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# Characterization and Isolation of Microorganisms from Mobiles of Students and Faculties at Noble University Campus, Junagadh, Gujarat, India

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**ABSTRACT**
Current study become designed to isolate and represent microorganisms from mobile telephones of Noble university campus college students and colleges to expose that mobile phones are capacity reservoir for wide variety of microorganisms. Total one hundred mobile samples protected on this look at for isolation of microorganisms and 34 selected colonies of microorganisms isolated from cell telephones have been similarly processed. Out of those colonies, we observed Staphylococcus aureus (37.27 %). Enterobacter aerogenes (22.47 %), Escherichia coli (21.53 %) and Streptococcus cristatus (18.73 %). The finding of this research suggests that microorganisms isolated and characterised from cell telephones are acknowledged to cause infections in human beings; therefore sharing of mobiles, utilization of cell during eating must be discouraged. non-public hand hygiene could be very essential and additionally washing of hand earlier than and after coping with of meals and contact decontamination should be followed by using human beings to prevent move and self contamination via those microorganisms.
**Key words:** Microorganisms, isolation, Mobile, characterised, Contamination.

## I. INTRODUCTION

A cellular smartphone is a protracted range, transportable digital tool for personal telecommunication. aside the same old voice feature of a cellular cellphone, a cell smartphone can support many extra services along with SMS for text messaging, electronic mail, pocket switching forget admission to to the internet, and MMS for sending and receiving pix and video (1). At gift, Ethiopia has the fastest increase rate of mobile cellphone subscribers from distinct components of the sector. using cellular telephones through people may also serve as a ability car for the spread of pathogenic microorganisms (2). A mobile phone can unfold infectious illnesses by its common touch with arms (3). mobile phones are an increasing number of becoming an essential manner of communication.

The sizeable majority of cellular telephones are hand held (4). Today mobiles have come to be one of the most critical accessories of professional and social existence. Even though they may be generally stored in bags or wallet, cellular phones are treated often and held close to the face station. for that reason the prevailing study became performed to determine whether or not mobile phones play a crucial position inside the unfold of microorganisms pathogens and to proffer feasible manipulate or preventive measures that could be instituted to avoid this probable vehicle of infections. it is also centered to show the necessity of cleanliness in handing personal targets like mobile phones cautiously with right cover which could save you the multiplication of microorganisms each pathogenic and non pathogenic (5-6).

Studies has proven that the combination of regular managing and the heat generated by way of the phones creates a top breeding floor for all styles of microorganisms which can be generally found in our skin and surroundings. The human frame floor is constantly in touch with environmental microorganisms and emerges as with ease colonized via sure microbial species. due to the achievements and benefits of the cellular phones, it is simple to overlook its danger to fitness; that is in opposition to the historical past that many customers may need to regard for private hygiene, and the number of people who may also use the same cellphone. This constant dealing with of the telephone by different customers exposes it to an array of microorganisms, and makes it desirable service for microbes living on each square inch of the telephone (7). In hospitals, laboratories or while

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in intensive care, mobile phone use often takes place. Even though, patients do not have direct contact with those telephones, colonized microorganisms on the gadgets can be transmitted to them by way of healthcare body of workers. This could motive nosocomial infections if sufferers' immune machine is weak (8-10).

This study changed into aimed at isolation and characterization of microorganisms related to mobile telephones. Most of time humans visit accommodations and cafeterias and order meals to the waiter for his or her meal of hobby. Then they wash their hand and awaiting foods. until food come they are trying to play video games, chatting with a few frame, calling and choosing up calls on their cell telephones. Then as quickly as food comes, they try to consume even as assuming cellular phones as a neat aspect. Although at some stage in eating time they pick up calls, which is a major condition to contaminate themselves with pathogenic microorganisms from cellular telephone.

