

Isolation and Characterization of Bacterial Population from Indian Paper Currency

Parul Gupta

Department of Botany, BBD Government College,
Shahpura, Jaipur, Rajasthan- 303130, India.



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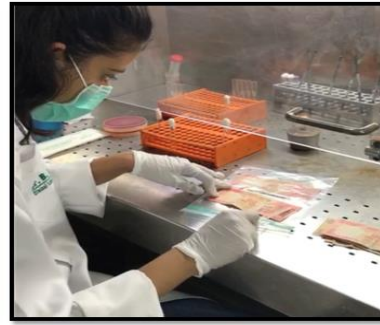
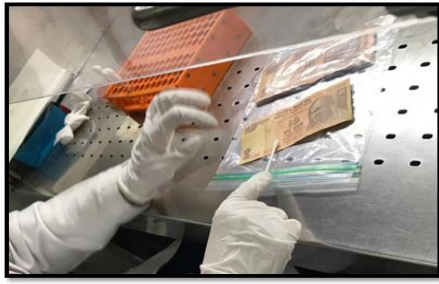
Introduction:

Microorganisms are found almost everywhere around us in our environment and are known to spread through contaminated water, food, air and vectors such as fleas, mites, rats, dogs and also through inanimate objects like clothes, utensils, furniture, hand railings or a door knob which we are generally unaware of. Paper currency notes are one of the most commonly exchanged objects and its potential to transmit pathogenic organisms has been well recognized (Khin et al. 1989 ; Abrams, 1972 ; Goktas, 1992; Basavarajappa et al. 2005) .Earlier studies in many countries have shown that circulating currency bills are most common fomite as it is handled by a large number of people under a variety of personal & environmental conditions (Uneke & Ogbu, 2007; El Dar 2005 ; Kalita et al. 2013)

Currency bills are exchanged for goods & services by one & all and a few seconds of money transaction can bring along a whole lot of pathogens. Numerous studies have well documented that paper currency acts as a vehicle to spread bacteria and other microorganisms and can accommodate a variety of contaminants for long periods (Lamichhane et al 2009 ; Angelakis et al 2014 ; Wamae 2009).

Methodology:

Indian currency of Rs. 10 and Rs. 20 were taken from the medical store of nearby SMS hospital Jaipur. These currency were kept into polyethylene bags and brought into the microbiology lab. Sterile cotton swab were then put inside the sterile Peptone water and then gently swab into the currency. This cotton swab then transferred into the fresh sterile tube of peptone water and incubated into at 37°C/15min. After 15mins of incubation they were swabbed onto Sterile Mac Conkey Plates.



Isolation of Organisms from Indian Currency.

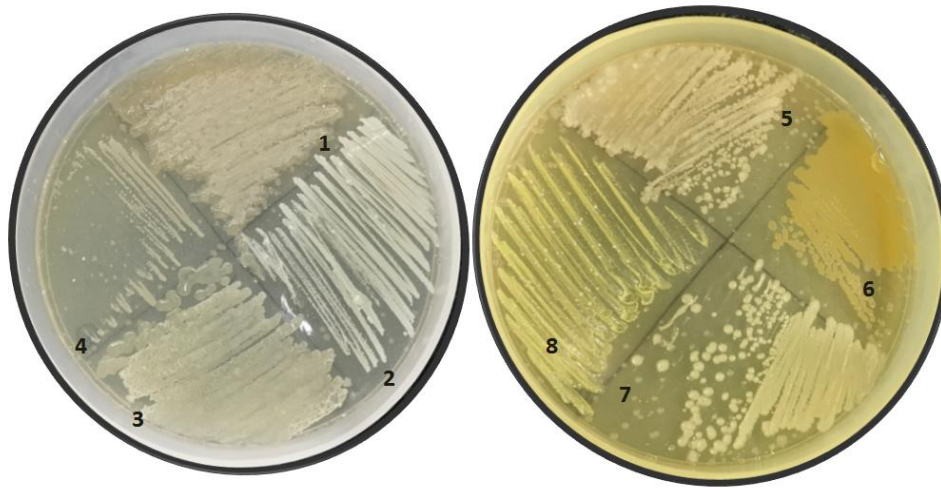
Pure culture Isolation :

Eight different types of colony were taken from the previously isolated Mueller Hinton agar plate. Macro and Microscopic examination of these cultured colonies were done. A small amount of colony were picked from the nichrome loop and streaked on the fresh MH agar plate. The plates were incubated at 37°C/24hours.



Pure Culture Isolation





Eight different types of colonies were streaked on the Mueller-Hinton agar Plate.

