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Currency as a New Mode of Transmission of Pathogens.

Soumyadipto Santra*, Neha Agnihotri, Sakshi Mishra, and Suneetha V.

School Of Biosciences & Technology, VIT University, Vellore, Tamil Nadu, India.

ABSTRACT

In this modern digital age, currency is flowing all over the world from hand to hand and is in more circulation than even air and water. We are all well aware of air, water, soil, food and sexual contact as a medium of transmission of pathogens. But had it ever occurred to you that even currency (monetary notes) can be a cause of transmission of pathogens. The note that you are holding might have completed several social cycles from farmers to dealers, from dealers to grocery shopkeeper to fisherman to bus-conductor and finally into your hands. It is a potential carrier of pathogenic bacteria as it travelled across various places and conditions to your hand. So one must be very careful while exchanging notes and the use of saliva while counting your notes must be strictly avoided.

Keywords: Currency, Pathogens, Imprinting Method, Escherichia Hermannii, Enterobacter Aerogenes, Enterobacter Gergoviae, Nosocomial Bacteria, Opportunistic Bacteria, Kb001, Kb002, Biochemical Tests

**Corresponding author*

INTRODUCTION

Now that we are well aware about the potential threat that the currency note you are holding, we must be aware of the common sort of bacteria that are travelling or are being transmitted through these monetary notes. We need to study about them and know them first in order to fight and eradicate this potential threat from our society. Our aim in this research is to find out the common type of bacteria present in the currency from several day to day life activity areas like the restaurants, transport areas, hospitals etc. We have isolated the bacteria from the sample notes and identified them and studied further about them and the potential threat that they pose on our society. We have created a report about the presence of bacteria in and around our university and studied about them.

MATERIALS REQUIRED

- NUTRIENT BROTH POWDER
- NUTREINT AGAR POWDER
- TEST TUBES
- PETRI DISHES
- SAMPLE CURRENCY NOTES COLLECTED FROM SEVERAL PLACES
- BIOCHEMICAL TEST KITS (KB001 & KB002)



FIG 1- Sample collected from limra restaurant



FIG 2- Sample collected from food court

METHODOLOGY

Three different currency samples were collected from 3 different places. The places were Limra Restaurant, Food Court and an Auto Driver. The samples were collected in sterilized containers using gloves and proper mechanisms.

A 300 ml nutrient broth in a 500 ml conical flask by adding 7.5 gm nutrient broth powder in 300 ml of distilled water. A 300 ml nutrient agar media was also prepared by adding 7.5 gm nutrient agar in 300 ml distilled water and 6 gm agar powder. Sterilization of the media along with the petri dishes was done.



FIG 3- Sterilisation of media and petri dishes

For extracting the bacteria from the samples two methods were implemented- (a) Spread Plate method- It was done by washing of samples in the nutrient broth followed by spreading of samples by L-rod on solidified nutrient agar media in the petri dishes inside the laminar airflow.



FIG 4- Washing of samples

(b) Imprinting Method- It was done by imprinting the currency samples on solidified agar media in petri dishes inside the laminar airflow.



FIG 5- Imprinting of samples

These two methods were followed by 48 hours of incubation to get colonies of bacteria.



FIG 6- Bacteria colony from limra



FIG 7- Bacteria colony from food court



FIG 8- Bacteria colony from auto driver

Repeated sub-culturing was performed to keep the colonies fresh and streaking was done to get separate colonies and thus isolate the bacteria.



FIG 9- Streaking from food court



FIG 10- Streaking from auto driver sample



FIG 11- Streaking from limra sample

After getting and purifying the bacteria colonies the next step is to identify the bacteria isolated from the samples. Biochemical test was done on all the 3 types of bacteria isolated by the help of inoculation loop and biochemical test kit [6] (KB001 & KB002).

The color change was noted after 24 hours of incubation of the test kit along with the bacteria samples and addition of required chemicals.

The color changes indicated the type of reactions the bacteria undergo and the chemicals that are utilized by the bacteria. This information was tallied with the biochemical test kit chart to identify the bacteria that was isolated from the samples.



FIG 12- KB001 (FOOD COURT SAMPLE)



FIG 13- KB002 (AUTO SAMPLE)



FIG 14- KB001 (LIMRA SAMPLE)

RESULTS AND DISCUSSION

After the isolation and detection of bacteria from the samples collected we came to the following result:

- *Enterobacter aerogenes*- from Limra Restaurant
- *Enterobacter gergoviae*- from Auto Driver
- *Escherichia hermannii*- from Food Court

Enterobacter aerogenes [3] is a pathogenic bacterium that are generally found in hospitals. It causes opportunistic infections. They are generally found in gastrointestinal tract of humans. The most dangerous fact about this species of bacteria is that they quickly become resistant to standard antibiotics during treatment.

Enterobacter gergoviae belongs to the Enterobacteriaceae family. They are also found in intestinal tract of humans and are frequently the cause of nosocomial infection [2] that arises from contaminated medical devices and personnel [4].

Escherichia hermannii is a gram negative rod- shaped bacterium commonly found in the wounds and faeces [7] of homoeothermic animals and can survive in adverse conditions. It is primarily an opportunistic pathogen which causes disease only in the weakened hosts. Reported diseases include septicemia, purulent conjunctivitis, periodontal lesions, neonatal brain infections, meningitis, cephalohematoma of neonate and wounds [5].

The studies of our research and pre-knowledge of the pathogenicity [1] of the bacteria we isolated proves and solidifies the claim that currency (monetary notes) are indeed a latest addition in the mode of transmission of pathogens [8] and is a grave source of concern.

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