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RESEARCH ARTICLE

EFFECT OF APPLICATION OF WRAPAROUND CLING FILM ON THE REDUCTION OF MICROBIAL CONTAMINATION OF MOBILE PHONES IN THE DENTAL OPERATORY-A COMPARATIVE EVALUATION

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Abstract

Aim: To evaluate and compare the microbial contamination of mobile phones with or without a wraparound mobile phone cover.

Material And Methods:34 dentists were included in the study and they were divided into 2 groups of 17 participants(group A and group B). Swabs were collected from the mobile phones of each participant as they reached the college, using a sterile swab impregnated with normal saline, aseptically. The mobile phones of all the participants were then disinfected.The phones of participants in group A were then covered using a wraparound cling film,whereas the phones of participants in group B were uncovered.By evening, samples were collected from each participant' sphones.The samples were transported immediately to the microbiological laboratory for culture and identification of microorganisms.The swabs were streaked onto blood agar,McConkey agar, Sabouraud dextrose agar,the plates were then incubated at 37oC for 48 hours.Isolated microorganisms were identified using Gram stain, morphology, catalase and coagulase reaction.

Results: Statistical analysis was donewith, Mann Whitneytest, Wilcoxon Signed Ranks Test,SPSS software. The results showed a statistically significant reduction in microbial growth in Group A as compared to that of group B for samples collected in the evening.

Clinical Significance: Preventing cross infection.

Conclusion: Mobile phones disinfected and covered with a wraparound cling film showed significant reduction in microbial growth indicating its use in the prevention of cross infection.

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Introduction:-

The mobile phones make life easier, as they are small and very useful during emergencies, they are the much preferred and most used routes of communication. Mobile communication technology increases the speed of communication and contact within health care institutions, making health care delivery more efficient. Today, mobile phones have become one of the indispensable accessories of professional and social life.[1]

Mobile phones of healthcare workers (HCWs) could be colonized by potential bacteria pathogens and could become vectors of nosocomial pathogens in healthcare facilities. Research has shown that the mobile phone could constitute a major health hazard. Microbiologists are of the opinion that the combination of constant handling and the heat generated by the phones creates a prime breeding ground for all sorts of microorganisms that are normally found on the human skin.[2]

According to the report by Cellular Operators Association of India, the total number of mobile phone users as of April 2017 is 934.58 million. If dentistry is concerned in particular, India now has >70,000 registered dentists, and it has been assumed that almost every dentist has a private cellular telephone (mobile phone), which highlights its importance in the medical/dental field.[3]

Dental clinics deal with bacterial aerosols generated by high-speed dental handpieces which settle over a long distance. Particularly, aerosols and spatter produced during dental procedures are a potential source for various diseases. Since mobile phones have established themselves as an unavoidable means of communication, dentists make or receive phone calls in clinical setup which has become a routine practice nowadays. It leads to the dental professionals being at a greater risk for acquiring and spreading infections.[4]

However, the key fact is that these phones are seldom cleaned by healthcare professionals and are frequently being contacted during or after patient examination and handling of specimens without proper aseptic measures such as proper hand washing, wearing personal protective equipment and sterilisation of dental instruments. Being small and compact, these mobile phones take up the role of reservoirs of infection, leading to the occurrence of various nosocomial infections.[5]

If disinfection of mobile phones is taken into consideration, rubbing the phone with a lint-free cloth dipped in 70% isopropyl alcohol is one of the most commonly used methods and certain studies have proved that this method is very much effective.

Hence, the aim of the study was to evaluate and compare the microbial contamination of mobile phones with or without a wraparound mobile phone cover.

Materials And Method:-

The study included Thirty-four mobile phones belonging to dentists working in the department of Conservative Dentistry and Endodontics, College of Dental Sciences, Davangere. The mobile phones of the participants were randomly divided into two groups, group A and group B, with 17 phones in each group.

Morning samples were collected from all the participants of both group A and group B as they reached the college. The mobile phone was first held with the aid of sterile gloves. Then by using a sterile swab impregnated with normal saline, samples were collected aseptically by rotating damp cotton swabs over three sites overall exposed outer surfaces of the mobile phones.The collected samples were then immediately transported to the microbiological lab. The samples were then streaked onto blood agar, McConkey agar, and Sabouraud dextrose agar. The culture plates were then incubated in an incubator at 37^0C for 48 hours.

