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HOW PAPER MONEY WILL LEAD TO TRANSMISSION OF VARIOUS MICROBES A COHORT STUDY IN TEERTHANKER MAHAVEER UNIVERSITY MORADABAD UTTAR PRADESH(U.P)

Dental Science

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ABSTRACT

Materials and method: 80 notes of different denominations paper currency notes 2 each of 10, 100, were collected from 20 randomly selected work places in the campus of Teerthanker Mahaveer university of Moradabad, Uttar Pradesh India. Only the notes printed in the same year were taken for the study. In a standardised microbiological laboratory in Moradabad city these notes were subjected to microbiological profile. A cohort study was conducted on the individuals of study sample. Calculation of absentees was done and why they were absent that was also noted. Leaves were taken due to various causes like common cold, throat infection, fever, stomach cramps, nausea/vomiting, diarrhea, skin infection, eye flue, urinary tract infection. Statistical analysis was done by using unpaired t-test, Mean and standard deviation calculation with the p value set as $p \leq 0.05$

Results: When the different groups of people were compared it was found that more bank cashers were absent from their duties due to the infections like common cold, throat infection, fever, stomach cramps, nausea/vomiting, diarrhea, skin infection, eye flue, urinary tract infection as compared to the other people in the campus like stationary juice corner etc and the difference between the two is statistically significant ($p = 0.039$).

Conclusion: This study gave the link of possible transmission of various diseases by the contaminated paper money and the people who are continuously handling the paper money are more prone to the infection. So they should be made aware of all these possibilities of getting infected

KEYWORDS

Currency notes, Micro biome, Public health

INTRODUCTION

Our environment plays a very important role in the transmission of various diseases. There are so many materials in the environment acting as vehicles for such transmission, with the paper money as one. As paper money provides the large surface area for microbial contamination chances of transmission of communicable diseases because of paper money are more as compared to the coins. Handling of paper money poses a great risk to the bank cashers as they are frequently involved in counting the notes. Moreover older the notes more are the contamination and more is the transmission of diseases. In developing countries like India many people have the habit of counting the note by applying the saliva on their fingertips so by that way promoting the transmission of various diseases .In India there are very few studies done on the contamination of paper money that becomes the reason of unawareness of the of the general people about the consequences of unhygienic practices while handling the paper money. Keeping all these things in mind the aim of this very study was to assess the effect of paper money on the health of general people.

MATERIALS AND METHODS

A total of 80 notes of different denominations paper currency notes 2 each of 10, 100, were collected from 20 randomly selected places in the campus of Teerthanker Mahaveer university of Moradabad, Uttar Pradesh India. Those notes printed in the same year were collected only and the collection was done by wearing sterile gloves and all the notes were kept in the sterile containers.

BACTERIOLOGICAL ANALYSIS

Techniques used for the isolation of bacteria from the notes were standard techniques. Cotton-tipped swab moistened with saline were used and both the sides of the notes were swabbed and the media used for the inoculation were Blood agar and MacConkey agar under the standard protocol .Identification of the bacteria was done by using the gram reaction and the tests conducted were catalase and coagulase tests; hemolysis, sugar fermentation, and other biochemical tests, including

tests for indole production, citrate utilization, and urase activity; triple sugar iron agar tests (for glucose, sucrose, and lactose fermentation); gas and hydrogen sulfide production tests; and oxidase tests, according to Cheesbrough.

PARASITOLOGICAL ANALYSIS

Material used for the isolation of parasites was a piece of 3x3 cm light foam dipped in dilute solution of sodium hypochlorite for sterilization. This material was then rinsed with water and after air dried 70% alcohol was used. Each and every piece of the swab was kept in the air tight container before every use. These pieces of foam were used to swab the both sides of notes and after that these swabs were kept in the capped bottle containing 10 mL of formol–saline. Then the next step was centrifugation solution at 2,000 g for 5 minutes. The sediment was placed on a glass slide, covered with a glass cover slip, before microscopic examination for parasite ova. Standard guidelines (WHO, 2004) were used for identification of parasites. Parasites were identified but were not quantified.