Additionally a few medical laboratory workers who work with the ones pathogenic organisms; contact their cell telephone with gloves throughout operating and when they finish paintings, they touch their cellular telephone on naked hand. We used to hold cellular telephones in our palm, these comes into a direct touch with human body and therefore microbes prompting switch from the skin and fingers to face, ears or hair. Consequently appropriate hand and body hygiene may be very essential. In Ethiopia, accessibility of water is trouble in many components of the United States together with in higher instructional establishments of the us. This shows that hand washing and drying may be hard in one of kind parts of the country wherein there may be no/low get admission to of water, therefore hand gel sanitizer will serve as an alternative to sanitize our arms. moreover, poor environmental hygiene and organization residing of students within the dormitory of higher organization of Ethiopia appears to growth the chance of hand contamination (11). Those state of affairs and dwelling conditions leads to the infection of mobile telephones. This pilot have a look at turned into designed to access the presence of microorganisms at the mobile phones of college of Noble university students and employees. Presently, cell phones are the most popular cellular communique devices for enterprise and private use. It has end up necessity of normal existence and an imperative attribute of the contemporary society which imposes alternate in human behavior. This observe was executed to benefit insight into the isolation and characterization of microorganisms that is located in cell phone because of negative non-public hand hygiene and could be of potential health hazard of our society.

## II. MATERIALS AND METHODS

This study was conducted between February 1 to March 31, 2022 at Faculty of Pharmacy, Noble University at Junagadh District, state Gujarat, india. A total of one hundred mobile samples from college college students and faculties were included on this study. Out of one hundred samples accumulated from mobile phones 50, 25, 15 and 10 samples belongs to college students, group of workers participants, cleaners and health specialists respectively. cellular phones of college students and colleges had been randomly sampled by way of taking written and oral concurs from all the members protected on this have a look at. The samples had been gathered aseptically the usage of sterile cotton tipped applicators which become immersed in zero.85% sterilized regular saline solution (NSS). all of the accumulated samples had been analyzed and screened in accordance with the previously pronounced technique (12). The cellular telephone was first held with the resource of sterile gloves. Sterile cotton swab moistened with the sterile (zero.eighty five%) ordinary saline answer was circled over the surface of each sides of the mobile cellphone. The cotton swabs were transferred at once to the laboratory with one hour of series to prevent dryness. Sampled mobile phone swab changed into streaked onto nutrient agar. The inoculated plates had been incubated aerobically in an inverted role at 37 °C for forty eight hours. The plates had been then determined for the presence of isolated colonies and 17 selected colonies have been once more sub- cultured on nutrient agar in petri- plates to isolate pure lifestyle. After separating natural cultures, microorganismsl isolates had been similarly recognized and characterised by Gram staining, Mac- Conkey agar and biochemical tests. (13).

Biochemical assessments were performed on pure culture for very last identification of the isolates on the idea of their biochemical reaction. Gramnegative rods have been identified through appearing a chain of biochemical assessments IMViC [Indole, Methyl Red, Voges Proskauer test and Citrate utilization test] (14). Grampositive cocci have been recognized primarily based on their response in catalase, and coagulase test (12-

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15). A slide coagulase test turned into done to differentiate among Staphlococcus and Streptococcus. Isolates had been purified, identified and named primarily based on the morphological, physiological and the biochemical characteristics offered in Bergey's guide of Determinative Bacteriology. (16).

## III. RESULTS

Maximum of our isolates gave nice reaction for catalase test subsequently, they belong to Entero microorganismsciae. Isolates NBC- 09, NBC- 05, NBS- 14 and NBSm- 02 which changed into diagnosed as Gram- terrible and gave tremendous reaction for Indole and MR check and bad response for vp take a look at, therefore diagnosed as Escherichia coli. Isolates NBH- 07, NBC- 01, NBH- 12, NBC- 08 which was recognized as Gramnegative, gave wonderful reaction for vp and catalase check identified as Enterobacter aeurogenes. Isolates NBH- 04, NBC- 10, and NBS- 01 which become diagnosed as Gram effective cocci and gave bad reaction for all the carried out biochemical tests besides MR take a look at had been diagnosed as Streptococci isolates NBS- 06, NBS- 02, NBS- 07, NBC07, NBS- 05 and NBS- 08 which become diagnosed as Gram advantageous cocci and gave high-quality reaction for MR, catalase and coagulase take a look at and variable response for vice chairman test and negative reaction for indole and citrate take a look at had been identified as Staphylococcus aureus. When the isolates once more sub- cultured on Mac Conkey agar, red shade colonies have been observed for those isolates which were diagnosed as E. coli and E. aerogenes in biochemical check. (Table 1). After calculating the total percentage of each isolate, we found Staphylococcus aureus (37.27 %). Enterobacter aerogenes (22.47 %), Escherichia coli (21.53 %) and Streptococcus cristatus (18.73 %) (Figure 1).