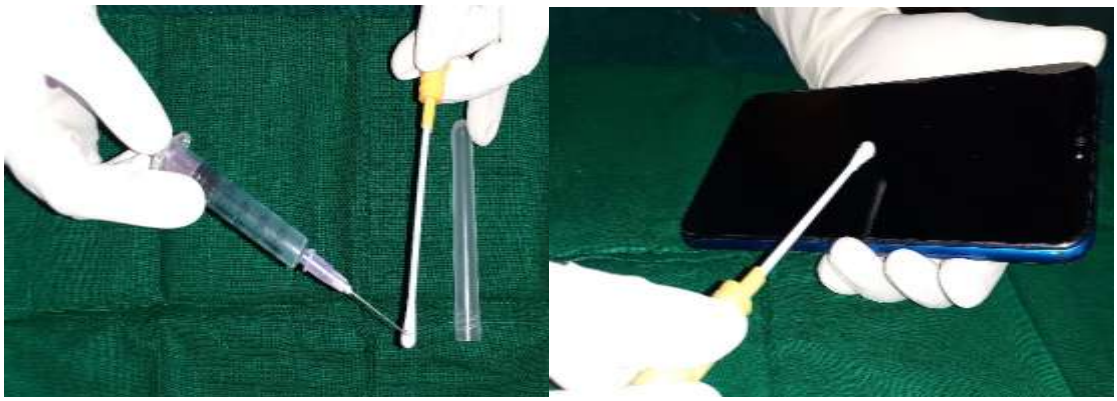

Fig1:- Dampening of the sterile swab with saline and collection of samples.

The mobile phones of all the participants of group A and group B were then disinfected with multi surface disinfectant spray by holding the phone 15-20 cm away from the nozzle and wiping it with a lint -free cloth. The mobile phones of participants of group A were then covered using a wraparound cling film, whereas mobile phones of participants of group B were left uncovered.

The participants were given back their mobile phones. By evening, samples were again collected using sterile swabs impregnated with saline, aseptically by rotating damp cotton swabs over three sites over all exposed outer surfaces of the mobile phones. For this, the wraparound cling film was removed first from the mobile phones group A participants were as the samples were collected directly from the surface of mobile phones of participants of group B. The collected samples were then immediately transported to the microbiological lab. The samples were then streaked on to blood agar, McConkey agar and Sabouraud dextrose agar. The culture plates were then incubated in an incubator at 37^0C for 48 hours.

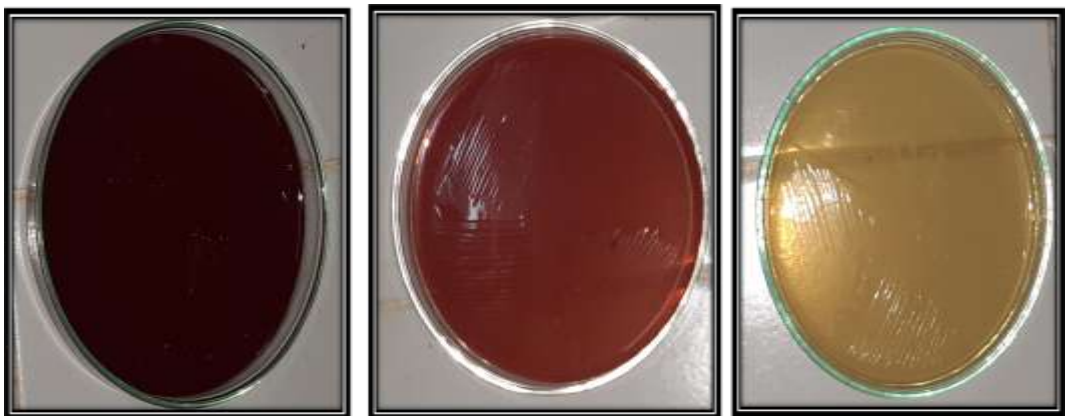

Fig 2:- Blood agar, MacConkey agar and Sabouraud dextrose agar, after streaking with swab samples.

After culturing the samples, the CFU were counted from the culture plates, manually and were given scores as shown in the table.(TABLE 1)

The microorganisms were identified using gram staining, morphology, catalase and coagulase reactions.

Table 1:- Density of microbial colony forming units and their corresponding scores.

Scores	**Density of Microbial Colonies**
0	No colonies (0 CFU)
1	Mild density (0-20 CFU)
2	Moderate density (20-40 CFU)
3	High density (40-60 CFU)
4	Very high density (60-80 CFU)
5	Extremely high density (80-100 CFU)

Statistical Analysis

SPSSS version 21.0(IBM Corp) software was used to carry out the statistical analysis of the data. Intergroup comparison was done using Mann Whitney U test, Wilcoxon signed rank test and descriptive statistics.

Results:-

Table 2:- Scores For Group A And Group B On Blood Agar Culture Plates.

