



## A Microbiological Study of Hygiene Maintained at Various Hostels of Chandigarh

### KEYWORDS

Hygiene, Hostels, Sources of Contamination, E. coli, Antibiotic Sensitivity test, Cell Surface Hydrophobicity

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### ABSTRACT

The present study was undertaken to assess the microbial load of hygiene maintained in Hostel kitchens. Samples were collected and *E. coli* was isolated from possible sources of contamination (Serving area, Nail, Knife, Hand, Dishcloth, Chopping board and Cooking utensil). *E. coli* strains were subjected to Antibiotic sensitivity test and SAT (Salt Aggregation Test). Metal ion resistance test was also conducted. Hygiene and cleaning practices followed by food handlers at Hostels were also surveyed. It was observed that only 36.84% food handlers were trained in food hygiene practices. Only 11.11% hostels follow daily overall cleanliness schedule and 63.15% of total Hostel kitchens were safe against rodents and insects. It was also observed that majority of food handlers washed hands before and after handling food (63.15%).

### Introduction:

Health and well balanced diet is essential for good health. Food safety issues have been the most wanted intervention in the field of nutrition all over the world. The major sources contributing to microbial contamination are the place of preparation, utensils for cooking and serving, raw materials, time and temperature abuse of cooked foods and personal hygiene<sup>1</sup>. It was also found that ignorance coupled with illiteracy of the personnel acts as a catalyst in the transmission of infectious organisms<sup>2</sup>. The contamination of foods, especially sliced fruits and vegetables is increased by unsanitary processing and preservation methods<sup>3</sup>. Wrong food safety practices of tertiary students living in hostels with self catering facilities and defects in their hostels may expose students to food borne diseases<sup>4</sup>. The type of food served in healthcare settings should be selected to minimize the risk of food borne infection<sup>5</sup>. *Escherichia coli*, a normal inhabitant of human gut, are one of the most commonly found bacteria in the community<sup>6</sup>. The food served at hostels are frequently associated with diarrheal diseases which occur due to presence of pathogenic bacteria, environmental contaminants and disregard to good hygienic practices (GHPs). Such foods have shown to be potential sources of bacterial pathogens notably *E. coli*. Therefore, it is essential to assess the knowledge and practice and help them to understand the importance of hygiene. So, a research was conducted to make a Microbiological study of hygiene maintained in various hostels of Chandigarh.

### Sample Collection:

Nineteen hostels of Panjab University and Home Science College were surveyed to fulfill our objective. A questionnaire on hygiene and cleanliness practices followed in hostel kitchens was made and filled in by interview method. The workers were interviewed regarding the hygiene practices followed by them.

### Bacteriological Analysis:

Samples of swab were aseptically collected from the hostels in sterilized tubes and immediately brought to the laboratory for further analysis. The inoculums from the samples were grown on Mac Conkey's agar for 24 hours at 37°C. The dark pink, non-mucoid lactose fermenting colonies were picked up and the cultures were further purified

by the plate streak method on EMB agar. The purified cultures were identified on the basis of colony morphology, gram staining and specific biochemical tests<sup>7</sup>. The isolated colonies were picked up with the help of inoculating needle and incubated in sterile nutrient broth. The broth was incubated for 24hrs; the culture was streaked on nutrient agar slants and incubated at 37°C for 24hrs. The cultures were maintained on nutrient agar slants, which were stored at 4°C in the refrigerator. Sub culturing was done after every 15 days. The sensitivity pattern of *E. coli* isolates was determined against selected antibiotics. Salt Aggregation Test was conducted to determine the hydrophobicity of *E. coli* isolated from swab samples from possible sources of contamination. Minimum inhibitory concentration was also determined.

### Data Analysis:

In order to determine the correlation of multi drug resistance with cell surface hydrophobicity, the chi-square test was applied.

### Result:

The hygiene maintained in hostel kitchens is an important public health issue. The food served gets easily contaminated, mainly due to negligence in the process of cutting, cooking, handling or serving of food. A total of 85 swab samples were collected from various hostels.

### Isolation of *E. coli*

Although most strains of *E. coli* bacteria are harmless and live in the intestines of healthy humans and animals, yet several strains can produce powerful toxins and cause severe illness in humans<sup>8</sup>. Out of 85 samples, *E. coli* was isolated from 68 samples.

### Antibiotic Sensitivity test<sup>9</sup>

Sixty five strains of *E. coli* were subjected to antibiotic sensitivity test. For this purpose 5 different antibiotics namely ampicillin, chloramphenicol, erythromycin, gentamycin and nalidixic acid were used.

### Cell Surface Hydrophobicity

A total of 65 strains of *E. coli* were subjected to the salt aggregation test (SAT) for determining the incidence and degree of cell surface hydrophobicity. Out of 65 samples

were tested in laboratory 62 samples showed hydrophobicity towards 3.2M Ammonium sulphate.

**Metal Ion Resistance**

The *E. coli* strains isolated were subjected to varying concentrations (20 µg /ml, 40 µg /ml, 60 µg /ml, 80 µg /ml, and 100 µg /ml) of silver nitrate and mercuric chloride to determine their minimum inhibitory concentration towards *E. coli*.

At lowest concentrations of metal ions tested (20µg/ml), 87.7% and 89.23% strains were resistant towards silver nitrate and mercuric chloride respectively, whereas at the highest concentration tested (100µg/ml), 20% and 16.9 % strains were found resistant to silver nitrate and mercuric chloride respectively.