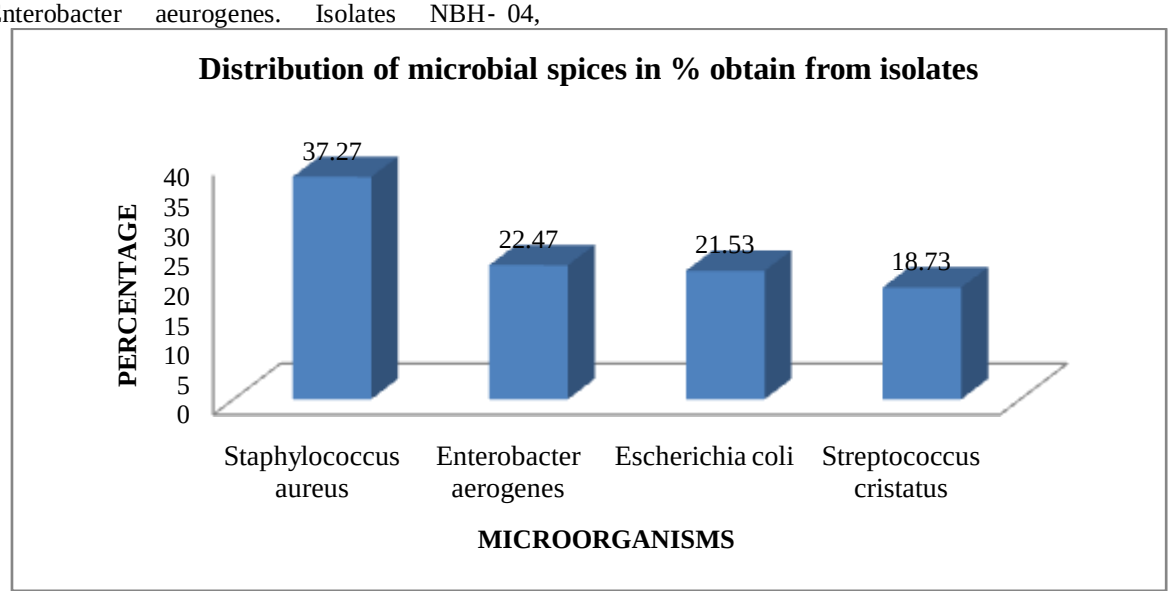


**Fig. 1. Percentage of microorganisms isolates from the samples collected from mobile phones**

## IV. DISCUSSION

We're living in a international, that is complete of microbes, it is not possible to make this world microbe loose but microbiological standards and hygiene practices must be adapted via the society for a wholesome existence. This research aimed to isolate and become aware of microorganisms and create awareness that mobile may also serve as vector for switch these microorganisms from one individual to every other, consequently non-public hygiene and cell decontamination may be very essential. The presence of Gram- terrible rod, Enterobacter aerogenes, a member of the coliforms, suggests the opportunity of the presence of the faecal contamination on the mobile smartphone. Gram bad sepsis is most typically as a result of Escherichia coli, Klebsiella spp Enterobacter spp and Pseudomonas aeruginosa. (17).

Out of these four microorganisms used to cause sepsis, we isolated and identified Escherichia coli and Enterobacter aerogenes from mobile and the percentage of both the microorganisms found to be 23.53% in our investigation (Table 2). The

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percentage of Escherichia coli isolated from mobile phone was found 28.2% in another study, which is slightly higher than our study (18). In preceding look at, it's far already mentioned that cell telephones may additionally get contaminated with such microorganisms together with Escherichia coli, Enterococci, S. aureus.