Blood agar	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5
Group A (Morning)	0	0	2	9	6	0
Group A (evening)	0	14	3	0	0	0
Group B (morning)	0	0	0	10	7	0
Group B (evening)	0	0	6	10	1	0

Table 3:- Scores For Group A And Group B On Mcconkey Agar Culture Plates.

McConkey Agar	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5
Group A (Morning)	0	0	5	8	4	0
Group A (evening)	0	12	5	0	0	0
Group B (morning)	0	0	0	9	8	0
Group B (evening)	0	0	3	8	6	0

Table 4:- Scores For Group A And Group B On Sabouraud Dextrose AgarCulture Plates.

Sabouraud dextrose agar	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5
Group A (Morning)	0	0	0	12	5	0
Group A (evening)	0	14	3	0	0	0
Group B (morning)	0	0	0	13	4	0
Group B (evening)	0	0	3	12	2	0

Table 5:- GROUP A - Wilcoxon Signed Ranks Test- descriptive analysis for blood agar.

	N	MEAN	SD	MINIMUM	MAXIMUM	P value
GROUP A-MORNING	17	3.23	0.664	2.00	4.00	0.00
GROUP A-EVENING	17	1.17	0.392	1.00	2.00	

Table 6:- GROUP B - Wilcoxon Signed Ranks Test- descriptive analysis for blood agar.

	N	MEAN	SD	MINIMUM	MAXIMUM	P value
GROUP B-MORNING	17	3.411	0.507	3.00	4.00	0.07
GROUP B-EVENING	17	2.705	0.587	2.00	4.00	

Table 7:- GROUP A - Wilcoxon Signed Ranks Test- descriptive analysis for McConkey agar.

	N	MEAN	SD	MINIMUM	MAXIMUM	P value
GROUP A-MORNING	17	2.941	0.747	2.00	4.00	0.00
GROUP A-EVENING	17	1.294	0.469	1.00	2.00	

Table 8:- GROUP B - Wilcoxon Signed Ranks Test- descriptive analysis for McConkey agar.

	N	MEAN	SD	MINIMUM	MAXIMUM	P value
GROUP B-MORNING	17	3.470	0.514	3.00	4.00	0.342
GROUP B-EVENING	17	3.176	0.727	2.00	4.00	

Table 9:- GROUP A - Wilcoxon Signed Ranks Test- descriptive analysis for Sabouraud dextrose agar.

	N	MEAN	SD	MINIMUM	MAXIMUM	P value
GROUP A-MORNING	17	3.294	0.469	3.00	4.00	0.00
GROUP A-EVENING	17	1.176	0.392	1.00	2.00	

Table 10:- GROUP B - Wilcoxon Signed Ranks Test- descriptive analysis for Sabouraud dextrose agar.

	N	MEAN	SD	MINIMUM	MAXIMUM	P value
GROUP B-MORNING	17	3.235	0.437	3.00	4.00	0.096
GROUP B-EVENING	17	2.941	0.555	2.00	4.00	

Fig 3:- Blood agar culture for samples (evening samples) for both group A and group B.

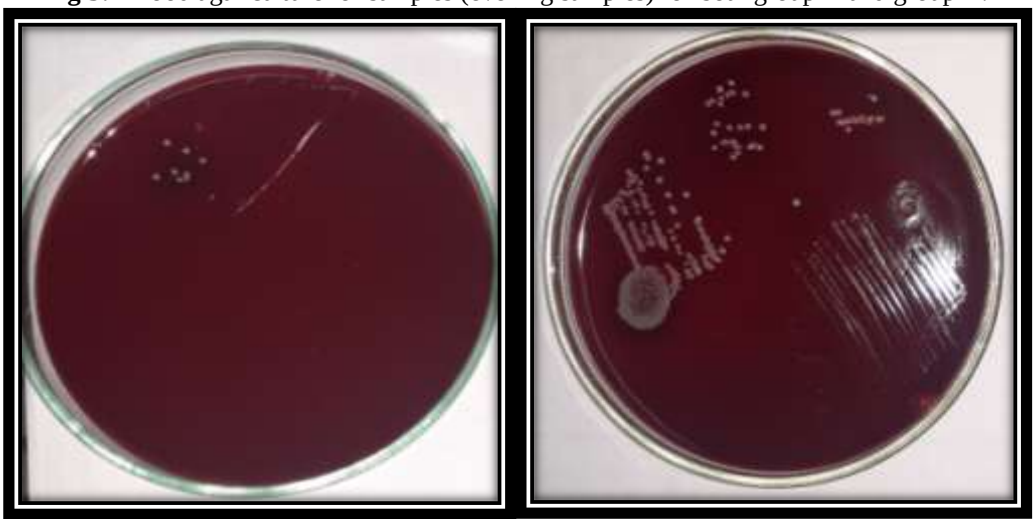

Fig 4:- McConkey agar culture for samples (evening samples) for both group A and group B.

