An Assessment of Oral Health Risk Associated with Handling of Currency Notes

Nagesh Bhat, Surekha Bhat, Kailash Asawa, Anil Agarwal

Abstract

Background: The objective of this study was to identify the micro-organisms present on the currency notes circulating in Nashik city. Materials and Methods: A total of 25 currency notes (Five of each Rs 5, Rs 10, Rs 20, Rs 50 and Rs 100) were randomly collected from open-air markets, milk-parlors, food-vendors, beggars, banks and petrol bunks. Persons handling the notes were asked to deposit them in sterile envelopes. The notes were taken to the laboratory immediately and micro-organisms were identified using standardized microbiological techniques.

Results: Micro organisms were isolated from 100% of the currency notes. Mainly three species were isolated, namely Escherichia coli, Proteus spp. and Staphylococcus aureus. Conclusion: Infected currency was identified as a potential public health hazard, as pathogens could spread by circulating banknotes. We recommend that currency notes must be handled with caution.

Keywords: Currency Notes, Paper Currency, Contamination

Introduction

Money, whether in the form of coins or paper notes is perhaps the most widely handled article by people everyday throughout the world. Money exchanges several hands each day. They go through clean & dirty hands(1). It is used for every type of commerce, from buying milk at a local store to trafficking in sex & drugs. All this trade is hard on currency, with lower- denomination notes receiving the most handling because they are exchanged many times(2). Contamination may occur during production, during storage after production, & during use. Microorganisms on the skin can be transferred from cashiers, salespeople & the general public to the currency notes that they handle. Contamination from the anal region, wounds, nasal secretions & aerosols generated by sneezing & coughing are potential sources of transfer of microorganisms to currency notes during handling(3).

Currency contamination is of importance to public health as it can provide a vehicle for easy transmission of pathogens between handlers. Bosch & Steyn showed that 90% of south-African bank notes in circulation in 1997 were contaminated with either bacteria or fungi(3). Concern over communicable diseases is giving a new meaning to the term “Dirty Money”. In response to the SARS outbreak, banks in China have begun disinfecting their currency notes. Paper money is “quarantined” for 24 hours before it is re-circulated. Researchers at the Regional Sophisticated Instrumentation Center (RSIC) at the North Eastern University in Shilong, India, who examined Indian banknotes, found germs which can cause Tuberculosis, meningitis, tonsillitis, peptic ulcers, throat infections, genital tract infections etc. The bugs from banknotes infect the body through
scratches on the hands or when the hand touches the mouth or nose(4).

There are only few studies conducted to detect oral health risk associated with handling of currency notes. Hence, this study is undertaken to detect the microbial contamination of currency notes in circulation in Nashik city.

Materials and methods

A total of 25 currency notes of denominations five notes each Rs. 5, Rs. 10, Rs 20, Rs 50 and Rs 100 in circulation were randomly collected at different times. Coins were excluded from the study. Currency notes were obtained from supermarkets, traders and buyers in open-air markets, milk-parlors, food-vendors, residential homes, pan-vendors, shoe-makers, beggars, banks and filling stations in Nashik city. Persons handling the notes were asked to deposit them in sterile envelopes. They were compensated with other currency of same denomination.

The notes were taken to the laboratory immediately, picked from the envelope with sterile forceps, rolled them, and immersed in 10 ml of nutrient broth in a test-tube and then incubated at 37°C for 24 hours. For bacterial isolation, a loop full of the incubated nutrient broth was then inoculated onto MacConkey and Nutrient agar plates and incubated for 24 hours at 37°C. Colonies on MacConkey agar and nutrient agar were identified as per Grams staining standard techniques.

Results

Of the 25 notes subjected to culture, all the notes (100%) obtained from various sources were contaminated with bacteria. Three different species were isolated. Escherichia coli were present on all the 16 (64%) notes, Proteus on 4 (16%) notes and Staphylococcus aureus on 5 (20%) notes (Table 1).

<table>
<thead>
<tr>
<th>Bacterial species</th>
<th>Rs.5</th>
<th>Rs.10</th>
<th>Rs.20</th>
<th>Rs.50</th>
<th>Rs.100</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No growth</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bacillus spp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Micrococcus spp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>(64%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klebsiella spp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Proteus spp.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>4(16%)</td>
</tr>
</tbody>
</table>

Table 1: Relative occurrence of bacterial species on currency notes in circulation in Nashik city.

Discussion

The present study collected the notes from various sources such as milk-parlors, vegetable vendors, beggars, local markets, supermarkets, banks and filling stations which is in accordance with the previous studies (3, 5-7). Hundred percent of the notes analyzed were found to be contaminated which is not observed in any of the previous studies. Currency notes of lower denominations (Rs.5, Rs.10) were the most contaminated and this is consistent with previous studies(1, 3). This is expected, as lower denomination notes pass through more hands than the higher denomination.

The frequency of occurrence of Escherichia coli was the highest in the present study (64%) which indicates the presence of fecal contamination via cross-contamination with raw products or poor personal hygiene. Common unhygienic practices in the open-air markets in rural areas, where traders and buyers eat market products after handling contaminated currency notes, may place the individuals at risk of ingesting enteropathogens(3). In contrast, isolation of E. Coli was only (17.5%)(8), (10%)(7) and (7%)(2) in the previous studies. A study on fate of fate of Escherichia coli O157:H7 and salmonella enteritidis on currency suggested that
coins could serve as a potential vehicle for transmitting both E. Coli O157:H7 and salmonella enteritidis(9).

The other isolates found in the present study were Staphylococcus aureus (20%) and Proteus (16%) which is approximately the same as reported in the previous reports (1, 6-8). Moreover, less number of bacteria was observed in the present study than was earlier recorded (1, 3, 6, 7).

**Conclusion**

This study has shown that currency notes in circulation in Nashik city are contaminated with potential pathogens and those users and handlers of the notes are the sources of contamination. Although there is no direct evidence that presence of microorganisms on currency results in infection, but still the strategies must be adopted to reduce the contamination of currency(7).

We therefore advocate a greater sensitivity in the handling of money. The general awareness about the possibility of acquiring infection while applying saliva on fingers for counting currency notes; and practicing good personal hygiene should be created in the public. Hygienic measures such as a thorough hand-washing with soap after shopping should be observed. The practice of keeping money in brassieres, handkerchiefs and in shoes should be discouraged. Regular disinfection of currency in bank by exposing to U.V. rays or fumigation has been wisely suggested(7). Public education on proper handling and care of currency is advocated, in order to reduce currency contamination.

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