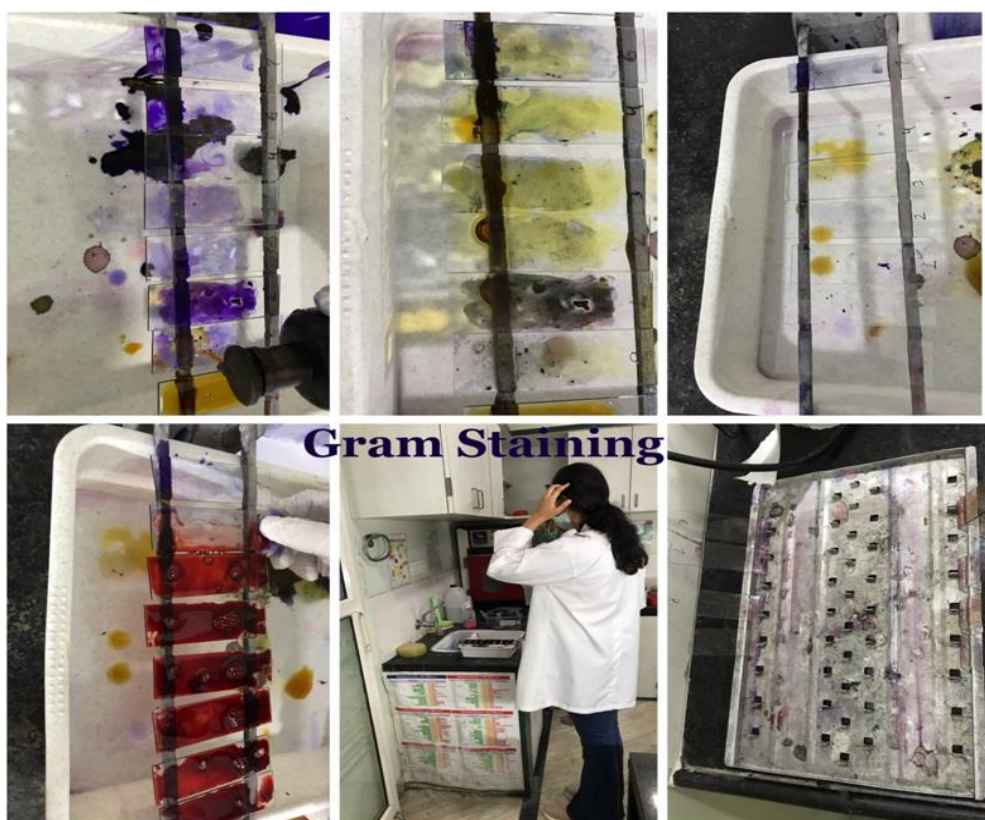
Gram's staining Protocol

Preparation of Slide smear: A grease-free slide was taken for preparation of a slide smear. With the help of nichrome loop a little amount of culture was transferred on a drop of water over the slide and a thin smear was prepared. The smear was then heat fixed.

Gram Staining:

Crystal violet stain was added over the fixed culture and let stand for 10 to 60 seconds. The excess stain was poured off & the slide was gently rinsed with water. Subsequently Gram's iodine solution was poured on the smear, enough to cover the fixed culture & let stand for 10 to 60 seconds. Excess iodine solution was poured off and the slide was rinsed with running water. Excess water from the surface was shaken off. Few drops of decolorizer was added on the slide and quickly rinsed off with water after 5 seconds.

Finally the slide was counterstained with basic fuchsin solution for 40 to 60 seconds and solution was washed off with water. The slide was shaken to remove most of the water and air-dried. Alternatively bibulous paper can be used lightly to dab the excess water. Alternatively, the slide may be shaken to remove most of the water and air-dried. Observe under compound microscope in Oil-immersion lens.



Gram Staining

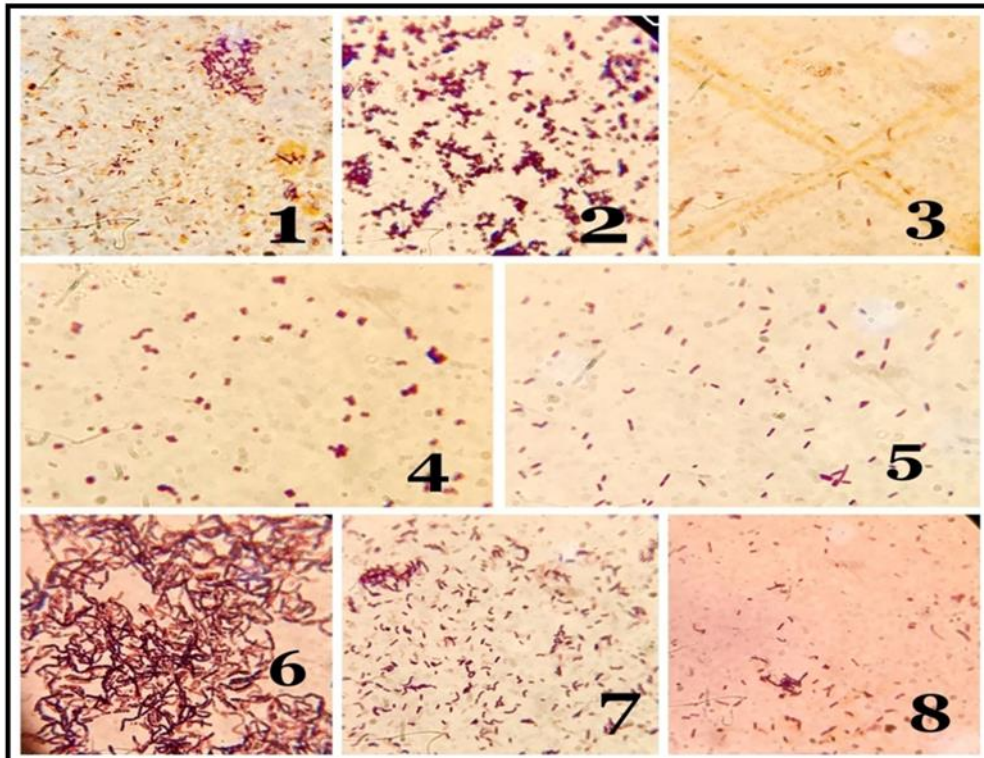
The slide was then studied under the microscope and the eight different types of bacterial colony which were isolated and cultured were studied and characterized. The observation are detailed in Table 1