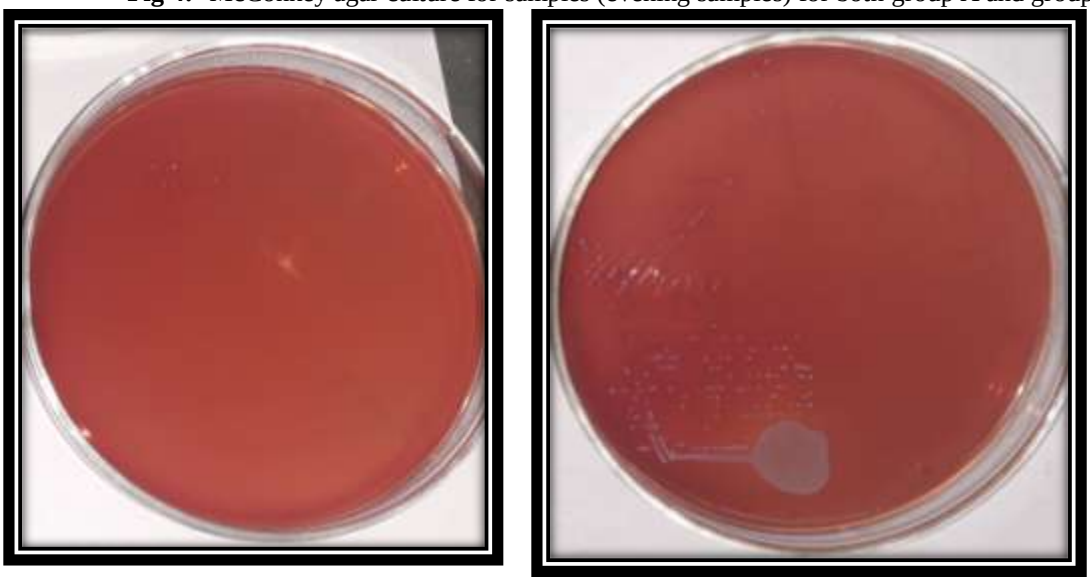

Fig 5:- Sabouraud dextrose agar culture for samples (evening samples) for both group A and group B.

Table 11:- Percentage Of Microorganisms Identified Using Gram Staining, Morphology, Catalase And Coagulase Reactions.

MICROORGANISM	PERCENTAGE	Mobile phone (N=34)
Staphylococcus epidermidis	64%	22
Staphylococcus aureus	63%	21
E.coli	26%	9
Candida albicans	55%	19
Aspergillus niger	8%	3

Discussion:-

Mobile phones are indispensable part of communication among doctors and other health care workers (HCWs) in hospitals. Hands of HCWs play an important role in transmission of hospital associated infection(HAI) and mobile phones which are seldom cleaned and often touched during or after the examination of patients without hand washing can act as a reservoir for transmission of potent pathogens.[6] The present study was conducted to evaluate and compare the microbial contamination of mobile phones with or without a wraparound mobile phone cover.

The results showed that there was a statistically significant reduction in the blood agar culture growth for samples of Group A that was collected in the evening as compared to morning, with a p value of 0.00.But the blood agar culture growth for samples of Group B that was collected in the evening showed no significant difference from that of the samples collected in the evening.

There was a statistically significant reduction in the MacConkey agar culture growth for samples of Group A that was collected in the evening as compared to morning, with a p value of 0.00.But the MacConkey agar culture growth for samples of Group B that was collected in the evening showed no significant difference from that of the samples collected in the evening, with a p value of 0.342.

There was a statistically significant reduction in the Sabouraud dextrose agar culture growth for samples of Group A that was collected in the evening as compared to morning, with a p value of 0.00.But the Sabouraud dextrose agar culture growth for samples of Group B that was collected in the evening showed no significant difference from that of the samples collected in the evening, with a p value of 0.096.

The microorganisms that were identified using gram staining, morphology, catalase and coagulase reactions were, Staphylococcus epidermidis, Staphylococcus aureus, E.coli, Candida Albicans and Aspergillus niger. The high isolation percent of Staphylococcus epidermidis clarified that the source of most mobile phones contaminated bacteria are the skin.

Limitations Of The Study

One of the limitations of the research was the lack of culture of bacteria such as Klebsiella species and enterococcus faecalis. So, it is suggested that these bacteria will be cultured in future research.

Conclusion:-

Within the limitations of the study, it can be concluded that, protective covering of mobile phones with a cling wrap has a significant role in reducing their microbial contamination while in the dental operatory, there by significantly reducing the risk of cross contamination and spread of infection.

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