

Article Title Page

HANDLER'S HYGIENE PRACTICES IN SMALL RESTAURANTS OF VADODARA

Author Details:

Mini Sheth

The Maharaja Sayajirao University of Baroda, Faculty of Family and Community Sciences, Department of Foods and Nutrition, Vadodara, India

Ashima Gupta

The Maharaja Sayajirao University of Baroda, Faculty of Family and Community Sciences, Department of Foods and Nutrition, Vadodara, India

Tejal Ambegaonkar

The Maharaja Sayajirao University of Baroda, Faculty of Family and Community Sciences, Department of Foods and Nutrition, Vadodara, India

Corresponding Author:

Mini Sheth

mks7@hotmail.com

Author Bio:

Mini Sheth is currently working as an Associate Professor and Deputy Director of WHO collaborating centre of Vadodara, Gujarat. She has been teaching and carrying out research activities in food safety, prebiotics and probiotics, fats and oils for more than 24 years in the Department of Foods and Nutrition, obtaining a Ph D degree in Foods and Nutrition in 1994, and thereafter, undergoing a UNESCO training program.

Ashima Gupta is currently pursuing a PhD in Foods and Nutrition from the Department of Foods and Nutrition, Baroda and Completed M.Sc. in Food technology in 2007

Tejal Ambegaonkar has completed her M.Sc in Foods and Nutrition form Department of Foods and Nutrition, Baroda.

Structured Abstract:

Purpose – This study aims to report the hygiene and sanitation practices of restaurant food handlers of urban Vadodara, Gujarat, India.

Methodology - Fifty five food handlers were purposively selected to study their personal hygiene and unit hygiene practices using semi structured questionnaire and observation schedules from forty small and medium sized restaurants of Urban Vadodara. Microbial analysis of five samples namely hand rinse sample, table mop cloth, towel, knife, plate swabs was carried out to determine the Total Plate Count and presence of Staphylococcus aureus, Coliform counts, Salmonella, Shigella, E.coli 0157:H7.

Findings- Most food handlers exhibited poor personal hygiene and poor personal habits. E.coli 0157:H7 was detected in two out of three knife samples and table mop cloth samples; Salmonella was detected in one of the table mops cloth and two hand towel samples respectively. Two of the table mop cloth samples also indicated presence of Shigella.

Research limitations/implications- The survey of food handlers implies gross violation of codex guidelines laid down for safe cooking and services practices for small and medium restaurants.

Practical implications- Consumption of foods at small and medium restaurants of urban Vadodara poses a high risk for the consumers.

Originality/value- This is an original study which should act as an eye opener for the food safety officers who need to enforce the food safety laws more stringently so as to reduce the risk of outbreaks of food borne illnesses in the city of Vadodara.

Keywords: Food safety, Knowledge, Food handlers, Microbial quality

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ABSTRACT

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INTRODUCTION

The health and the nutritional status of people is largely dependant on the quality of food they eat. It is, therefore, essential to ensure that the food they consume is safe and wholesome. Rapid industrialization and change in life styles of people has resulted in marked increase in the consumption of food outside the house. Large numbers of eating establishments such as restaurants, fast food centers, *dhabas*, street food stalls, etc have mushroomed in cities of India, which are manned by different categories of workers (Mohan *et al.*, 2001). Unhygienic preparation of food in such places provides ample opportunities for contamination, growth, or survival of food borne pathogens. In a highly populated country like India, the number of man hours people lose by consuming unhygienic food and falling ill clearly points out the need to implement food safety measures in these places (Rao and Gopal, 1992). Food handlers are an important source of introducing pathogens into foods during its preparation and service. A food handler is any person who handles food, regardless whether he prepares or serves it.

Food handlers in the restaurants are epidemiologically more important than the domestic food handlers in the spread of food borne illnesses (Mohan *et al.*, 2006). Unhygienic practices like coughing and sneezing in the food preparation area, improper hand washing, wearing dirty clothes etc all may introduce a variety of micro organisms in the food (Linton, 1995). Food handlers involved directly or indirectly in food handling, usually have very poor knowledge of personal hygiene and are not exposed to appropriate hygienic methods of food processing and food handling (Sashidhar, 1992). High mean Aerobic Mesophilic Colony Count (AMCC) (10^8 CFU/g) and *S.aureus* counts (10^7 CFU/g) have been reported along with presence of *Escherichia coli*, *Salmonella* and *Shigella* in 60, 55 and 65% samples respectively, in *bhelpuri* brought from different street food vendors of Vadodara city (Sheth *et al.*, 2005). Another study conducted at University hostel canteens in Vadodara city of India revealed occurrence of *Salmonella*, *E.coli* and *Listeria* from 62.5%, 75% and 87.5 % from the cooked food samples respectively and the inmates of these hostel often fell ill after consuming canteen food (Sheth and Patel, 2005).

