Comparative Studies on the Efficacy of Commercial Cleansing Agents Used in the Maintenance of Food Hygiene and Sanitation

Afsar Uddin Ahmed[1*], Marufa Aziz Khan[1] and Md. Shahid Sarwar[2]

[1]Institute of Nutrition and Food Science, Dhaka University, Dhaka-1000

[2]Department of Applied Chemistry and Chemical Technology, Dhaka University, Dhaka-1000.

Abstract

Four commercial cleaning agents (CA) viz. VIM, TRIX, FLEX and crude Ash for cleaning crockeries were tested for their efficacy. Of the 4 CA, 2 were manufactured by the multinational companies, one was locally manufactured and the crude Ash (burnt plant material) was prepared locally and collected from hawker. Full rice plate, small curry bowl and tea-cup of ceramic, spoon of stainless steel and drinking water glass of glass material were used as test crockeries. The inner surfaces of the test crockeries were rinsed with sterile water. The rinsed water of before-wash and after-wash with test CA were cultured on PCA and MacConkey media. Standard plate count and coliform count was made. The total counts of bacteria showed that VIM did not work at all. Remarkable reduction of bacterial load was observed in case of TRIX. Almost similar results were recorded in case of FLEX. Ash reduced the load moderately. In before wash coliforms were lesser in number in all the crockeries. However, the after wash counts were further reduced by all the CA but mostly by crude Ash.

Key Words : Cleansing Agents, Efficacy, Food Hygiene.

Introduction

Specific cleansing agents are used in the cleaning of crockeries, food preparation and processing sites, utensils and equipments. These are some chemical compounds, or mixtures of compounds which are usually prepared for the removal of food soils and microorganisms enmeshed in it. Although, plain, soft and clean water is the universal cleansing agent or as solvent[6], yet it is not adequate to maintain the standard of hygiene and sanitation of food industries or such places as domestic kitchens. In the cleaning process microorganisms adhered to the surface of an object are reduced and reached to a safe level. The function of cleansing agents is to reduce the surface

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*Author for Correspondence

tension of water and allow it to reach every nook and corner and reacts with the organic soil, emulsify them, make them loose and finally dislodge them while rinsing[3]. Without knowing the nature and characters about the cleansing agents and the nature of soil to be removed, their use will never fulfill the purpose. Therefore, the efficacy of the cleansing agents are to be checked through various tests. Solubility, p^H, buffering ability, sequestering power of the compounds in both the dry and liquid forms are considered as the efficacy of any cleansing agents[6]. Anon (1976) stated that surface characteristics should be considered when selecting a cleaning compound and cleaning method, because it dramatically affects the cleaning requirements[1].

Choice of cleansing agents, the wide variety available on the market is confusing for the user. No one of them is ideal and more depends on the method by which they are applied than on the choice of a near-perfect agent. In general the costly, fancy cleansing agents of unusual perfume or colour should be avoided as unnecessary[2]. Plentiful availability of these cleaning agents in the market as well as purchase ability for the common people must the considered in this regard.

Materials and Methods

Cleansing Agents

To test the efficacy, four commercial cleansing agents, 2 from local and 2 from multinational companies were selected. The compositional descriptions of the cleansing agents were not found on the cartoons and packages. Ash, a traditional cleansing agent made from burnt unknown plant materials was collected loose from hawker. The samples were tested without further processing. Table-1 shows the information about the samples:

Table 1. Description of the cleansing agents

Name of cleaning agents	Manufacturer	Composition	Physical nature & smell	p^H
VIM (Trade name)	Lever Brothers Bangladesh Ltd.	Unknown	Solid powder, lemon flavor	8.0
TRIX (Trade name)	Reckitt & Colman Bangladesh, Ltd.	Unknown	Lequid, mint flavor	6.0
FLEX (Trade name)	Manola Bangladesh Ltd.	Unknown	Lequid, Lemon Flavor	6.0
Ash	Locally from hawker	Crude ash from burnt plant materials	Powder, no smell	7.5

[a] The chemical composition available on the package.

P^H of the cleansing agents

Tested cleaning compounds were 'VIM', 'TRIX', 'FLEX', and ash. Since 'VIM' & 'Ash' are in powder form the p^H was checked by adding 10ml of distilled water to 1 gm of the sample. The p^H was recorded by p^H paper [Merck (India) Ltd.]. 'TRIX' and 'FLEX' are in liquid form, so they were checked directly. Table-1 shows the p^H of the test cleansing agents.

Crockeries

The tested crockeries were the full rice plate, the tea cup and the small bowl of ceramic, the spoon made of stainless steel and glass. These were collected from a Dhaka University Students' Hall.

Culture Media

The plate count agar (PCA), was used for the detection of total bacterial count and the MacConkey agar medium (Dehydrated media from Difco, USA) was used for the detection of the coliforms. The media was sterilized by autoclaving and 10-12 ml of sterilized media was the poured into the sterilized petri dishes. The media was allowed to solidify and kept the plates in the dryer in inverted position to dry the surface moisture. Dried agar surface allow the growth of the bacterial colonies discrete and separate and facilitate the counting of bacteria.

Efficacy test of the cleansing agents by bacterial count

Inner surface of the crockery was rinsed by 10ml of sterilized distilled water and was collected in a sterile conical flask. This was the sample considered as 'before wash'. The crockeries were then cleaned by the test-cleansing agents (Domestic kitchen amount) and rinsed by 10ml of sterilized water and was collected as before. This sample was considered as 'after wash'. Then 0.1 ml of the samples were inoculated on to the media and spreaded by sterilized glass spreader. The inoculated plates were incubated at 37°C for 24-48 hours. After incubation bacterial colonies appeared on the agar surface. The colonies were counted by colony counter or by nacked eyes.

