

The Public Household Waste Bins – Potential Source of Contamination

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Abstract

The aim of our study was to investigate for the presence of total and fecal coliforms on the hand contact surface of the public household waste bins placed near the blocks of flats. The samples were taken from five different areas of the city of Timișoara. According to the Order no. 119/2014, for the approval of Hygiene and public health standards regarding the population's living environment, this waste bins should be maintained clean by periodically washing and, considering that they serve for the temporary storage of household and food wastes, fecal coliforms are supposed to be absent from these surfaces.

From a total of 100 analyzed samples, 27% were positive for total coliforms and 6% for fecal coliforms. Only the samples taken from a single area were all negative for fecal coliforms. In the other three areas, we found 16% and twice 4% positive samples.

Analyzing the results, it can be assumed that the contact surface of these household waste bins might be a possible source of contamination with intestinal pathogens, for the people handling them.

Keywords: fecal coliforms, contamination, household waste bins

Introduction

There have been some studies which focused on showing the extent of microbial contamination of the various public surfaces (Reynolds *et al.*, 2005) and inside the home (Scott *et al.*, 1982), in order to assess the possibility of human illness occurrence, due to the potential pathogenic germs found on these surfaces. It has also been attempted to demonstrate the presence of pathogenic germs on the hands of certain social categories (Judah *et al.*, 2010) and of caregivers in hospitals, day care centers for the elderly and children, as well as their involvement in the etiology of certain transmissible diseases.

The aim of this study was to investigate for the presence of total and fecal coliform germs, on the hand contact surface of the public household waste bins, those which are placed near the blocks

of flats, from the city of Timișoara. Considering that this containers serve for the storage of household waste and food scraps and that they should met certain integrity, storage and salubrity conditions, including the maintenance of cleanliness by periodical washing (6), fecal coliforms are supposed to be absent from these surfaces.

Materials and methods

There have been analyzed 100 samples, taken from five different areas from city of Timișoara. Sample collecting was performed according to the procedure for sanitation samples, from the surface of the lid handles.

In order to evidence the presence of coliform bacteria, there have been done inoculations from the native sample (1 ml) into tubes containing 10 ml of simple strenght McConkey broth and

Positive results on Levine media

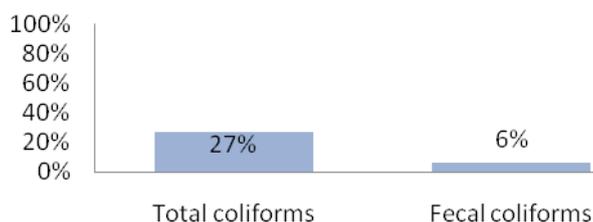


Fig. 1

Figure 1. Positive results on Levine media

Table 1. Results obtained after confirmation on Levine media

	Total coliforms	Fecal coliforms	Total number of samples
Area I	9 (36%)	4 (16%)	25
Area II	10 (40%)	1 (4%)	25
Area III	3 (12%)	0 (0%)	25
Area IV	5 (20%)	1 (4%)	25

an inverted Durham tube inside. After a 24 h incubation, at 37°C, for total coliforms and at 45.5°C, for fecal coliforms, we considered positive those tubes in which the gas was present, with or without changes in the color of the media. In order to confirm the presence of coliforms, it was necessary to inoculate Levine agar (EMB) plates from the presumptive positive tubes. On Levine agar, *Escherichia coli* produces small, dark blue-violet to black colonies, with a green metallic sheen.

Results and discussions

From a total of 100 analyzed samples, after confirmation on Levine media, 27% were positive for total coliforms and 6% for fecal coliforms (figure 1).

Since the intestinal microorganisms that can cause diseases in humans and can reach on certain surfaces exposed to human contact, vary in kind (bacteria, viruses, protozoa) and in number, it would be impossible to test for each pathogen. Also, in some cases, their identification might be expensive or might require elaborate work protocols. So that it is much easier to test for the presence of nonpathogenic intestinal organisms,

such as *Escherichia coli*. Because *E. coli* is a normal inhabitant of the intestinal tract and it is not normally found in water, soil and public surfaces (Țibru and Lăzărescu, 2013), its identification on certain surfaces exposed to human contact may suggest faecal contamination, due to non-complying with the elementary hygiene rules.

The need to confirm the presence of *E. coli* as an indicator for faecal contamination stems from the fact that, on McConkey broth, both *E. coli* and *Enterobacter aerogenes* ferments lactose with color-shifting of the media and gas accumulation in Durham tubes. Whereas *E. coli* is a bacteria of intestinal origin, with low resistance in the external environment, properties that makes it an indicator of recent faecal contamination, *E. aerogenes*, even if it has the same origin, is widely spread in nature, outside of the intestinal tract. However, recent studies confirm that certain strains of *E. coli* can survive for a long time and multiply in the extraintestinal environment, advocating their inclusion in the group of ubiquitous bacteria and thus diminishing their importance as an indicator of faecal contamination (1).

The results obtained after confirmation on Levine media, for each area, are shown in table 1. Regarding the total coliforms, it can not be made a precise correlation between the degree of contamination and the cleanliness of the bins, since the proportion of positive samples was higher in area II than in area I, the latter being considered as the most dirty in terms of the integrity of the bins, the presence of organic matter on the lids and handles and the way of storing the garbage in plastic bags.

Instead, faecal coliforms were found to be in the highest proportion in area I, where inappropriate storage of waste (disposable diapers discarded as such, without using a plastic bag) and lack of bin integrity, attracted vectors (pigeons), of which feces could be identified on the bin's contact surfaces. In the other three areas, however, the presence of organic matter on the surface of the handles could not be detected and yet there were positive samples in areas II and III, which could suggest a possible contamination of human origin.

Conclusions

Analyzing the results, we can state that the contact surfaces of the household waste bins

might be a possible source of contamination with potential pathogens of intestinal origin, for people handling them.

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