Food contact surfaces (equipments and utensils) can be the potential source of contamination in the food products. Counts above 10 CFU/ml for salmonella from the swabs of food contact surfaces were reported from samples of hospital kitchen of Vadodara (Sheth *et al.*, 2005). Study on microbial quality of various utensils and bulk-water for cleaning plates used for serving *bhelpuri* and sandwiches by street food vendors reported presence of *Salmonella* and *E.coli* in 80% and 60% of bulk-water samples respectively, and in 20 % and 40% of the dish swabs respectively (Sheth *et al.*, 2005). Due to lack of information available on the

hygiene and sanitation practices of food handlers of the restaurant workers, the present study was undertaken to determine the hygiene and sanitation practices of food handlers as well as the microbial quality of selected samples brought from small and medium restaurants of Vadodara city of India.

METHODS AND MATERIALS - Forty small and medium sized restaurants were selected using purposive sampling, from different locations of Urban Vadodara. The criteria used for the selection of these restaurants were: Non A.C. restaurants catering to lower and middle socio-economic groups and having sitting capacity between 41-60. A semi-structured questionnaire was formulated and used to obtain information on the restaurants. Fifty five food handlers were surveyed for background information like age, educational status, etc. On the spot observation of the food handlers was conducted to study their hygiene practices and personal habits. Hand rinse sample of the servers, hand towel, table mop cloth, knife and plate swabs and were analyzed for determination of Total Plate Count (TPC), *Escherichia coli* and *coliform Counts (ECC)*, *E.coli 0157:H7*, *Salmonella enteritidis* and *Shigella flexneri* and *Staphylococcus aureus (S.aureus)*. All the glass wares were sterilized before their use by keeping them in a hot air oven at 160 °C for two hours (FAO, 1979). Dilution blanks were prepared by dissolving 10 g peptone, 5 g sodium chloride (NaCl), 9 g disodium hydrogen phosphate and 1.5 g of potassium dihydrogen phosphate in a liter of distilled water which was then sterilized for 15 minutes at 121 °C at 15 lbs pressure (FAO, 1979).

Collection and preparation of samples for microbial analysis (hand towel, table mop cloth, knife and plate): Surface swab technique was used for the collection of samples. Sterile cotton swabs (Hi Media Pvt. Ltd, Mumbai) and templates dipped in dilution blank were used for collecting samples of table mop cloth, hand towel, plate and knife. The templates (3X3 cm) were prepared from aluminum foil, and were sterilized by alcohol flaming (Jay, 1987). The collected samples were brought aseptically to the laboratory and then released in the 100 ml buffer peptone water. Appropriate dilutions were made using serial dilutions technique prior to enumeration. The hand rinse samples- were collected from servers by making them wash their hands with 100ml sterile water into a sterilized sampling bag, into a sterilized funnel. The wash water was then brought aseptically to the laboratory, and analysed after making appropriate dilutions. Readymade flexi plates procured from Himedia Laboratories were used for the enumeration of *Staphylococcus aureus* and *Escherichia coli* and *coliform counts (ECC)*. Nutrient agar was prepared in the laboratory using 5 g beef extract, 5 g peptone and 15 g agar in 1 liter distilled water and was used for determining the Total Plate Count (TPC) of the samples. Samples were incubated for 18-24

hours at 35-37° C for *ECC* and *E.coli* 0157:H7. *Salmonella enteritidis* and *Shigella flexneri*, *S.aureus* and TPC plates were incubated for 24-48 hours at 37° C. The number of colonies developed at the end of the incubation period was multiplied by the dilution factor to obtain the bacterial counts.

RESULTS AND DISCUSSION- Background information: The survey on socio economic profile (Table1) of the food handlers of restaurants revealed that most (56%) of the food handlers were cooks and a majority of them (58%) were in the age group of 31-45 year. Thirty four percent of food handlers were educated up to higher secondary level and 24% were illiterate. About 93% of the food handlers were getting fringe benefits from the restaurants in the form of meals.

Table 1: Socio-economic profile of the food handlers (n=55) employed by the small and medium restaurants of Urban Vadodara.