Results

Table-2 shows the results of the standard plate count on PCA. The table shows both before-wash (BW) and after-wash (AW) counts of bacteria. The after-wash indicate wash with the test cleansing agents i.e. VIM, TRIX, FLEX and Ash. It was apparent from the table-2 that the count of BW of all the test

crockeries are more than those of AW. Both BW and AW counts were too numerous to count (tntc) in case of 4 crockeries i.e. tea-cup, small bowl, rice-plate and tea-spoon when cleaned by VIM. The BW and AW counts of glass and rice-plate were 192 and 123 respectively. The count of AW with TRIX, FLEX and Ash were lesser than that of AW with VIM. The BW count of glass was 256 and it was 00 when washed with TRIX. When the AW count of rice-plate with FLEX was 75, it was tntc at BW. Similarly when the AW count of rice plate was 35, it was 640 at BW.

Growth of the bacterial colonies on the MacConkey's agar were very few in case of all the test crockeries when the rinsed samples of both-BW and AW were inoculated. When VIM was used it was 12 of BW for glass and 19 and 3 for rice plate. From small bowl, the counts were 25 and 12 of BW and AW respectively when FLEX was used. With the same cleansing agent it was 56 and 34 from the rice plate. When ash was used for the rice plate the BW and AW count was 72 and 7 colonies respectively. However, the remaining samples showed no growth of coliforms on the MacConkey plates. After the microscopic observation of the gram stained slides of the colonies on MacConkey agar, the gram negative rods were considered as most probable coliforms. Table-2 shows the results.

Table 2. Removal of bacteria (count) by cleansing agents on PCA plate

Cleaning agents		VIM		TRIX		FLEX		Ash	
Sample crockeries	**Materials**	**BW**	**AW**	**BW**	**AW**	**BW**	**AW**	**BW**	**AW**
Glass (drinking)	Glass	192	84	256	0	13	0	19	8
Cup (Tea)	Ceramic	tntc	tntc	198	49	39	12	29	8
Small bowl	Ceramic	tntc	tntc	143	38	52	28	14	12
Tea spoon	Steel	tntc	tntc	27	8	Not	done	27	9
Full rice plate	Ceramic	tntc	123	35	0	tntc	75	640	35

Table 3. Removal of bacteria (count) by cleansing agents on Mac-Conkey agar plate

Cleaning agents		VIM		TRIX		FLEX		Ash	
Sample crockeries	**Materials**	**BW**	**AW**	**BW**	**AW**	**BW**	**AW**	**BW**	**AW**
Glass (drinking)	Glass	12	0	0	0	0	0	0	0
Cup (Tea)	Ceramic	0	0	0	0	0	0	0	0
Small bowl	Ceramic	0	0	0	0	25	12	0	0
Tea spoon	Steel	0	0	0	0	0	0	0	6
Full rice plate	Ceramic	19	3	0	0	56	34	72	7

BW : Before wash
AW : After wash
tntc : Too numerous to count

Discussion

For the efficacy test of the cleansing agents in terms of the removal of soil attached to the crockeries the bacterial count of 'before wash' and 'after wash' by cleansing agents, were performed. The efficacy of cleaning agents relate with how much soil it can remove from surfaces. Since bacteria are enmeshed in the soil, during rinsing with the sterile water, subsequently inoculation, growth on agar surface and their counts reflect the efficacy. The results showed that in case of all the crockeries there were no marked reduction of bacteria, after wash by 'VIM which proved that it did not work at all, although it was highly alkaline. When 'TRIX' was used for the same utensils it was seen that the 'after wash' count was remarkably reduced which indicated comparatively more effective. Almost similar effect was recorded in case of 'FLEX'. Both the agents were in liquid form and mildly acidic in reaction ie. with p^H 6. Generally to clean the food soils, alkaline cleaning agents are required. The acidic cleaning compounds are used to remove inorganic soils eg. oxides of metals[3]. The fact is to be verified in the next programme.

Crude 'Ash' was alkaline in reaction with p^H 7.5. Its use gave rise the appreciable amount of reduction of bacterial load. Although ash was lesser alkaline than 'VIM', it worked better in the removal of soil with bacteria. However, the alkaline cleaners are more effective in the removal of soil than that of acidic cleaners[3]. But the present study showed the acidic cleaners are better than alkaline in terms of the reduction of bacterial load. This is happened due to the solubility of the compounds[3]. Since 'VIM' & 'Ash' are less soluble in water, they did not work properly. Hence, the efficacy of the cleansing agents depends on the solubility of the compounds as well[5].

In the study, Mac-Conkey agar plates were also used to detect the presence of coliform bacteria and their subsequent removal. From a BW sample of rice plate a number of 72 gram negative bacterial colonies were observed which indicated presence of most probable coliforms that greatly removed by ash. In another plate presence of some bacterial growths were also counted in case of after wash by 'Ash'. The ash itself may contain a high number of bacteria when it is prepared in unhygienic way. Therefore, use of crude ash is not always hygienic and safe from bacteriological point of view.

The crockeries, made of the materials were of ceramic, stainless steel and glass. Presence of glaze materials on the ceramic and glass surfaces and the surface of stainless steel were very smooth. However, the experimental results showed easier removal of soil due to the smooth surfaces of all the crockeries.

From the results of the study, it can be concluded that ashes of good quality (hygienic) are better in the cleansing of corckeries. This conclusion is based on the detergent action, easy and plentiful procurability and on its cheaper availability. Perfumed and coloured cleansing agent should be avoided since perfumes are suspect because they hide the bad smells which come from failures in cleaning.[4]

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