

Full Length Research Paper

An overview of food safety knowledge and practices in selected schools in the city of Al Ain, United Arab Emirates

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Safe food handling in school canteens is an important practice to protect the students from food borne illnesses. The main purpose of this study was to present an overview of food safety knowledge and hygienic practices in selected schools in Al Ain city in the Emirate of Abu Dhabi, United Arab Emirates. The study consisted of three parts. The first part tackled students' and teachers' behavior during breakfast snack in addition to a quick assessment of premises from a food safety point of view. The second part focused on food safety knowledge and practices among students and teachers while the third part dealt with assessment of microbiological contamination of food contact surfaces and hands of students, teachers and food handlers. Results showed that only four school out of eight (50%) keep foods at 5°C or below. With respect to cleanliness of refrigerators, six out of eight schools visited (75%) do not clean their refrigerators enough. For personal hygiene, it was observed that 37.5% of respondents do not wash their hands properly after using toilet. This behavior may expose students to bacterial food poisoning such as salmonella and staphylococcus, which result into vomiting and severe abdominal pain. For the second part, results showed that 60.3% of respondents eat their meal in school playground. Utilization of playground for eating and physical activity simultaneously may expose the area to more dust, which serves as a potential source of contamination. For the microbiological evaluation of surfaces and hands of students and food handlers, the study revealed that although the general microbiological conditions were normal, the presence of *Escherichia coli* and *Staphylococcus aureus* on hands of students, food handlers and even teachers was worrying. In survey questionnaire to assess food safety knowledge, 87% of the participants expressed their appreciation of the importance of food safety.

Key words: Food Safety, personal hygiene, *Escherichia coli*, *Staphylococcus aureus*.

INTRODUCTION

According to the World Health Organization, 1.8 million people died from diarrheal diseases in 2005 alone and most of the cases were associated with ingestion of contaminated food and drinking water (WHO, 2007).

Since food is one of the primary sources of disease transfer, meals prepared and supplied in schools require great attention because the intended users are young children who are more susceptible to food-borne illnesses

with limited choices (Soares et al., 2012). Aziz and Dahan (2013) described school children as captive consumers who are usually not able to buy food from external sources during school hours. Despite the greater care needed, several food-borne disease outbreaks in schools continue to be reported (Nicholas et al., 2002). Marzano and Balzaretto (2013) reported a Salmonella outbreak which occurred in schools in France, involving 544 adolescents (<20 years old). Further investigations identified frozen beef burger as the cause of the outbreak. Marzano and Balzaretto (2013) also reported an outbreak in Germany involving more than 11200 students. The outbreak was described as one of the largest foodborne gastroenteritis in Germany with several hundred schools affected. Laboratory analysis on patients showed that many of the victims were infected with noroviruses where the source of the norovirus was identified in deep-frozen Chinese strawberries (Robert Koch Institute, 2012). From epidemiological point of view, there are several causes of food borne disease outbreaks. Su et al. (2005) reviewed the food borne disease outbreaks due to bacteria in Taiwan from 1995 to 2001 and found that most common bacteria involved were *Vibrio parahaemolyticus*, *Staphylococcus aureus*, and *Bacillus cereus*. Paulson (2000) and Green et al. (2006) reported that hygiene of food workers could be a critical factor in spreading food-borne illnesses in the food service environments. Therefore, in order to minimize the chance of food borne disease occurrences, Gibson et al. (2002) reported that hygienic food preparation and education of those involved in the preparation, processing and serving of meals are crucial. In the kitchen, cutting boards may cause cross-contamination if not adequately sanitized (Sneed et al., 2004; Staskel et al., 2007). The sink drain area of the dishwashing sink, the hand-washing sink, spout handles and the handle of garbage lid are also among the most common sources of bacterial contamination (Staskel et al., 2007). From the literature reviewed, it can be seen that food safety handling practices at various establishments including schools have been well studied in many places, however in the United Arab Emirates, no such study has been done to the best of our knowledge. For this reason, the first objective of this study was to generate a general idea about food safety handling and practices in schools of the city of Al Ain in the Emirate of Abu Dhabi; while the second objective was to use this information as a base to promote food safety attitudes in the school system in the Emirate of Abu Dhabi in future.