Sr.No.	Details	Number (n=55)	Percent
1.	Age		
	a) Below 16 yrs	0	0
	b) 17-30 yrs	15	27.27
	c) 31-45 yrs	32	58.18
2.	d) Above 45 yrs	8	14.54
	Educational level		
	a) Illiterate	13	23.63
	b) Up to primary	21	38.18
	c) Primary to higher secondary	19	34.54
3.	d) Higher secondary to graduate	2	3.63
	e) Above graduate	0	0
	Type of work done in the restaurant		
	a) Cook	31	56.36
	b) Waiter	21	38.18
6.	c) Cleaner	3	5.45
	d) Supervisor	0	0
	Fringe benefits		
	a) Yes	51	92.72
	b) No	4	7.27

Personal hygiene of food handlers: Appearance of 29% of the food handlers was dirty and use of protective clothes like apron, headgear or hand gloves was practiced by only 2% of the food handlers (Table 2). When asked for the reasons for not wearing the protective clothing, the handlers reported that wearing of apron and headgear was considered as a status symbol, which is required to be maintained in high class restaurants. Only 5% of the food handlers

had neatly cut nails, whereas, 67% had short and dirty nails. Few of the food handlers (16%) had neatly combed hair, whereas 84% of food handler's hair appeared dirty. Clothes worn by 94% of food handlers also appeared dirty. 58% and 21% of food handlers kept moustache and beard. Keeping moustache and beard by the food handlers is undesirable and is a risk for microbial contamination of the food (Jay, 1987).

Table 2: Observed practices for personal hygiene of the food handlers (n=55)

SR.NO.	DETAILS	NUMBER (N=55)	PERCENT
1.	Appearance of the food handler		
	a) Neat and clean	3	5.45
	b) Somewhat clean	36	65.45
	c) Dirty	16	29.09
2.	Protective clothing worn		
	a) Yes	1	1.81
	b) No	54	98.18
3.	Nails		
	a) Long and dirty	15	27.27
	b) Neatly cut	3	5.45
	c) Neatly cut but dirty	37	67.27
4.	Hair		
	a) Neatly combed	9	16.36
	b) Somewhat combed	42	76.36
	c) Dirty	4	7.27
5.	Moustache		
	a) Present	32	58.18
	b) Absent	23	41.81
6.	Beard		
	a) Present	12	21.81
	b) Absent	43	78.18

Personal habits: 64% food handlers chewed tobacco and reported eating beetle leaf and/or beetle nut, whereas 33% had habit of smoking (Table 3). Wearing accessories like watch, ring and bracelet/bangle was practiced by 18%, 11% and 18% of food handlers respectively while working in the kitchen. Unhygienic practices like chewing tobacco and beetle leaves spitting may introduce a variety of food micro organisms in food (Kudu and Mishra, 2003). These poor practices followed by food handlers of the restaurants indicate gross violation (on part of food handlers) of codex guidelines laid down for safe cooking and services practices. Food safety knowledge and practices of catering employees in one of the city in the Southwestern United States indicated that the employees were most knowledgeable about personal hygiene, but did not practice proper hygiene during the catering functions (Hertzman and Barrash, 2007).

Table 3: Personal habits of the food handlers (n=55)

Sr.No.	Details	Number (n=55)	Percent
1.	Chewing tobacco, beetle nut and/or beetle leaf		
	a) Yes	35	64
	b) No	20	36
2.	Habit of smoking		
	a) Yes	18	33
	b) No	37	67
3.	Watch worn		
	a) Yes	10	18.18
	b) No	45	81.81
4.	Ring worn		
	a) Yes	6	10.9
	b) No	49	89.09
5.	Bracelet or bangle worn		
	a) Yes	10	18.18
	b) No	45	81.81

Microbial analysis: Table 4 and 5 shows *E.coli* O157:H7, *Salmonella* and *Shigella* counts of the samples brought from the restaurants. As seen from the table, *E.coli* O157:H7 was detected in two out of three knife samples and two out of three table mop cloth samples. The *S. aureus* counts for the most samples were found to be low ($<\log_{10} 1.2$ - $\log_{10} 2.9$). However, studies have reported high bacterial and *S.aureus* counts in the knife samples brought from street vendors selling sandwiches in Urban Vadodara (Sheth *et al.*, 2005). *Salmonella* was detected in one of the table mop cloth and two hand towel samples respectively. Two of the table mop cloth samples also indicated presence of *Shigella*. Observations showed that use of clean cloth for mopping of tables and counters was unsatisfactory in 90% of the restaurants studied. *Salmonella* and *Shigella* were not found in any of the hand rinse sample except for one sample from R₂ restaurant which showed presence of *Shigella*.

Since *E.coli* is an organism of intestinal origin and is supposed to be completely absent in food, the presence of *E.coli* in various samples indicates poor hygienic practices of the restaurants under study. Also the detection of pathogens such as *E.coli* O157:H7, *Salmonella* and *Shigella* in some of the samples indicate risk to safety of food served in these restaurants. The results clearly indicate that training on food safety should be imparted to food handlers of small and medium restaurants. The health authorities should draw up terms and conditions for recruitment of staff trained in food safety for serving in small public catering establishments. In addition to the skills in their jobs, their knowledge on hygiene habits and food safety behaviors must also be ascertained.

Table 4: TPC, *S.aureus* and ECC counts of samples indicative of personal hygiene of the staff and unit hygiene of the restaurants.

