



EVALUATION OF BACTERIAL CONTAMINATION OF CURRENCY NOTES FROM SIDDIPET DISTRICT OF TELANGANA STATE

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ABSTRACT

Currency in the form of paper printed notes is the mostly used article by people everyday through out the world. Currency is used as a medium for exchange services and goods, settlement of debts and for deferred payments in economic activities. Currency represents a universal medium for the transmission of pathogenic organisms. This prospective study, which was carried out for period of one and half months in different places around the Siddipet District. The present investigation was carried out on a Two hundred Indian currency notes of all denominations obtained from different occupational groups in Siddipet in Siddipet District, Telangana, India. Around 86% of currencies were contaminated with pathogenic organisms. Isolates from collected Indian currency yielded 5 different types of bacterial species. Assessment revealed active participation of the following organisms as *Escherichia coli*, *Bacillus* spp, *Klebsiella* spp, *Staphylococcus aureus*, and *Pseudomonas* spp. Indian rupees 100, Rs. 50 had more contamination, other denominations like Rs. 10, Rs. 20 had moderate contamination and less contamination with Rs. 500. The study suggested that Indian currency notes are highly contaminated with pathogenic bacteria and this contamination may play a significant role in transmission of infectious diseases. Hence a tremendous care must be taken while handling the money during the preparation and handling of food to avoid cross contamination.

KEYWORDS

Currency, *Escherichia coli*, Pathogenic Microorganisms, Denomination.

INTRODUCTION

Microorganisms are known to spread through air, water, food, etc., an important mechanism of the spread of pathogens by fomites. In this respect currency notes act as very good fomites for transmission of infections, and usually gets contaminated microbes while coughing, sneezing or money counting by tongue-wet fingers (Saadabi et al., 2011). Globally, currency is one of the most frequently passed from hand to hand. During its passing, money gets contaminated and plays a crucial role in the transmission of microorganisms to other people.

Money is not usually suitable for the survival of microorganisms, except for some that are resistant to external conditions and non-resistant forms of spores (Gedik et al., 2013). In addition, the general hygiene levels of a community may contribute to the amount of microbes found on the currency notes, and thus the chance of transmission during handling of the currency.

Indian currency is commonly contaminated with pathogenic bacteria and this contamination may play a significant role in the transmission of different diseases (Elumalai et al., 2012). People and government are relevant about spread of pathogens through food, air, water and have taken enough steps to control it. But, they are not aware about the possibility of acquired infections while applying saliva on fingers for counting currency notes which are widely exchanged from hand to hand represents a universal medium for transmission of microorganisms in the environment and among human beings.

In India, studies have reported the bacterial colonization of currency (Lamichhane et al., 2009; Sadawarte et al., 2014). Studies of the contamination of currency agents is lacking in mid Telangana. Knowledge of the bacterial diversity of the currency notes in circulation can provide the basis for raise health consciousness in people during currency handling and effective control of infection transmission. Hence, the present study was undertaken to identify microbial contamination of Indian currency notes in circulation.

METHODOLOGY

Study Area and Design

The current study was conducted in different parts of Siddipet district, Telangana, India where various currency denominations were randomly collected from February 2026 to March 2026 and the processing of the samples were done at Department of Microbiology, Government Degree & P.G. College, Siddipet(A), Telangana.

Sample collection

A total of 200 currency notes consisting of 40 notes of each of INR.10, INR.20, INR.50, INR.100, and INR.500 denominations were collected from local RMP. Doctors, Vegetable market, Panipuri vendors, Auto drivers, Banks, TSRTC Bus conductors, Saloons, Hotels, Petrol bunks, Tea shops, General stores aseptically and transferred them into a sterile polyethene zip lock covers. After dropping the currency notes in the polyethene zip lock bags and we have labelled them accordingly; notes were not touched by the researchers using bare hands at any stage. The packet was sealed and immediately transported to the laboratory for analysis. 10 fresh new notes were collected from the bank as control samples.



