ml of sterile lactose broth and incubated at 35º C for 24h. A 1ml to 10ml mixture was transferred to selenite cystein broth (SC) (Himedia, Mumbai), and incubated at 35º C for 72h. Plates of *Salmonella & Shigella* ager (SS) were daily streaked and incubated at 35º C for 24h. Lactose negative suspected *Salmonella or Shigella spp*. were biochemically and serologically identified according to (FDA 2002 and APHA 1976) using the reagent kits. Enumeration of other members of Enterobacteriaceae in the samples was carried out by spreading 0.l ml of dilution onto the surface of violet red bile glucose agar medium as recommended by (APHA 1976 and FDA 2002). *Y. enterocolitica* was detected by mixing 25 ml of the samples with 225ml *Yersinia* selective enrichment supplement (Himedia, Mumbai). Samples were incubated at 30º C for

48 h, spread onto *Yersinia* selective agar medium (M843, Himedia, Mumbai), incubated at 35º C for 18-24h. The suspected colonies were further identified according to (FDA 2002).

Additional HiCromegenic media were used in parallel for isolation of some pathogens, whenever possible, to compare their efficiency for isolation with the conventional selective media used in this work. The same dilutions were used to inoculate the HiCromegenic media. HiCrome *Listeria* Agar Base (M1417, Himedia, Mumbai) was used for detection of *L. monocytogenes,* HiCrome *Bacillus* agar (M1651, Himedia, Mumbai) was used for detection and enumeration of *B. cereus,* HiCrome *E. c.* 0157:H7 agar (M1574, Himedia, Mumbai) was used for detection of *E. coli* O157: H7 and HiCrome *Salmonella* agar (M1296, Himedia, Mumbai) was used for isolation and identification of *Salmonella*.

Identification of the isolates

Representative isolates from either the different selective media or chromogenic media were purified, Gram stained and subjected to microscopic examination as well as their chemical and biochemical confirmations tests. Additional kits were used to help for accurate identification including Hi *Listeria* identification kit, Hi *Listeria* latex test kit, Hi Staph identification kit, Hi Staph latex test kit, Hi *E. coli* identification kit, Hi *E. coli* 0157 latex test kit, Hi *Salmonella* identification kit and Hi *Salmonella* latex test kit.

The Food System kits

For more accuracy and comparison, miniaturized biochemical food-system, kits (micro titer plates) for detection of pathogenic germs, was delivered from Liofilchem. Via Scozia-Zona Ind. Le-64026 Roseto D.A. (TE) Italy were also used to compare their results with those obtained by the conventional selective and the Chromogenic media. According to instruction supplemented by the company, 25 ml of the juice sample was homogenized in buffered peptone water (225ml) and incubated at 36º C for24 hrs. Aliquot of 0.2ml of the sample was dispensed into the vial of the physiological solution supplied in the kit, and 0.2ml (4 drops) of the sample suspension was transferred into each well of the system, and incubated at 36 ºC for 18 – 24 hrs. *Salmonella spp., S. aureus, E. coli, B. cereus, Listeria spp*. as well as yeasts and moulds were detected in their specified wells according to the instructions provided by the company and attached with the kits.

RESULTS AND DISCUSSION

A total of fifty-three samples of street-vended juices including ten samples each of licorice, mango and sobia juices, 13 samples of Indian dates juices and 10 samples of washing water were microbiologically investigated. The investigated microbiological parameters using different detection methods as well as the obtained averages counts are given in Table (1).

As seen from this Table, using the classic/selective media, the highest bacterial populations (ca 10^6) were detected in juice samples however the lowest counts (ca 10^2) were detected in washing water. Mould and yeast with an average of counts ca 10^3 were detected. These microorganisms were found in all the examined mango and Indian dates samples, however only 60% and 80% of sobia and licorice were positive. Interestingly, all water samples were negative using classic methods however 40% of them were positive when tested using the food system kits.

Table (1). Microbiological quality of street-vended juices samples using different detection methods.