Sr. No.	Parameter	Samples	Log ₁₀ Counts (CFU/9cm ²)			
			R ₁	R ₂	R ₃	Average
1.	<i>S. aureus</i>					
		Plate	ND	ND	ND	NA
		Knife	ND	2.6	2.2	1.6
		Table mop cloth	4	2.8	1.9	2.9
		Hand towel	ND	2.0	1.6	1.2
		Hand rinse	ND	2.2	3.3	1.83
2.	<i>E.coli</i> & total coliform count (ECC)					
		Plate	ND	1.3	ND	0.43
		Knife	ND	1.3	1.4	0.9
		Table mop cloth	3.8	2.3	1.9	2.66
		Hand towel	ND	1.7	1.4	1.03
		Hand rinse	ND	1.7	ND	0.56
3.	Total plate count (TPC)					
		Plate	#	#	2.4	NA
		Knife	#	#	4.6	NA
		Table mop cloth	#	#	5.5	NA
		Hand towel	#	#	4.3	NA
		Hand rinse	#	#	5	NA

NOTE: - Value represents average of duplicate samples;- Values for hand rinse samples are expressed per ml, and values for knife sample are expressed per cm²;- R = Restaurant; ND = Not detected; # = Not done; NA= Not applicable.

Table 5: *E.coli* O157:H7, *Salmonella* and *Shigella* counts of samples indicative of personal hygiene of the staff and unit hygiene of the restaurants.

Sr.No.	Parameter	Samples	Log ₁₀ Counts (CFU/9cm ²)			
			R ₁	R ₂	R ₃	Average
1.	<i>E.coli</i> O157:H7					
		Plate	ND	ND	ND	#
		Knife	ND	1.0	1.0	0.66
		Table mop cloth	ND	1.3	1.3	0.86
		Hand towel	ND	ND	ND	#
		Hand rinse	ND	ND	ND	#
2.	<i>Salmonella enteritidis</i>					
		Plate	ND	ND	ND	#
		Knife	ND	ND	1.0	0.33
		Table mop cloth	3.79	ND	ND	1.26
		Hand towel	ND	1.6	1.3	0.96
		Hand rinse	ND	ND	ND	#
3.	<i>Shigella flexneri</i>					
		Plate	ND	ND	ND	#
		Knife	ND	ND	1.0	#
		Table mop cloth	ND	2.27	1.6	1.29
		Hand towel	2.0	ND	ND	0.66
		Hand rinse	ND	1.6	ND	0.53

Note: - Value represents average of duplicate samples;- Values for hand rinse samples are expressed per ml, and values for knife sample are expressed per cm²;- R = Restaurant; ND = Not detected; # = Not done.

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TITLE - HANDLER'S HYGIENE PRACTICES IN SMALL RESTAURANTS OF VADODARA

Authors Information:

Full name – Dr. Mini Sheth

Affiliation- Associate Professor

E-mail address – mkss7@hotmail.com

Full international contact details – Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India

Brief professional biography- Myself, Dr. Mini Sheth (Registered Dietitian) is currently working as an Associate Professor and Deputy Director WHO collaborating centre of Vadodara, Gujarat. I have been teaching and carrying out research activities in food safety, prebiotics and probiotics, fats and oils for more than 24 years in the Department of Foods and Nutrition. I obtained my Ph D degree in Foods and Nutrition in 1994 and thereafter I have undergone UNESCO training program.

I have been recognized as member of Task force on Probiotics, by the International life science Institute (ILSI) India, Since February 2009, as well as fellow of Hind Agricultural and horticulture society in December 2008. Am on the editorial board for Asian journal of home science and also review papers for Journal of food safety, and Journal of food science and technology.

I have successfully completed 3 year research project sponsored by World Bank on the “Capacity building Food service providers on Food Safety”, of the Ministry of Health and Family Welfare, Government of India (2005-2008) as well as have undertaken projects on “Testing of Soy based high protein *dal* (split legume) like extruded product for preparation of indigenous food items and “Nutrient content and Shelf quality of pickles and developing nutrition labels for various Indian pickles”.

I have so far published 35 research papers in peer reviewed journals as well as written articles for books. A book entitled “training manual on food safety for food service providers” has been recently published. I have several awards for best paper presentation at International forum. I have attended several conferences including the first UK International Conference on functional foods at Oxford Brookes field University at UK held on 25-26 Nov 2010.

Full name – Ashima Gupta

Affiliation- PhD scholar

E-mail address – ashimafoodee@gmail.com

Full international contact details – Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India

Brief professional biography- Presently I am pursuing PhD in Foods and Nutrition from Department of Foods and Nutrition, Baroda. Completed M.Sc. in Food technology in 2007

Full name – Tejal Ambegaonkar

Affiliation- M.Sc. (Foods and Nutrition)

Full international contact details – Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India

Brief professional biography- She has completed her M.Sc in Foods and Nutrition from Department of Foods and Nutrition, Baroda.