Figure 1: Currency notes collected from different places of Siddipet

Microbiological Analysis

A sterile cotton swab was dipped in the sterile distilled water and was rubbed on surface of currency notes on both the sides and then it was inoculated on to the culture plates under sterile conditions under laminar air flow chamber. Different sterile swabs were used for different currency note samples. The plates were then incubated at 37 ° C for 24 hours. After then the plates were observed for bacterial colonies. And then pure isolated colonies were gram differentiated by the gram staining technique.

RESULTS

Table 1: Physical state of Currency Notes Collected from different places from Siddipet

	Old	Moderate	New	Total
INR 10	10	16	14	40
INR 20	14	14	12	40
INR 50	14	18	8	40
INR 100	16	12	12	40
INR 500	10	14	16	40
Total	64	74	62	200

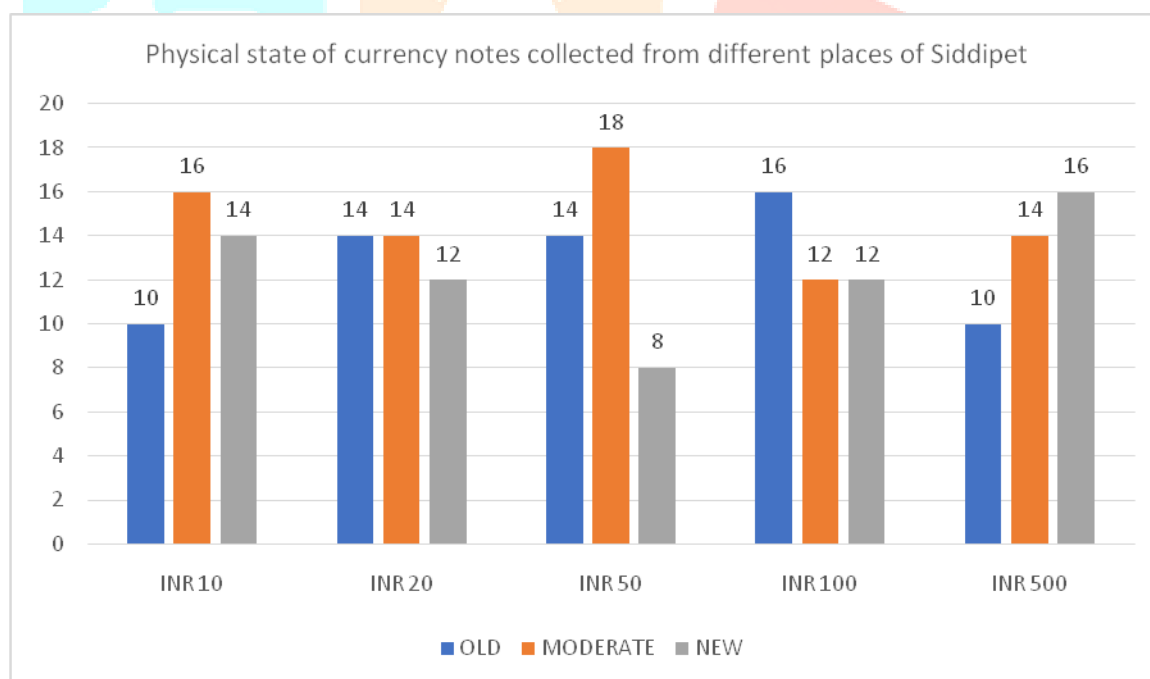


Figure 2: A Bar graph on the physical state of currency notes collected from the various places of Siddipet

Table.2: Bacterial Isolates in the currency notes

	<i>E.coli</i> <i>spp</i>	<i>Klebsiellaspp</i>	<i>Pseudomonas</i> <i>spp</i>	<i>Staphylococcus</i> <i>spp</i>	<i>Bacillus</i> <i>spp</i>	No growth	Total
RMP Doctors	4	6	2	0	2	5	19
Rythu Bazar	6	12	4	2	7	6	37
Panipuri vendor	4	6	0	0	2	2	14
Auto Driver	2	6	0	0	0	2	10
Banks	2	10	0	0	4	6	22
TSRTC Bus Conductor	0	11	4	0	5	4	24
Hair Saloon	0	13	0	0	0	0	13
Hotel	3	2	0	0	3	0	8
Petrol Bunks	2	14	0	0	0	8	24
Tea Shops	0	2	0	0	0	15	17
General Stores	0	9	0	0	3	0	12
Total	23	91	10	2	26	48	200