MATERIALS AND METHODS

Eight public schools from the city of Al Ain were randomly selected

for the survey. After selection of schools, a letter of consent was written to each school administration seeking for approval to participate in the study. The chosen schools provide foods in the form of snacks to their students such as cheese croissants, chips, chocolate and juice. These foods are usually served between 8 to 9 am. The foods are considered low risk foods. However, if not handled properly, they can pose considerable risk to consumers. For this reason, the assessment was made specifically for personal hygiene of students, teachers, handlers and serving conditions in which foods are handled before delivering to consumers.

Design of the study

The design of the study consisted of three sections. The first section was to observe food safety behavior of school children, teachers and workers handling food in addition to the assessment of general conditions of school environment. The second section was designed to evaluate food safety knowledge and practices among students and teachers in the selected schools. Finally, the third section dealt with the assessment of microbiological contamination of food contact surfaces and hands of students, teachers and food handlers.

Observation of food safety behavior in schools

Here, observations were made about food safety practices and personal hygiene adopted by students and teachers during their breakfast snack. Conditions of facilities were also observed. In this part, four observable practices were used to evaluate temperature time control during storage and serving food. Seven elements were directed to personal hygiene of food handlers and students. Two elements evaluated cafeteria design while utensils used for serving food were evaluated in two practices. Pest control method being applied was evaluated in three observable practices. The list of observable points is detailed in Table 1.

Assessment of food safety knowledge and practices

Based on the recommended food handling practices, a set of questionnaire was prepared and administered in selected schools by a team of three female students. The questionnaire consisted of demographic information, interest in acquiring food safety knowledge, attitude towards hand washing and adopted food-handling practices. The details of questionnaire are shown in Tables 2, 3 and 4.

Microbiological assessments

The microbiological cleanliness of hands of teachers, students and other workers along with surfaces such as those of tables and windows was evaluated by swabbing as described in Yousef and Carlstrom (2003).

Media preparation

Phosphate buffer saline (PBS), egg yolk tellurite, violet red bile agar and MUG supplements were manufactured by Oxoid, (USA). Plate count agar, potato dextrose agar and Baird Parker agar were

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Table 1. Food safety and hygienic practices observed in the selected schools.

Observed practice	Yes	No	% of Yes	% of No
Temperature time control (a)				
Cold food held at 5°C or below	4.0	4.0	50.0	50.0
Refrigerator freed from dirt	2.0	6.0	25.0	75.0
Food stored in proper containers	5.0	3.0	62.5	37.5
Food is stored at least 6 inches off the floor	4.0	4.0	50.0	50.0
Personal hygiene of workers (b)				
Hands washed after use of the toilet	40.0	24.0	62.5	37.5
Workers wear clean and appropriate uniform	24.0	40.0	37.5	62.5
Gloves/utensils used/changed as needed	24.0	40.0	37.5	62.5
Worker observed washing hands as needed	32.0	32.0	50.0	50.0
Students wash their hands before and after meal	40.0	24.0	62.5	37.5
Worker take appropriate action when coughing or sneezing	40.0	24.0	62.5	37.5
Perfect conditions of hygiene, cleanliness and organization: With suitable products for personal hygiene	32.0	32.0	50.0	50.0
Cafeteria design (C)				
Suitable localization: Area free of unsanitary condition; absence of trash, old objects, pets, insects, animals, rodents.	4.0	4.0	50.0	50.0
Suitable door, windows: Smooth surface ,impermeable ,washable ,easy to clean	4.0	4.0	50.0	50.0
Services (d)				
Dishes are dry and clean	4.0	4.0	50.0	50.0
Smooth surface, easy to clean and disinfect and properly maintained in good working order	3.0	5.0	37.5	62.5
Pest control (e)				
Screens are on open windows and doors in good condition	5.0	3.0	62.5	37.5
Evidence of presence of pest	3.0	5.0	37.5	62.5
Foods protected against waste, spit ,insects and rodents	5.0	3.0	62.5	37.5

Table 2. Eating place, time and source of information of food safety knowledge.