Type/No. of sample		Licorice (10)	Mango (10)	Sobia (10)	Indian dates (13)	Water (10)
Total bacterial count	Positive samples	10(100%)*	10(100%)*	10(100%)*	13(100%)*	10(100%)*
	Average cfu/g	34x10^{6*}	18x10^{6*}	24x10^{6*}	16x10^{6*}	20 x10^{2*}
Mould &Yeast count	Positive samples	8 (80%)*	10(100%)*	6(60%)*	13(100%)*	Nil (0%)*
		8(80%) ***	10(100%) ***	6(60%) ***	13(100%) ***	4(40%) ***
	Average cfu/g	21x10^{3*}	71x10^{3*}	33x10^{3*}	61x10^{3*}	Nil*
Enterobacteriaceae	Positive samples	7(70%)*	8(80%)*	6(60%)*	3(23%)*	5(50%)*
	Average cfu/g	43x10^{2*}	39x10^{2*}	37x10^{2*}	38x10^{2*}	26 x10^{2*}
Coliform group	Positive samples	7(70%)*	6(60%)*	6(60%)*	3(23%)*	5(50%)*
	Average cfu/g	29x10^{2*}	37x10^{2*}	28x10^{2*}	30x10^{2*}	21 x10^{2*}
Yersinia enterocolitica	Positive samples	4(40%)*	3(30%)*	3(30%)*	2(15%)*	3(30%)*
	Average cfu/g	17x10^{2*}	26x10^{2*}	16x10^{2*}	19x10^{2*}	13 x10^{2*}
Staphylococcus aureus	Positive samples	5(50%)*	0(0%)*	3(30%)*	5(38%)*	4(40%)*
		5(50%) ***	1(10%) ***	3(30%) ***	6(46%) ***	4(40%) ***
	Average cfu/g	19 x10^{2*}	0*	19 x10^{2*}	31 x10^{2*}	4*
Escherichia coli0157H7/ Escherichia coli	Positive samples	3(30%)*(1)	3(30%)*(1)	3(30%)*(1)	3(23%)*(1)	4(40%)*(1)
		4(40%)**(1)	4(40%)**(1)	4(40%)**(1)	3(23%)**(1)	4(40%)**(1)
		5(50%)***(2)	5(50%)***(2)	4(40%)***(2)	4(31%)***(2)	4(40%)***(2)
	Average cfu/g	22x10^{2*}	48x10^{2*}	14x10^{2*}	21x10^{2*}	10 x10^{2*}
		24 x10^{2**}	34 x10^{2**}	15 x10^{2**}	23 x10^{2**}	4**
Salmonella typhimurium/ Salmonella spp.	Positive samples	3(30%)*(3)	0(0%)*(3)	4(40%)*(3)	2(15%)*(3)	0(0%)*(3)
		4(40%)**(3)	1(10%)**(3)	5(50%)**(3)	2(15%)**(3)	0(0%)**(3)
		4(40%)***(4)	2(20%)***(4)	6(60%)***(4)	3(23%)***(4)	2(20%)***(4)
	Average cfu/g	20x10^{2*}	0*	9x10^{2*}	21x10^{2*}	0*
		20 x10^{2**}	2 x10^{2**}	9 x10^{2**}	18 x10^{2**}	0**
Listeria monocytogenes/ Listeria spp.	Positive samples	3(30%)*(5)	4(40%)*(5)	2(20%)*(5)	4(31%)*(5)	2(20%)*(5)
		4(40%)**(5)	5(50%)**(5)	3(30%)**(5)	4(31%)**(5)	2(20%)**(5)
		5(50%)***(6)	5(50%)***(6)	4(40%)***(6)	5(38%)***(6)	3(30%)***(6)
	Average cfu/g	18 x10^{2*}	22x10^{2*}	26 x10^{2*}	18x10^{2*}	3*
		16 x10^{2**}	27 x10^{2**}	17 x10^{2**}	20 x10^{2**}	8**
Bacillus cereus	Positive samples	1(10%)*	3(30%)*	4(40%)*	5(38%)*	0(0%)*
		2(20%)**	4(40%)**	5(50%)**	7(54%)**	0(0%) **
		2(20%)***	4(40%)***	6(60%)***	8(61%)***	3(30%) ***
	Average cfu/g	3 x10^{2*}	4 x10^{2*}	3 x10^{2*}	4 x10^{2*}	Nil*
		4 x10^{2**}	7 x10^{2**}	4 x10^{2**}	11 x10^{2**}	Nil**

Classic methods, ** chromogenic methods, * food system kits, (1) positive samples for E.coli0157H7,(2)positive samples for E. coli, (3) positive samples for S. typhimurium, (4) positive samples for Salmonella spp., (5) positive samples for L. monocytogenes, (6) positive samples for Listeria spp.*

The Enterobacteriaceae bacteria were detected in 70%, 80%, 60%, and 23%, with an average count of ca 10^2, of licorice mango, sobia and Indian dates respectively while 50% of washing water samples were contaminated by such organisms. Average counts of ca 10^2

coliform group bacteria were detected in 70%, 60%, 60% and 23% of licorice mango, sobia and indian dates samples respectively. Fifty percent of the washing water was contaminated by this fecal bacteria group.