Identification of Fungi

Growth of fungi was done on Sabaroud dextrose agar using standard techniques of Bruge.

Then a cohort was conducted on the bank cashers and other randomly selected shops located in the campus of the Teerthanker Mahaveer university Moradabad UP. Then not only the absentees but the reason behind was also noted down. Absentees because of sickness like common cold, throat infection, fever, stomach cramps, nausea, vomiting, diarrhea, skin infection, eye flue, and urinary tract infection were calculated.

STATISTICAL ANALYSIS

Contamination of the paper money with the bacteria, Fungi and parasite were calculated and for comparison between the cashers and rest of the shops in the campus parametric unpaired t-test was used with Statistical significance set at $p \leq 0.05$.

RESULT

Finally total of 80 notes were analyzed for any microbial contamination. After analysis it was found that almost every note collected was contaminated and moreover the rupees 10 note i.e. lower

denomination note was contaminated more as compared to the higher (Table 1). Absentees were more found among the bank cashers due to the sickness as compared to the other people in the campus (Table 2)

Table 1: Bacterial, parasitical, and fungal analysis Of currency notes

Micro-organisms	10%	100%
Staphylococci spp.	24.05	20.91
Bacillus spp.	24.01	21.05
Pseudomonas spp.	6.06	3.08
Klebsiella spp.	6.64	6.61
Shigella dysenteriae	12.02	10.01
Protozoa, Ascaris lumbricoides, Entamoeba histolytica	3.16	NIL
Aspergillus spp.	12.02	11.01

Table 2: Comparison of the leaves taken by the cashiers and general staff

Number of leaves	Cashers		General people		t-value#	p-value
	Mean ± SD		Mean ± SD			
Throat infection	100	2.20±1.60	75	1.50±1.2	2.002	0.049
Common cold	66	1.6±1.4	52	1.27 ±1.31	1.15	0.253
Fever	70	1.61±1.4	50	1.26 ±1.30	2.04	0.043
Diarrhea	7	0.19±0.53	5	0.14±0.46	0.410	0.682

#Unpaired student's t-test; *p ≤ 0.05 is statistically significant; SD: Standard deviation

DISCUSSION

In this very study it was found that 100% of the notes were contaminated with microorganisms. Not only the Indian rupee but also the Saudi one Riyal paper note, Palestine bank note, Mexico currency notes, Colombian bills, and South African bank notes are also contaminated with the microorganisms discussed in various studies .There are various methods of spread of infection like coughing and sneezing on hands and then exchange of the money with contaminated hands moreover application of saliva while counting the money and improper hand washing. Similar studies conducted were by Uneke CJ, Siddique S and Agersew A.As in this very study lower denomination notes i.e rupee 10 notes were more contaminated than higher denomination notes and the reason was that these notes were more frequently circulated in the population in day today life. It was also found that old notes were more contaminated than the new notes. In the present study it was found that bank cashers had taken more leaves due to illness than the other people in the campus, reason behind all this is that they are more frequently involved in handling the money. It was also found that it was the throat infection found more among bank cashers than the other diseases. The reason behind the survival of the micro-organisms on the Indian rupee is its composition i.e. cotton ,linen and textile fiber ,so the various studies were taken to substitute the composition of bank notes with the plastic polymer substrates.

CONCLUSION

In this very study it was found that paper money is a contaminated vehicle in the environment for the transmission of various diseases and the frequent handlers that is bank cashers are the source of contamination, no doubt there are very less evidences on the presence of microorganisms on currency results in sickness, still the finding of our study gives an indication toward it

RECOMMENDATION

General awareness should be given to the people that for counting the notes application of the saliva on their finger tips may lead to the various infections and good personal hygiene should be practised The banks should be suggested to regularly disinfect currency notes by exposing to U.V. Rays or fumigation.

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