Food safety knowledge	Score	%
Where are you eating your meal? n =146		
Class	23	15.8
School ground	88	60.3
Cafeteria	13	8.9
Teachers room	22	15.1
Total	146	100.0
When you eat your meal? n =146		
8-9 AM	16	11.0
9-10 Am	28	19.2
10-11 AM	102	69.9
Total	146	100.0
Have you ever read an article, magazines, or books on food safety? n = 153		
Yes	122	79.7
No	31	20.3
Total	153	100.0
Have you ever been suffered from food poisoning? n=149		
Yes	40	26.8
No	109	73.2
Total	149	100.0

Table 3. Hand washing attitude of students and teachers.

Hand washing attitude	Score	%
<i>Do you wash your hands after coming out from toilet?</i>		
Yes	143	96.0
No	1	0.7
Sometimes	4	2.7
Often	1	0.7
Total	149	100.0
<i>Do you wash your hand with water only</i>		
Yes	22	14.8
No	96	64.4
Sometimes	30	20.1
Often	1	0.7
Total	149	100.0
<i>Do you wash your hand with water and soap</i>		
Yes	125	83.9
No	3	2.0
Sometimes	20	13.4
Often	1	0.7
Total	149	100.0

Table 4. Food safety knowledge of students, teachers and sellers.

Food safety knowledge	Score	%
<i>Meal should not be left more than 4 h at room temperature</i>		
Accept	100	74.6
Do not Accept	8	6.0
I do not know	26	19.4
Total	134	100.0
<i>Insects and cockroaches are food contaminants.</i>		
Accept	140	95.2
Do not accept	5	3.4
I do not know	2	1.4
Total	147	100.0
<i>Meal handling practices</i>		
6-7 AM	3	6.1
7-8 AM	4	8.2
8-9 AM	42	85.7
Total	49	100.0
<i>Where do you store the meal?</i>		
Cafeteria	32	56.1
Refrigerator	24	42.1
Closet	1	1.8
Total	57	100.0
<i>Do you wear gloves in the process of selling?</i>		
Yes	10	16.7
No	47	78.3
Sometimes	3	5.0
Total	60	100.0

Table 4. Contd.

<i>What action do you take on remaining meal?</i>		
Throw it	32	65.3
Give it to students	13	26.5
Store it for next day	4	8.2
Total	49	100.0
<i>Response of students and teachers to the descriptive questions</i>		
<i>What are the causes of food poisoning?</i>		
Uncovered food	5	6.3
Uncooked food	3	3.8
Expired food	10	12.7
Unclean tools	5	6.3
Bad storage	11	13.9
Personal hygiene	6	7.6
Contaminated food	25	31.6
Bacteria and microorganisms	13	16.5
No food control	1	1.3
Total	79	100.0
<i>Comments about meals</i>		
Clean	44	86.3
Unclean	7	13.7
Total	51	100.0
<i>Comments about serving window</i>		
Clean	21	46.7
Unclean	24	53.3
Total	45	100.0

supplied by HiMedia India. All media were prepared as per manufacturer's instructions and sterilized at 121°C for 15 min.

Swabbing

By using sterilized cleansers, swabs were collected from the target surfaces and hands of students, teachers and food handlers serving foods. Length and width of the surfaces were measured by using scale. Test tubes were transported to laboratory in a cooler and immediately analyzed upon arrival.

Aerobic plate count

Aerobic plate counts (APC), yeast and mold count, and *S. aureus* determination were carried out according to the method outlined in (Yousef and Carlstrom, 2003). Colonies developed in the petri dish were counted by using colony counter and expressed as CFU/cm². *Escherichia coli* was investigated by the most probable number (MPN) technique. Tubes showing gas production in EC broth were streaked on Eosin Methylene blue (EMB) agar to confirm the presence of *E. coli*, which appears bluish with greenish metallic sheen on EMB plates.

RESULTS AND DISCUSSION

Description of the study population

One hundred and forty-seven respondents participated in

the study. The respondents lived in the city of Al Ain in the Emirate of Abu Dhabi and their age groups are shown in Figure 1. As shown in Figure 1, the majority of the population under study is between 16 and 19 years of age representing 48%. The second largest group falls between 12 and 15 years while 11% of them fall in the range of 20 to 25 years and only 8% of them are above 26 years of age.

Figure 2 shows educational profile of the study group. From the figure, it can be seen that most of the participants are secondary school students consisting 52% of the population. The primary school students represent 31% of the population while the remaining 17% consisted bachelors, diploma holders and postgraduate qualification holders representing teachers and workers.

