SHORT COMMUNICATION ISOLATION AND CHARACTERIZATION OF BACTERIAL FLORA FROM INDIAN CURRENCY CIRCULATING IN DEHRADUN, UTTARAKHAND.

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ABSTRACT

Currency is one of the potential vectors to transmit diseases as it harbours various microorganisms on its surface. Money is widely circulated and can be contaminated with disease-causing microorganisms especially if handled with unclean hands, or kept in dirty surroundings. In the present study paper notes and coins were collected in sterile plastic bags from three different locations in Dehradun, Uttarakhand: bus stop, hospital and street food vendor to isolate and characterize bacteria present on the surface of currency. The bacteria isolated from the currency collected belonged to Bacillus, Pseudomonas, Klebsiella, Micrococcus and E.coli genera.

KEYWORDS: Indian currency, disease-causing microorganisms, Bacillus, Pseudomonas, Klebsiella, Micrococcus and E.coli.

INTRODUCTION

Indian currency is widely handled by from low to high society people circulating every day in various different locations. Currency surfaces which harbour microbes might act as fomite and thus plays an important role in the transmission of disease-causing microorganisms. This
route of transmission of bacteria is of great importance for health in developing countries, like India where the frequency of infection is general indication of local hygiene and environmental sanitation levels. Survival of various microorganisms on paper money and coins indicate that currency use represents a potential cause of sporadic cases of food borne illness reservoir (Prasai et al., 2008).

Currency is generally contaminated through human unhealthy activities and extensive exchange among humans in day to day activities. The main bacterial flora reported were *E. coli*, *Pseudomonas* sp., *Klebsiella* sp., *Streptococcus* sp., *Staphylococcus* sp., *Salmonella* sp., *Enterobacter* sp. and *P. mirabilis* (Barolia et al., 2011; Borah et al., 2012; Elumalai et al., 2012; Pradeep et al., 2012). Fungus like *Aspergillus niger* and *Fusarium* were also isolated from Indian notes (Rote et al., 2010; Abirami et al., 2012). *E.coli* 0157:H7 and *Salmonella enteritidis* can survive for up to eleven days and up to nine days respectively on the surfaces of currency, thus making it possible for currency to transfer bacteria to human hands (Kuria et al., 2009). Bhat et al. (2010) reported that bacteria on currency surface can cause tuberculosis, meningitis, tonsillitis, peptic ulcers, throat infections, genital tract infections.

**MATERIALS AND METHODS**

**Sample collection:** Paper currency of Rs.10 and coins of Rs. 5 denominations were collected, randomly in triplicates from three different sites of Dehradun, Uttarakhand viz., hospital, street food vendor and bus stop, in sterile plastic bags. The currency was immediately transported to the laboratory for further characterization.

**Recovery of bacterial flora:** The bacterial isolates were recovered from currency surface by rubbing sterile cotton plug (dipped in autoclaved distilled water) and incubating in saline water at 37°C overnight. Distilled water serially diluted and spread on nutrient agar plate for bacterial isolation and characterization.

**Morphological and Biochemical characterization:** The bacterial isolates were characterized on the basis of morphological and biochemical characteristics: cell morphology, presence of endospore, oxidase, catalase, Voges Proskauer test, methyl red test, indole test, citrate utilization test, Triple Sugar-Iron Agar Test (TSI Test), urease test, nitrate reduction, growth on mannitol salt agar and sulphide Indole motility test according to Bergey’s manual of Systematic Bacteriology (Vos et al., 2009).
RESULTS AND DISCUSSION

The currencies collected from hospital, street food vendor and bus stop were found to be contaminated with bacteria. Out of 15 bacteria isolated from coins only Bacillus species were present while from paper notes of the 25 isolates the presence of Bacillus, Pseudomonas, Klebsiella, Micrococcus and E.coli species were detected.

Indian currency provides surface area for microbial establishment and the microflora also changes depending on where the money has been passed. The large population, high density and weather conditions in India create ideal conditions for bacteria to proliferate. Also the prevalence of unhealthy money handling culture like counting money with salvia, keeping money under clothes and not washing hands after money usage increases the risk of transmission of diseases by currency (Pradeep et al., 2012).

A more descriptive study is needed to confirm the presence of pathogenic microorganisms on currency surfaces. Still currency do harbour bacteria on their surfaces thus it is recommended the need of good hygiene practices especially when handling money and food together, hands should be washed or sanitized after handling coins and use of plastic money. All these methods can reduce the risk of transmission.

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