Y. enterocolitica were detected in averages of ca 10^2 in the examined samples. The bacterium was detected in 30% of mango and sobia however 30%, 40% and 15% of water, liquorices and Indian dates samples were contaminated by such pathogen respectively.

Using classic methods, *S. aureus* was detected in counts of ca 10^2 in 50%, 38% and 30% of samples of licorice Indian dates and sobia however all mango samples were free. When the food system kits were used, one more positive sample in mango and Indian dates were added. Both methods detected 40% positive in washing water samples.

The bacterium *E. coli* O157: H7 was detected, with average counts of ca 10^2 using classic selective media, in 30% of licorice mango and sobia, however only 23% of Indian dates were positive for the presence of this pathogen. When chromogenic media were used, percentages were increased to 40% in licorice mango and sobia. Using the food system kits, more increase in positive samples, for the presence of the bacterium *E. coli*, were detected since 31% of Indian dates samples while 50%, 50%, 40%, and 40% of licorice mango, sobia and water washing samples were positive for the presence of this bacterium respectively.

S. typhimurium was detected in 40, 30, and 15% of sobia, liquorices and Indian dates samples respectively however all mango and washing water samples were negative .Using the chromogenic medium, the same pathogen was detected in one more positive sample of licorice sobia and mango. When food system kits were used, *Salmonella spp.* was detected in 60, 40, 23 and 20 % of sobia, licorice Indian dates and mango samples respectively. Interestingly, tow water samples were positive for the presence *Salmonella spp.* however were negative for *S. typhimurium* when using both classic and chromogenic media.

L. monocytogenes were detected in average of ca 10^2 in the examined juices. Using the classic selective medium 40, 31 and 30% for mango, Indian dates and liquorices respectively, however only 20% of both sobia and water samples were found to be contaminated by such pathogen. Chromogenic medium added one more positive sample in licorice mango and sobia. The food system kits were able to detected *Listeria* spp. in 50% of liquorices and mango, 40, 38 and 30% of sobia, Indian dates and washing water respectively.

Using classic method *Bacillus cereus* was detected, in average of ca 10^2, in 40%, 38%, 30% and 10% of sobia, tamrhendy, mango and liquorices samples respectively. Chromogenic media added one more positive sample in sobia, mango and liquorices samples however two positives samples were added to tamrhendy. Using the food system kits, one more positive sample was added to both sobia and tamrhendy.

As a general conclusion, as seen from Table (1), chromogenic media gives higher results for positive samples than the traditional classic media. For example, in sobia samples, one more positive sample was detected when chromogenic media were used for detection of *E. coli* O157: H7, *S. typhimurium, L. monocytogenes* and *B. cereus* and thus, chromogenic media proved to be more selective than classic media. The same was true, when comparing the results of positive samples obtained by chromogenic media and the food system kits, as we found that the percent of positive samples detected by the food system kit were higher than those detected by the chromogenic media Table (1).

Taking into consideration that the food system kits allow the detection of the bacteria, depend on some biochemical reactions, however the chromogenic media detect the

bacterial cell itself and allow isolation of the detected strains. This criterion may give more preference to the use of chromomgenic media. Thus, using the chromogenic media used for detection *L. monocytogenes*, *S. typhimurium*, *E. coli* and *B. cereu*s may have several advantages such as low cost, significantly less processing time and less cross-contamination than the other used methods. In this regard, (Tambekar *et al*., 2009) found that chromogenic media was more efficient for simultaneous detection of *E. coli* and coliforms from ready-to-eat foods. This is in accordance of the results obtained in this study.

Eighty-five isolates were picked up from the different selective agar media, of the positive examined samples, (classic methods) including *B. cereus* agar medium, MacConkey sorbitol agar medium, *Listeria* oxford base medium, *Salmonella Shigella* agar medium, Baird parker agar base medium and *Yersinia* selective agar base medium for identification/confirmation as *B. cereus*, *E. coli O157: H7*, *L. monocytogenes*, *S. typhimurium*, *S. aureus and Y. enterocolitica* respectively. Sources and numbers of these isolates are presented in Table (2).