Observation of food safety behavior in schools

Eight schools were randomly selected and approached. After the approval of administration, three female observers who were graduating students from the Department of Food Science, College of Food and Agriculture, United Arab Emirates University visited the schools for evaluating food safety behavior of students and teachers. The observers also inspected general

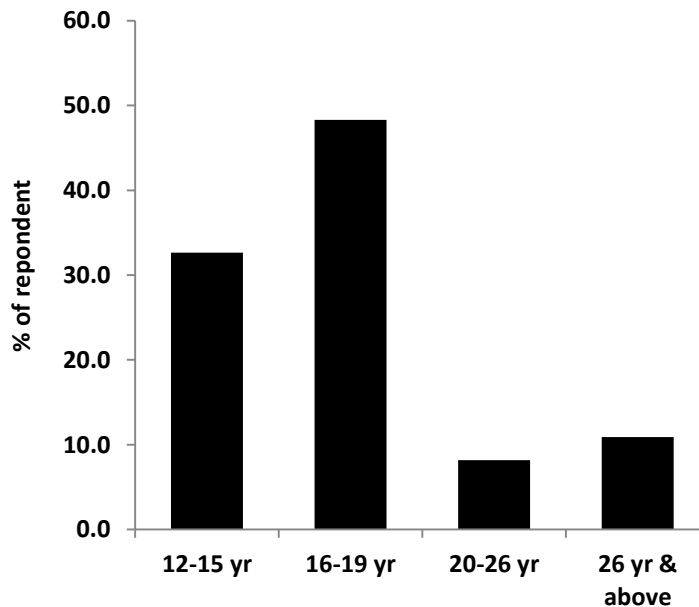


Figure 1. Age brackets of study group in percentage.

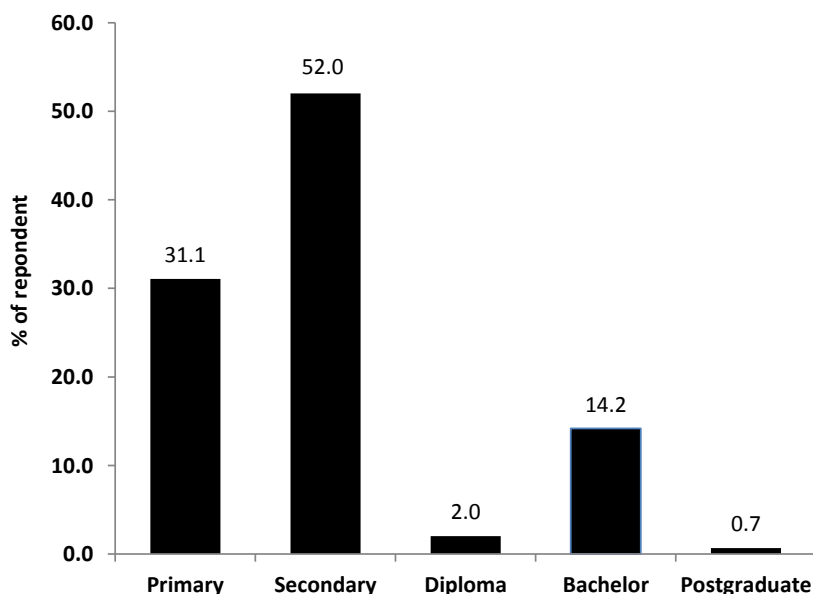


Figure 2. Educational profile of study group in percentage.

conditions of premises and facilities used to serve food from food safety point of view. Information recorded is presented in Table 1.

As shown in Table 1, refrigeratable foods were held at 5°C or below only in four schools (50%). With respect to cleanliness of refrigerators, six out of eight schools visited had unacceptable level of dirt in their refrigerators. Failure to keep food at the appropriate temperature and the inability to keep the refrigerators clean suggest that

participants have limited knowledge about the relationship between temperature and microbial proliferation and cross contamination. This observation is in agreement with what have been reported by Ovca et al. (2014). In a study to evaluate food safety awareness, knowledge and practices among students in Slovenia, the researchers reported that 57.2% of respondents do not pay adequate attention to the effect of temperature on microbial growth. When prepared food is not consumed

immediately, considerable number of respondents in the above-mentioned study (48.8%) reported that they do not keep the leftover food in refrigerator. In the event that the leftover food is to be re-heated in the kitchen, the process is far from ideal and most of them do not do it to the recommended temperature (Ovca et al., 2014). In a previous study conducted by Jevšnik et al. (2008) to evaluate consumer awareness of food safety, it was found that 43.7% of respondents do not know the temperature of their home refrigerator.