They said that 16.7% of the samples have been fantastic for pathogens acknowledged to cause nosocomial infections. the share all the microorganisms identified in our look at were discovered better than this examine. Streptococcus species is likewise acknowledged to reason infection starting from pneumonia, meningitis, pharyngitis. S. aureus is a not unusual bacterium determined at the pores and skin and the noses of up to twenty-five% of the healthful humans and animals can motive infection from pimples and boils to pneumonia and meningitis, and is a near relative of methicillin resistant S. aureus (MRSA). the primary reservoir of S. aureus is the hand from in which it's miles brought into meals during coaching. In preceding observe, the proportion of Streptococcus spp. and S. aureus from non-public cellular cellphone become mentioned 1% and 19% respectively. (17-18).

**Table 1. Outcomes of Gram staining, Biochemical tests a look at and subculture characteristics on Mac- Conkey agar**

| Sample code | Gram stain | Shape of microorganisms | Biochemical test | | | | | | Mac-Conkey culture |
|---|---|---|---|---|---|---|---|---|---|
| | | | Indole | MR test | VP test | Citrate | Catalase | Coagulase | |
| **NBS-06** | + | Cocci | - | + | + | - | + | + | - |
| **NBS-02** | + | Cocci | - | + | - | - | + | + | - |
| **NBSm-02** | - | Bacilli | + | + | - | - | + | - | + |
| **NBS-07** | + | Cocci | - | + | + | - | + | + | - |
| **NBH-04** | + | Cocci | - | + | - | - | - | - | - |
| **NBH-07** | - | Bacilli | - | - | + | + | + | - | + |
| **NBS-14** | - | Bacilli | + | + | - | - | + | - | + |
| **NBC-07** | + | Cocci | - | + | - | - | + | + | - |
| **NBC-01** | - | Bacilli | - | - | + | + | + | - | + |
| **NBC-05** | - | Bacilli | + | + | - | - | + | - | + |
| **NBH-12** | - | Bacilli | - | - | + | + | - | - | + |
| **NBC 09** | - | Bacilli | + | + | - | - | + | - | + |
| **NBC-10** | + | Cocci | - | + | - | - | - | - | - |
| **NBC-08** | - | Bacilli | - | - | + | + | + | - | + |
| **NBS-05** | + | Cocci | - | + | - | - | + | + | - |
| **NBS-08** | + | Cocci | - | + | + | - | + | + | - |
| **NBS-01** | + | Cocci | - | + | - | - | - | - | - |

+ = Positive reaction; - = negative reaction; Sample codes: S refers to students; Sm refers to stiff members; C refers to cleaners and H refers to health professionals.

**Table 2. Percentage of microorganisms isolated from the mobile phones of Noble University students and faculties.**

| S. No. | Microorganismsl isolates | Percentage |
|---|---|---|
| 1 | Escherichia coli | 21.53 % |
| 2 | Enterobacter aerogenes | 22.47 % |
| 3 | Streptococcus cristatus | 18.73 % |
| 4 | Staphylococcus aureus | 37.27 % |

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In gift course of investigation percent of Streptococcus cristatus and Staphylococcus aureus became found 18.73% and 37.27% respectively, which became very a good deal higher than the preceding report. The presence of Gram- poor rods indicated faecal infection of mobile phones. Telephones of cleaners had the most important form of microorganisms in this examine. This may be because of long time publicity to the environment and usage whilst cleaning. Multiple utilization and exposure of mobile telephones to environmental microbes at the hand and pores and skin of the customers may additionally have contributed to the extent of isolation of microorganisms from business phones inside the gift study. This concurs with the previous findings (Rusin et al 2000). The effects confirmed that cellular telephones were contaminated with different styles of microorganisms noted above. consequently, due to private nature of people and proximity to sensitive a part of our bodies in utilization which includes faces, ears, lips and fingers of customers should end up veritable reservoirs of pathogens that might bring about infections.

## V. CONCLUSION

We isolated and characterised microorganisms primarily based on biochemical take a look at and differential staining. In our findings Streptococcus cristatus, Escherichia coli, Enterobacter aerogenes, and Staphylococcus aureus microorganismsl species were recognized. This examine confirmed that cell telephones could serve as vector to transmit those microorganisms from one individual to another. most of these microorganisms are harmful and cause morbidity and mortality in to humans. in order that personal hygienic and sanitation measures inclusive of washing of hand earlier than and after dealing with of meals and speak to decontamination need to be adopted through people to save you microorganismsl infections.

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