Table.3: Percentage of Bacterial Isolates from the currency notes in circulation

	<i>E.coli</i>	<i>KlebsiellaSpp</i>	<i>Pseudomonas</i> <i>Spp</i>	<i>Staphylococcus</i> <i>aureus</i>	<i>Bacillus</i> <i>Spp</i>	No Growth	Total
INR 10	7	22	3	1	5	2	40
INR 20	6	20	3	1	5	5	40
INR 50	5	18	2	0	6	9	40
INR 100	3	17	1	0	5	14	40
INR 500	2	14	1	0	5	18	40
Total	23 (11.5%)	91 (45.5%)	10 (5%)	2 (1%)	26 (13%)	48 (24%)	200 (100%)

DISCUSSION

The currency notes are graded using different conditions of the currency notes, appearance of currency notes, and degree of dirtiness as new, moderate, and old as shown in Table-1. The study revealed the contamination of microorganisms of the currency notes (Pradeep et al., 2012). The currencies were mostly contaminated with pathogenic organisms. The different isolates collected from currency notes yielded 5 different types of bacterial species. Identification showed the active participation of the following species as *Escherichia coli*, *Klebsiellaspp*, *Pseudomonas spp*, *Staphylococcus aureus*, *Bacillus spp* were the most frequently occurring pathogens among the contaminated currency notes (Singh and Kaushik, 2022). Among them *Klebsiellaspp* pathogens are most common and frequently occurring pathogen.

The prevalence occurrence of different pathogenic microorganisms isolated from currency notes are shown in Table-2. Which were collected from local RMP. Doctors, Vegetable market, Panipuri vendors, Auto drivers, Banks, TSRTC Bus conductors, Saloons, Hotels, Petrol bunks, Tea shops, General stores. The results showed in the Table-3 indicates all the denominations of the currency notes has microbial contamination, denominations like INR 10, INR 20 had moderate to less contamination and denomination of INR 500 shows less contamination as they are used less in everyday(Sadawarte et al., 2014). Smaller denominations appeared to be highly contaminated compared to larger denomination currency notes because the smaller units are most frequently used and handled in everyday monetary transactions and are often tattered and dirty(Agarwal et al., 2015).

The present study indicates the frequent occurrence of bacterial contamination of *Klebsiella* spp (45.5%) which indicates the presence of faecal contamination through cross contamination with poor personal hygiene or raw products. Some of most common unhygienic practices in the openair markets like Rythu bazar , Siddipet, wheretraders, merchants, and buyers eat direct market products after handling the bacterial contaminated currency notes. In contrast to the earlier studies, the isolation rate of *E.coli* in this study was relatively low (11.5%). Other isolates detected like *Staphylococcus aureus*(1%) and *Psuedomonas* spp(5%) both of which were reported at lower frequencies compared to previous findings(Dudhagara et al., 2011).

Currency notes were generally found to be contaminated with bacteria, particularly enteric pathogens and other potential harmful pathogens(Sucilathangam et al., 2016). This indicates the need for preventive personal measures to minimize their adverse health effects.

Currency has got the potential to change through many hands over the world and exposed to different diverse environments at a high relative frequency. From the results of the present study, it is concluded that currency is contaminated with bacterial pathogens and this contamination plays a significant role in the transmission of various diseases. The most general awareness about the acquiring infections while applying the saliva to the fingers while counting the notes; and in public we should help in creating the awareness on practicing the good personal hygiene. Personal hygiene helps to reduce the risk of infections is mostly recommended especially for the persons who handles food and currency simultaneously(Okpala and Ezeonu, 2019).

CONCLUSION

The circulation of currency notes are very likely to get contaminated by the bacterial pathogens. Many diseases like UTIs, Blood stream infections, pneumonia, and wound infections can possibly be transmitted by the currency notes exchange and hence hand hygiene should be properly maintained after handling of the currency notes. The above on going aspect should be studied well for future research in the public health aspect.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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