From the data shown in Table 1, it is clear that four out of the eight schools selected do not keep refrigeratable food at right temperature. Although they have refrigerators, six schools do not keep refrigerators clean. With regard to availability of storage facilities, it was observed that five out of eight schools visited were found to be storing foods in proper conditions. Remaining three schools did not keep foods properly in store. With respect to distance of food from the floor in store, Table 1 shows that in four schools, food is kept at least 6 inches above the ground level. However, there are four schools which do not apply this practice.

For personal hygiene, Table 1 shows that 62.5% of the people observed wash their hands after using the toilet. However, there are 37.5% who do not adhere to this important practice. Even those who are doing it need to be trained on how to do it properly. For the evaluation of cleanliness of workers, results showed that 62.5% of them were not only wearing unclean uniform but also were not changing gloves and utensils when needed. This observation is relatively lower than what had been reported by Santana et al. (2009) who found that 86.7% of the workers in the schools who participated in their study failed to have proper personal hygiene practices and did not use hair restraints or proper uniforms.

With respect to location and cafeterias-design (Table 1), four out of the eight schools visited had suitable location area which was free from unsanitary vicinity such as trash collection sites or exposed to roaming animal, pets and rodents. The other four schools were without proper location and exposed to various physical hazards. Similarly, the fixtures such as doors, windows and surfaces of working area in the cafeteria were not suitable in many schools. In a similar study conducted by Santana et al. (2009) in Brazil, the researchers found that the main food safety related problems of the schools were improper location, improper ventilation, free access by people who do not work in the cafeteria and areas of food contact surfaces not properly cleaned. The researchers also observed that poor lighting and unprotected window screen against insects were part of the identified problems.

In the schools visited, foods are served to students in dishes. Most of the time these dishes are not adequately clean to ensure that cross contamination is avoided. As an example, Table 1 showed that in four out of the eight schools visited, dishes were washed and dried in a

proper way; however, there were four schools in which this activity was not a routine. Regarding the appropriateness of material used for making contact surfaces, results showed that 5 out of eight 75% of school do not have smooth benches that can be easily washed and maintained properly. For pest control system, results indicated that the pest control system adopted by these schools is not robust enough to eliminate the potential source of pest invasion Table 1. In five schools out of the eight, evidence of the presence of pest is vivid. The proximity of some serving site of the schools to waste collection is also a real concern.

Assessment of food safety knowledge of students, teachers and food handlers in schools

In order to have a clear understanding about food safety knowledge and practice of the population under investigation, the present study investigated where these people eat their school meals during the break time. Results have shown that the majority of the respondents 60.3% eat their meal in school playground (Table 2). The school playground is an open place where students run and play during their break. The physical activity and big number of students moving around may expose the area to more dust and serve as a potential source of contamination. Therefore; from food safety point of view, the school playground may not be an ideal place to eat meal. The fact that majority of students eat their meal in an open place suggesting limited knowledge of food safety. In a study conducted by Ovca et al. (2014) in Slovenia to evaluate food safety awareness, knowledge and practice among students, it was found that only 65.8% of the students were able to give correct answers to the questions asked. These questions fell within the range of self-reported knowledge of respondents in this study. In another study conducted by Tan et al. (2013) to assess hand hygiene knowledge, attitudes and practices among food handlers at primary schools in Hulu Langat district, Selangor (Malaysia), the researchers reported 85.4% of the respondents under study have good hand hygiene knowledge, which is a critical part in food safety. A population of 94% was reported for cross contamination, followed by personal hygiene with a population of 79.9%. For the frequency of occurrence of food poisoning in this study, 73% reported that they never had suffered from food poisoning while 26.8% said they had suffered from the problem before and this percentage was twofold of what had been reported by Ovca et al. (2014).

With respect to source of information about knowledge of food safety, the majority of the respondents (80%) reported that they read article, magazine or books to enrich their food safety knowledge, which is a good practice.