Hygiene practices followed by food handlers in kitchens of Hostels in Chandigarh:

The employees of various hostels were interviewed regarding cleaning and hygienic practices followed by them. Only 63.15% of the kitchens were safe against rodents and insects. A large number of hostels, that is, 14 out of 19 (73.68%) used dustbin with a lid. Furthermore daily cleaning schedule was followed by only 11.11% of the hostels. For wiping purposes, most of the food handlers (63.15%) used cloth duster. Usage of soap/ detergent and water was noticed in 42.1% of food handlers for washing hands. Work surface was cleaned everytime after using it by 36.84% food handlers and two times a day by 42.1% of food handlers. The serving area was cleaned before and after serving everytime by 9 out of 19 (47.36%) in the Hostels. Moreover Non- Perishable foods are stored in tightly closed jars by 31.57% of the Hostel workers and perishable foods are kept in refrigerator by 36.84% of the food handlers.

Figure 1 shows the comparison between various hostel kitchens regarding the aspects of workers trained in food hygiene, safety of kitchen against rodents and washing hands before and after handling food. Girls' hostel kitchens of P.U. showed highest percentage of safety of kitchen against rodents and insects, boy's hostel kitchens of P.U. showed highest percentage (50%) in workers trained in food hygiene while 100% of workers of Home Science College washed hands before and after handling food.

**Figure 1: Comparison of cleaning practices followed by workers between various hostel kitchens.**

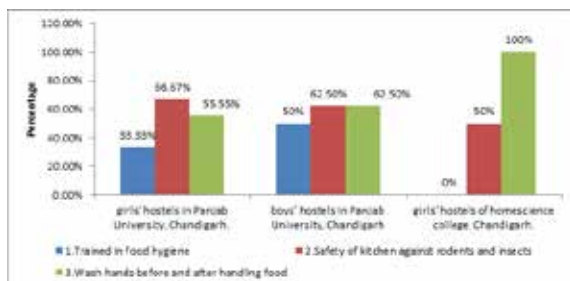


Figure 2 depicts the storage conditions of non-perishable foods. 100% of hostel kitchens of Home Science College, 55.55% of Girls' hostel kitchens and 62.5 % of Boys' hostel kitchens of P.U. use closed packets for storing these in cupboards. Tightly closed jars were used in 33.33% and 37.5% of kitchens of Girls' and Boys' hostels of Panjab University respectively.

**Figure 2: Storage conditions of non-perishable foods in various types of hostel kitchens.**

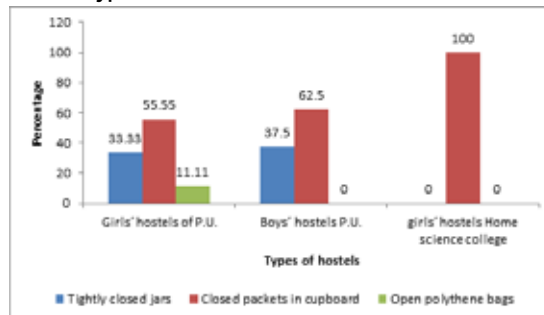
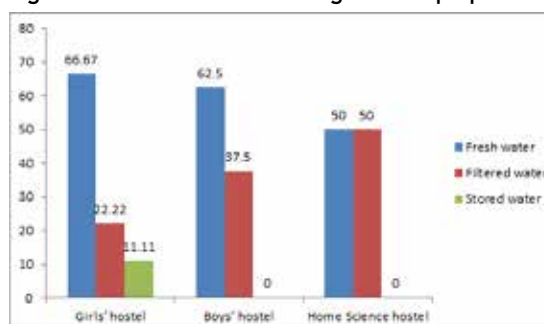


Figure 3 shows the comparison of sources of water being used to prepare food. 66.67% of Girls' Hostel kitchens used fresh, 22.22% used filtered and 11.11% used stored water for preparing foods. 62.5% of Boys' hostel kitchens used fresh water and 37.5% used filtered water while 50% Hostel kitchens of Home Science College used fresh and 50% used filtered to prepare food.

**Figure 3: Sources of water being used to prepare food.**



**Summary and Conclusion:**

Food can easily transmit diseases from person to person as well as serve as a growth medium for bacteria that can cause food poisoning. Food-borne diseases are certain to occur if cleanliness and sanitation aspects are not given priority *E. coli* was isolated in 68 out of 85 swab samples. In our study, high contamination was seen in hands, nails, dishcloths and chopping boards of food handlers. The risk of bacterial food-borne disease also increases when food is prepared in communal kitchens, as in student accommodation, youth hostels and shared homes. This increase may be due to the number of individuals using the kitchens, the lack of feeling of responsibility and the differing standards of hygiene of the users of these kitchens<sup>11,12</sup>. The manifestation of disease is an outcome of offending properties of host and virulence attributes of a pathogen. Therefore, the virulence characteristics of the *E. coli* isolates from various swab samples were screened for cell surface hydrophobicity, resistance to common antibiotics and heavy metal ions. During our data collection, we also imparted knowledge of hygiene and sanitation and food safety measures because the best way to ensure safety of food is by strict control and hygiene at all stages of manufacture and distribution coupled with consumer education.

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