Colony (Macroscopic) Characteristics:

Sr. No.	Size	Shape	Color	Margin	Elevation	Opacity	Gram's nature
1	18-20mm	Irregular	Off white	Undulated	Raised	Opaque	Gram Positive bacilli
2	2-3mm	Regular	Off white	Entire	Raised	Opaque	Gram Positive cocci
3	9mm	Irregular	Off white	Undulated	Raised	Opaque	Gram negative bacilli
4	2-3mm	Regular	Off white	Entire	Flat	Translucent	Gram Positive bacilli
5	1mm	Regular	Yellow	Entire	Flat	Opaque	Gram Positive bacilli in cluster
6	1cm	Irregular	Off white	Entire	Flat	Opaque	Gram positive coccobacilli
7	1cm	Regular	yellow	Entire	flat	Opaque	Gram Positive bacilli
8	1.8-2 cm	Irregular	Off white	Undulated	Raised	Opaque	Gram Positive bacilli

Table 1

Microscopic (Gram staining) images of all eight isolates



Conclusion:

An array of microorganisms are present on the circulating paper currency which can cause several diseases in humans. Hence after this present study it can be concluded that there are huge number of invisible inhabitants on the currency which can be carriers of serious diseases. So the best way is to wash your hands after handling cash.

References

1. Khin NO, Phyu PW, Aung MH, Aye T (1989) Contamination of currency notes with enteric bacterial pathogens. *J Diarrhoeal Dis Res* 7: 92–94. pmid:2632642 <https://www.ncbi.nlm.nih.gov/pubmed/2632642>
2. Abrams BL, Waterman NG (1972) Dirty money. *Journal of the American Medical Association*, 219(9):1202–1203. pmid:4621943 <https://www.ncbi.nlm.nih.gov/pubmed/4621943>
3. Goktas P, Oktay G (1992) Bacteriological examination of paper money. *MikrobiyolBul* 26: 344–348. pmid:1435365 <https://www.ncbi.nlm.nih.gov/pubmed/1435365>
4. Basavarajappa KG, Rao PN, Suresh K (2005) Study of bacterial, fungal, and parasitic contamination of currency notes in circulation. *Indian J PatholMicrobiol* 48: 278–279. pmid:16758695 <https://www.ncbi.nlm.nih.gov/pubmed/16758695>
5. Uneke CJ, Ogbu O (2007) Potential for parasite and bacteria transmission by paper currency in Nigeria. *J Environ Health* 69: 54–60. pmid:17506357 <https://www.ncbi.nlm.nih.gov/pubmed/17506357>
6. El-Dars FM, Hassan WM (2005) A preliminary bacterial study of Egyptian paper money. *Int J Environ Health Res* 15: 235–239. pmid:16134486 <https://www.ncbi.nlm.nih.gov/pubmed/16134486>

7. Kalita M, Palusinska-Szys M, Turska-Szewczuk A, Wdowiak-Wrobel S, Urbanik-Sypniewska T (2013) Isolation of cultivable microorganisms from Polish notes and coins. *Pol J Microbiol* 62: 281–286. pmid:24459833 <https://www.ncbi.nlm.nih.gov/pubmed/24459833>
8. Lamichhane J, Adhikary S, Gautam P, Maharjan R, Dhakal B (2009) Risk of Handling Paper Currency in Circulation Chances of Potential Bacterial Transmittance. *Nepal. J. Sci. Technol*, 10: 161–166 <file:///C:/Users/Hp/Downloads/2952-Article%20Text-10170-1-10-20100406.pdf>
9. Angelakis E, Azhar EI, Bibi F, Yasir M, Al-Ghamdi AK, Ashshi AM, et al.(2014) Paper money and coins as potential vectors of transmissible disease. *Future Microbiol* 9: 249–261. pmid:24571076 <https://www.ncbi.nlm.nih.gov/pubmed/24571076>
10. Wamae CN (2009) Circulating money is "vector" of common disease causing agents. *East Afr Med J* 86: 149–150. pmid:20084996 <https://www.ncbi.nlm.nih.gov/pubmed/20084996>