For the assessment of hand washing practices, results

are presented in Table 3. A population of 96% of the respondents said they washed their hands after using a washroom. This value is much higher than what has been observed by the team of visitors who conducted this study 62.5% (Table 1). To find out whether water and soap were used to wash hands, Table 3 showed that 84% of the respondents confirmed that they used water and soap during hand washing. This value is comparable to what has been reported by Hassan and Dimassi (2014). In an assessment of Food safety and handling knowledge and practices of Lebanese University students, these researchers reported that 86.7% of the study population mentioned they wash their hands with water and soap. The proportion that uses only water to wash hands was 4.5% relatively lower than what has been found in this study 14.8%, Table 3.

When the respondents were asked to what extent, they have agreed with the statement that meals should not be left more than four hours at room temperature, 74.6% of them agreed (Table 4). However, in reality, the percentage reported by Abushelaibi et al. (2015) is much lower than that. In an evaluation of the effect of person-in-charge training program which was conducted by the Dubai Municipality, the researchers found that when a similar question was asked to food handlers, only 35.4% of them were able to give correct answer. For proper keep up of food establishment, 95.2% of the people who answered the questionnaire of this study said they hate insects and cockroaches in particular in food serving areas. When asked where they keep food, only 42% of those who answered the questionnaire said they keep food in refrigerator. The remaining 58% leave their food on the counter in the cafeteria at room temperature. Considering the high temperature in the United Arab Emirates which sometimes reaches 48°C, this practice could be very dangerous resulting in disease causing microbial proliferation. With respect to food handling practices, the self-reported hand hygiene finding is shown in Table 4. As it can be seen, only 16.7% of food handlers wear gloves while handling foods. This implies that more than 80% of them handle food with bare hands. Handling foods without proper gloves could be an important means of transmitting foodborne illness especially if hand hygiene practices are inadequate. In a similar study conducted by Tan et al. (2013) in Malaysia, it was reported that more than 90% of the participants wore gloves when touching ready to eat foods. This percentage is much higher than what has been found in our study. Therefore, the need to educate people on hand hygiene knowledge and practices in our schools is evident.

Like any other business, food sale is not same every day. Sometimes food prepared is not sold the same day and is stored until used. Therefore, proper actions are needed to be taken to ensure food being sold to consumers is fit for consumption. In order to have an idea about how food handlers manage the leftover food, the

food sellers were asked what action they usually take when food is not all sold. The answers received showed that 65.3% of sellers throw away the remaining food while 26.5% of them give it free to students. Only 8.2% reported they store it for the next day (Table 4).

Regarding the cause of food poisoning, the study investigated the understanding of school children and teachers about the major causes. The results are stipulated in Table 4. Here, it can be seen that people interviewed had different understanding about the causes of food poisoning. Some of them said exposing food to the external environment for long time is one of the problems associated with food poisoning. Others reported that inadequate cooking time or temperature is an issue. However, the majority of them 48.1% believed that contaminations and microbial agents like bacteria are the main causes. For the general comments on the meals that were being sold at the school, 86.3% of the people surveyed felt that meals were clean while 13.7% believed the meals were not clean enough. As far as the cleanliness of the serving windows are concerned, 46.7% thought the windows through which foods were served to students and teachers were clean while 53.3% held opposite view.

Microbiological assessments of personal hygiene of student, teachers and workers

In each of the eight schools visited, swabbing technique was conducted on hands of students, teachers and workers in addition to surfaces of serving windows and tables to evaluate the level of hygiene on these frequent potential sources of contamination. Results of microbiological analysis for aerobic plate count, yeast and mold, *E. coli* and *S. aureus* are shown in Table 5.

In all the schools, the average aerobic plate counts were relatively higher in workers hands 7.6×10^3 CFU/cm² than students and teachers with counts 10.6×10^2 and 6.1×10^2 CFU/cm², respectively. These aerobic plate counts were found to be much lower than those reported by Santana et al. (2009). In a similar study conducted in Brazilian public schools, researchers found that in some schools, values as high as 6 log cycles were found in the hands of food handlers. However, no contamination with *Staphylococci* coagulase-positive or thermo tolerant coliforms was observed. Aerobic plate count higher than 3 log cycle is considered as poor sanitary condition which means there are potential risks of the presence of pathogenic microorganisms. Close examination of results showed that in all the 40 swab samples taken, the bacterial loads were relatively high. In fact a microbial load as high as 7.5×10^3 CFU/cm² was found on the hand of one of the workers. For serving windows and surfaces of serving tables, the aerobic plate counts were 2.8×10^3 and 5.8×10^2 CFU/cm², respectively. Jevšnik et al. (2013) assessed bacteriological test of kitchen surfaces and participants' hands in Slovenia and reported high aerobic

Table 5. Results of bacteriological analysis of swabs for students, teachers and workers hands.

