

CURRENCY NOTES: A POTENTIAL CARRIER OF MICROBIAL CONTAMINATION DURING COVID PERIOD

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ABSTRACT

Paper currency is a potential carrier of microbial contamination. Paper currency is circulated within the society from one individual to another are known to carry microbes on their surface. Currency notes contaminated by microbes might also act as pathogens, playing an important role in transmission of diseases. An individual living in unhygienic condition will contaminate the notes with bacteria, viruses etc. Hence the chance of contamination and prevalence of infection increases. Especially, in the case of Covid-19. These note act as the vehicle for contamination of hands of the next user. Improper hand washing after using toilet, counting paper notes with saliva, coughing

and sneezing on the hands and exchanging money and storage of paper notes on dirty surfaces leads to contamination. For conducting the study ten rupee notes were collected from market (old note), bank (new note) and hypermarket (average used note) around the location of Marayamuttom. Contamination is seen more on currency note collected from market. This will give the exact idea about the transmission of microbes through paper currency. So we suggest proper sanitation or hand washing with soap after the use of paper currency will help to prevent transmission of Covid-19 and other transmissible form of diseases.

KEYWORDS: Carrier, Pathogens, Unhygienic, Contamination, Sanitation.

INTRODUCTION

Thousands of years ago people purchased goods by bartering system or by means of exchanging goods among themselves. After that commodity money was introduced. Commodity money are substance which the people values enough and accept as payment. Commodity money vary from the localities upon the things that the people of locality values

the most. These commodity moneys were later replaced by coins that is pieces of metal made up of gold, silver, bronze, etc.

Paper currency were first invented in china and become much popular and now a days these are used by all the countries including India. Currency notes are made of blend of many substance such as paper, cotton, linen, textile fibre and animal gelatin, and the surface of notes are coated with small segments of fibre. The substances are blended in such a way that it have a strong bond in between and do not pull apart and tear off easily.^[1]

Microorganisms are small microscopic living organisms which are not visible to naked eyes. Microorganism are present all over the environment and some of them are pathogenic in nature and are capable of producing many life threatening complications. Microorganisms spread easily through air, water, food and by means of fomites. Fomites are inanimate objects in environment capable of absorbing, harboring and transmitting infectious microorganisms. These route of transmission are of great importance in the health of many population particularly in developing countries where the frequency of infection is a great indication of local standards of hygiene and environmental sanitation. Paper currency provide a greater chance for microbial reproduction in the surface. An individual living in unhygienic condition will contaminate the notes with bacteria and hence the chance of contamination and prevalence of infection increases. These note act as the vehicle for contamination of hands of the next user. Improper hand washing after using toilet, counting paper notes with saliva, coughing and sneezing on the hands and exchanging money and storage of paper notes on dirty surfaces leads to contamination. Microorganism commonly seen on paper currency include bacillus species, staphylococcus aureus, micrococcus species, corynebacterium species, vibrio cholera, mycobacterium tuberculosis, enterobacterial species etc. Many infections such as gastroenteritis, diarrhea, pneumonia are spreaded by this type of microorganisms.^[1,2]

This study was performed to survey the microbial contamination through paper notes in the form of paper in and around Marayamuttom local place, Neyyatinkara, Trivandrum, Kerala, India. Only we are using currency rupees ten for study and choosing it from different working atmospheres according to their usage ie, we are using new currency, average used currency and an old currency, The currency was handled legally and after study the same currency was reused by sterillisation (UV sterillisation). This work only determines the presence of microorganism and not go for isolation, identification or further study. Our observation and

result reveals the paper currency was the best source of transforming microorganism from one person to another.

According to our study, paper currency may be converted to Plastic polymer currency to reduce the possible contamination. Polymer currency have more tear resistance than paper currency. They are resistant to wringing, folding as well as do not absorb water, sweat and dirt. And hence have a large security than paper currency. That is polymer currency is cleaner than paper currency.

In this study we actually shown the transmission and growth of some bacteria's over the paper currency exchanges. The chance of transmission increases when the exchange of currency increases. This study is relevant in this covid period, because some findings are supported for the transmission of Covid viruses through paper currency.

MATERIALS AND METHODS

Currency notes of rupees 10 which were collected from bank, hypermarket and fish market according to their usage as new currency, average used currency and repeated used currency. These notes were randomly collected in sterile polyethylene bags with sterile gloves. These notes were transferred to the sterile nutrient agar media had already prepared and stored in microbiology laboratory. The transfer of currency notes were carried out in aseptic condition. The agar plates were then incubated for 48 hours in an incubator and the growth were observed. A control was also prepared and incubated along with the currency notes. The control contains only nutrient agar.

Materials

Currency notes, Sterile polyethylene bag, Sterile Nutrient agar medium, Sterile gloves, Sterile Petri plate, Incubator.

METHODS

Step 1: Currency collection (Random sampling method).

The notes for the research purpose were collected by random sampling method. The notes were collected from near by bank, hypermarket and fish market according to the use. The note collected from bank is of less used as compared to hypermarket that is average used and that of fish market which is old note. The notes were collected in sterile polythene bags using sterile gloves.