In the same time, sixty-seven isolates picked up from the different chromogenic media including HiCrome *E. coli* 0157:H7 agar, *Listeria* agar base, *Bacillus* agar and *Salmonella* agar were subjected to the same purpose of confirmation /identification. Sources and numbers of these isolates are presented in Table (2).

All the aforementioned isolates were identified according to their morphology, physiological and biochemical characteristics however only 5 *L. monocytogenes* isolates (2 from classic and 3 from chromogenic media), 5 isolates of *S. typhimurium* (2 from classic and 3 from chromogenic media), 6 isolates of *E. coli* 0157:H7(3 of each media), 3 isolates of *B. cereu*s (1from classic and 2 from chromogenic media) as well as 4and 2 isolates of *S. aureus* and *Y. enterocolitica* (from classic media) respectively were randomly taken to subject for more confirmation of identification using additional kits including Hi *Salmonella* identification kit and Hi *Salmonella* latex test kit, Hi *Listeria* identification kit and Hi *Listeria* latex test kit, Hi Staph identification kit and Hi Staph latex test kit and Hi *E. coli* identification kit and Hi *E. coli* o157 latex test kit.

The identification kits confirmed all the isolates picked up from the chromogenic media however only one isolate of *S. typhimurium* isolated by classic media, from sobia sample, failed to be identified by their respective kits. These results confirm, again, that chromogenic medium still to be the superior for isolation of the pathogens from street-vended juices.

The Egyptian guideline standards(579,687/2005 and 686/2006), specified for juices, stated that the total bacterial count should not exceed 100cfu/ml, mould and yeasts should not exceed 10 cfu/ml and these drinks should be free from any pathogenic organisms. For drinking /washing water, the total bacterial count should not exceeding 10 cfu /ml and water should be free from coliform, *E. coli*, *salmonella*, *pseudomonas*, *Clostridium* and pathogenic microorganisms.

According to these microbiological specifications of the Egyptian standards, most of the examined juices samples(81%) were found to be not accepted, due to one or more of criteria, however only 19 % of samples were complied with and accepted by these standards (Table 3). Surprising, all the examined washing water samples were found not to comply with these standards (Table 3).

Table (2). Sources and numbers of the different identified isolates.

Type/No. of sample	Licorice (10)	Mango (10)	Sobia (10)	Indian dates (13)	Water (10)	Total No. isolates
S. aureus	5*	0*	3*	5*	4*	17*
Y. enterocolitica	4*	3*	3*	2*	3*	15*
E. coli O157:H7	3*	3*	3*	3*	4*	16*
	4**	4**	4**	4**	3**	19**
L. monocytogenes	3*	4*	2*	4*	2*	15*
	5**	3**	4**	2**	4**	18**
B. cereus	1*	3*	4*	5*	0*	13*
	4**	5**	2**	0**	7**	18**
S. typhimurium	3*	0*	4*	2*	0*	9*
	1**	5**	4**	0**	2**	12**
Total No. isolates	19*	13*	19*	21*	13*	85*
	14**	17**	14**	6**	16**	67**

**Classic methods, ** chromogenic methods.*

Table (3). Juice samples as complies with the Egyptian Standards.

Juice products	No. of examined samples	No. of accepted samples
Licorice	10	2
Mango	10	4
Sobia	10	2
Indian dates	13	0
Water	10	0
Total	53	8

Over all the obtained results of this study indicated that juices, sold by the mobile street-vendors in different location of Great-Cairo Governorate, showed high degree of contamination and can poses a serious challenge to the consumer. pathogens including *S. aureus*, *B. cereu*s, *E. coli* O157: H7, *L. monocytogenes*, *Y. enterocolitica* and *S. typhimurium* were isolated from most of the examined samples as well as the washing water used for washing glasses, utensils, preparation and serving such these drinks.