Swab (n= 8)	Aerobic plate count			Yeast and mold		
	No. of +ve	Lowest CFU/cm ²	Highest CFU/cm ²	No of +ve	Lowest CFU/cm ²	Highest CFU/cm ²
Student hands	8	<10	10.6x10 ²	2	1.5	1.7
Teachers hands	8	<10	6.1x10 ²			
Workers hands	8	<10	7.6x10 ³	2	2	16
Service window	8	<10	2.8x10 ³			
Service table	8	<10	5.8x10 ²	1	1	2

Swab (n=8)	<i>E. coli</i>			<i>Staphylococcus</i>		
	No. of +ve	Lowest CFU/cm ²	Highest CFU/cm ²	No. of +ve	Lowest CFU/cm ²	Highest CFU/cm ²
Student hands	1		1	2	1	2
Teacher hands	1		1			
Worker hands	1		2	1		2
Services windows						
Services table				1		3

Colony Forming Unit (CFU).

plate count on hands, kitchen counters and plastic dishes. For yeast and mold, swab samples from five schools showed presence of yeast and mold. The highest yeast and mold count of 16 CFU/cm² was found on the hands of a worker. This finding is similar to study conducted by Jevšnik et al. (2013) where they found considerable colonies of yeast and mold on knives for chopping meat.

On comparing, the microbiological load observed on the hands of students, teachers and workers in this study with other studies (Santana et al., 2009; Jevšnik et al., 2013) the loads reported here are not that high. However, the presence of *E. coli* and *S. aureus* on hands of students, food handlers and even a teacher is worrying. Coliform bacteria are important microbiological sanitary indicators which suggest there is a need for hygiene in processing and handling of foods. The presence of coliforms and *E. coli* may indicate fecal contamination because of lack of hygiene after using the toilet. Contaminated hands play a key role in carrying fecal flora from one host to another (Curtis and Cairncross, 2003). The hygiene and sanitary microbiological indicators can differ from one country to another. In the United Arab Emirates, the maximum limit is not known to the authors however, in places such as Slovenia, the law on specific measures of food poisoning and their prevention (Slovenian Official Gazette No. 24/1981) set the maximum number for aerobic plate count to 200 CFU per 20 cm². This number is much lower than what is reported in this study.

Conclusion

From the preliminary findings in the first part of the study, it can be noted that 37.5% of respondents do not wash their hands properly after using toilet. This revelation showed that proper personal hygiene is not adequately

maintained in the school visited. For the evaluation of cleanliness of workers, it was found that 62% of those who serve food were not only wearing unclean uniform but also were not changing gloves as recommended. This finding also is another important setback that needs attention. With respect to cleanliness of refrigerators, the majority of the schools 75% do not keep their refrigerators clean enough. For the second part, results showed that 60.3% of respondents eat their meal in school playground. Utilization of playground for eating and physical activity simultaneously may expose the area to more dust, which serves as a potential source of contamination. For the appreciation of the importance of food safety, it was found that 87% of those who participated in the study appreciated the importance of food safety in maintaining good health, which means they are prepared to actively participate in future food safety intervention programs. In the third part of the study, the microbiological evaluation of surfaces and hands of students and food handlers revealed that the general microbiological conditions although were not unusual but the presence of *E. coli* and *S. aureus* on hands of students, food handlers and even a teacher is worrying. It is worrying because it can expose students to bacterial food poisoning such as salmonella and staphylococcus, which result into vomiting and severe abdominal pain. Therefore, it can be concluded that there is a need of food safety intervention in the schools. The information gathers from this study suggests that, personal hygiene and keeping food at proper temperature should be the points of focus in any future food safety intervention activity.

Conflict of Interests

The authors have not declared any conflict of interests.

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