Step 2: Preparation of sterile nutrient agar medium.

Bacteria require adequate nutrition, optimum pH, temperature and oxygen for growth and multiplication. Artificial media are prepared by using mixture of various nutrients for the growth and multiplication of microorganisms. Nutrient agar is the common laboratory medium used for growth of bacterial species. Nutrient agar contain beef extract (3g), peptone (5g), agar (15g), distilled water (1000ml). Final pH of the nutrient agar is 6.8 ± 0.2 . Peptone is used to provide organic nitrogen. Beef extract/yeast extract is the water soluble content that contribute vitamins, carbohydrates, nitrogen and salts. Water serves as transport medium. Agar is a mixture that provide nutrient nourishment for bacteria. Peptone, beef extract, agar, distilled water are combined and boiled for approximately 1 minute to ensure they are mixed and then sterilized by autoclaving typically at 121°C (250°F) for 15 minutes, 15 psi pressure. Then cooled to around 50°C and poured into petridish which are covered immediately.

Step 3: Placing of currency directly to the medium aseptically.

The currency notes were transferred into petridish containing sterile nutrient agar medium. The notes were handled by using sterile gloves. The notes were removed from the polythene bag with the help of sterile gloves and transferred directly into previously prepared sterile nutrient agar. Then the petridish was placed on the incubator and incubated upto 48 hours.

RESULTS AND DISCUSSIONS

We found more number of colonies of micro organism depending upon the use of currency. The currency collected from the bank (Fig 2), that is the new currency notes show less microbial contamination. The average used currency (Fig 3) shows contamination more than that have occurred in the new currency. Contamination in the old currency (Fig 4) was much high as compared to new as well as average used currency. The statistical diagrams shows the percentage of contamination on all these currency notes (Fig 5). So we conclude that our daily used currency is the best Carrier for transporting various types of micro organism and pathogenic condition. This study is more relevant in this covid period because the chance of spreading of Covid 19 viruses as bacteriophage through paper currency. So we suggest proper hand hygiene after the use of paper currency at anywhere.



Figure 1.



Figure 2.



Figure 3.



Figure 4.

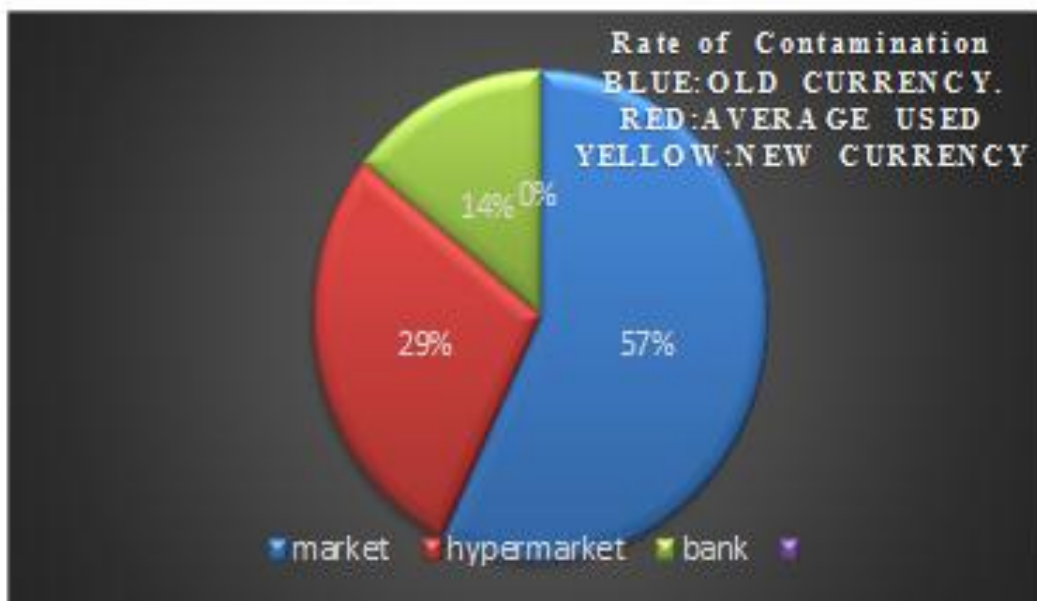


Figure 5.

Figure 1 Represent control culture media.

Figure 2 Represent the growth of microbes after incubation on new currency/unused currency.

Figure 3 Represent the growth of microbes after incubation on moderately used currency.

Figure 4 Represents the growth of microbes after incubation on maximum used currency /maximum circulated currency.

CONCLUSION

From our study we conclude that to reduce the contamination, proper hand hygiene is necessarily after the use of paper currency. So we concluded that our daily used currency is the best Carrier for transporting various types of micro organism and pathogenic condition. This study is more relevant in this covid period because the chance of spreading of Covid 19 viruses as bacteriophage through paper currency. So we suggest proper hand hygiene after the use of paper currency at anywhere.

Also the people should use the currency with good personnel hygiene as the currencies are good carriers of pathogenic microorganisms.

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