Such contamination could mainly be due to poor quality of water used for dilution/preparation of the drink (as it is clear from the present results), prevailing unhygienic conditions related to washing of utensils used for preparation and conservation of the product as well as high ambient temperatures (>30^{o}C during summer season) and the

high pH values of the products (4.5 – 6.2) that favor the bacterial growth and reduce the shelf life of the juice. The unhygienic surrounding environment including dust, air flies and sometimes the presence of sewage in streets may also increase the probability of such contamination. One of the most important factors, to increase cross-contamination, is that the most of those street-vendors are uneducated and thus this increase lack of knowledge of personal hygienic practices and also lack of familiarity with the basic rules of health and food safety (Lewis *et al*., 2006; Subbannayya *et al*., 2007).

It is well known that the presence of coliform bacterial group, *E. coli* and other enterobateriacaea group indicates fecal pollution of these drinks. This could be explained by inadequate hand washing, use of contaminated water and poor processing practices used in preparation and serving drinks to the consumer. Presence of *S. aureus* is another indicator of less personal hygiene since such organism is widely distributed in nature and on the surface of human skin, eyes and nasal secretions as well as in respiratory tracts (Tambekar *et al*., 2007; Opeolu *et al.,* 2010) and thus this pollution can arise even from indiscriminate disposal of phlegm and sputum . Also, dressing of unclean clothes and surrounding poor unhygienic environment my assist for cross-contamination by such pathogen.

The presence of the other pathogens including *E. coli* 0157:H7, *L. monocytogenes*, *S. typhimurium*, *Y. enerocolitica* and *B. cereus* may indicate the same aforementioned hypothesis and that fecal pollution contamination can consider alarming enough for the presence of any other pathogens, in the polluted samples, since all the fecal polluted juices samples were in the same time contaminated with one or more of the investigated pathogens (data not shown).

In conclusion, results obtained in this study indicated that consuming of drinks/juices sold by mobile street-vendors, in many locations of Great-Cairo city, may possess a serious challenge to the consumers. These results will help to clarify the epidemiology of diseases in the country. It may help/enforce the dissection makers to take the proper methods/actions to control such outbreaks that may arise from the consumption of these juices. It may also be useful in the development of any microbiological guidelines specified for those vendors. Since all mobile vendors are not inspected by the concern authorities, we believe that hygienic regulations should be issued for those people. Also, the non-governmental organizations together with the governmental health agencies are encourage taking simply measures to educate those vendors on topics of food safety and hygienic practices. On the other hand, careful handling/preparing, washing, cleaning, and above all personal hygiene awareness would help to minimize such contamination.

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تقييم الجودة الميكروبيولوجية لبعض المشروبات المباعة بواسطة الباعة الجائلين في شوارع القاهرة الكبرى.

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الملخص

تم إنجاز هذا البحث بهدف تقييم الجودة الميكروبية للعصائر التى تباع بواسطة الباعة المتجولين فى شوارع مدينة القاهرة الكبرى حيث تم جمع عدد ٤٣ عينة من أربعة أنواع من المشروبات- من مناطق مختلفة- وكذلك ١٠ عينات مياه تستخدم فى غسيل الأوانى ولأكواب. هذا وقد تم ذلك باستخدام ٣ طرق مختلفة للفحص الميكروبيولوجي (النظم التقليدية classic selective media ، نظم الكروموجينيك chromogenic media و نظام الكتزالسريعة rapid food-system kits). وقد أظهرت النتائج أن حوالى ٥٠٪ من العينات المختبرة كانت ملوثة بالميكروب العنقودى الذهبى *Staphylococcus aureus* بينما ٤٠ ٪ من العينات المختبرة كانت ملوثة بكلا من:*L. monocytogenes* و *Y. enterocolitica*, و *B. cereus*, و الـ*Salmonella typhimurium* و لكن ٣٠% من العيبات المختبرة كانت ملوثة ب*E. coli* 0157:H7 . أيضا فأن العد الكلي للبكتيريا تراوح ما بين ١٠[٢] إلى ١٠[٦] /مل في حين أن متوسط تعداد الفطريات والخمائر في العينات الموجبة كانت ١٠[٣] / مل. ويبدو أن هذا التلوث يرجع أساسا إلى سوء نوعية المياه المستخدمة وكذلك الأوضاع الصحية المتردية التى تم تطبيقها خلال إعداد وتجهيزتلك المشروبات. وتفيدهذه النتائج فى توضيح خريطة وبائيات الأمراض المنقولة عن طريق الغذاء فى البلاد وأيضا تشد الانتباه الى ضرورة إصدار القوانين الصحية والمراقبة الصارمة لهؤلا الباعة الجائلين وذلك لضمان مشروبات امنة صحية.