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JIDAK January-March 2019, Volume 1 , Issue 1

JOURNAL OF INDIAN DENTAL ASSOCIATION - KOCHI

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# JIDAK

January-March 2019, Volume 1 , Issue 1

JOURNAL OF INDIAN DENTAL ASSOCIATION - KOCHI

Journal of Indian Association of Kochi Branch (JIDAK) is the official scientific publication of Indian Dental Association, Kochi Branch. It is a peer-reviewed journal published quarterly in e-format as well as print format.

The journal invites manuscripts from dental and other allied health sciences. It publishes manuscripts under categories of Original Research, Review and Case Reports.

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## EDITORIAL BOARD

# Messages

I am extremely glad to know that IDA Kochi is releasing a scientific journal for the first time. IDA Kochi is one of the most vibrant branches in Kerala and is rich with frontline leaders both in state and national level.

Every year IDA Kochi is keen to conduct various branch level and state level programs which has been very well appreciated. I am sure that this year also IDA Kochi will achieve remarkable milestones as earlier by planning and executing useful programs for members and public. I wholeheartedly extend my best wishes to the new team lead by. Dr. Bindu Rachel Thomas and Dr. Siby T. Chennankara and Wishing you a very successful and productive IDA year.

Scientific journals are very much useful for general practitioners for updation of knowledge. All members should make use of this journal and can improve their day to day practice by referring these type publications. Experienced authors share their clinical experiences and knowledge here and thus members are much benefited by implementing the new updates in their practice. I use this opportunity to congratulate the Editor Dr. Meera Gopalakrishnan for her untiring effort to bring out this Journal "JIDAK". I hope IDA Kochi will publish Journals at regular intervals in future .On behalf of IDA Kerala state I wish all success to "JIDAK" : once again congratulations .Team "IDA KOCHI"

**Dr. G. S. Abhilash**
**President,**
**IDA Kerala State**

It gives me immense pleasure to pen a message for IDA Kochi's new venture - Journal.

At this point of time when there is increasing importance on evidence based treatment, the significance of scientific journals can never be understated. With more and more dental surgeons graduating, the need to have quality publications to document clinical knowledge and research is also on the rise.

Moreover the platform that a branch scientific journal provides to the editorial team is immense. It is definitely a stepping stone to identify and groom potential members with editorial accumen towards accepting larger responsibilities in future.

IDA Kerala State wishes IDA Kochi and it's editorial team the very best in its new venture.

**Dr Suresh Kumar G**
**Hon. Secretary,**
**IDA Kerala State**

Dear IDA Kochi members.

It gives me immense pleasure to have been given an opportunity to write a foreword to the IDA Kochi's Scientific Journal with the new face, new aspirations and goals called the JIDA Kochi. Sharing scientific information and updating oneself by reading that facilitates knowledge upgradation and brings about a thought process that increases one's quest on newer developments research or clinical cases happening in the profession. This great initiative by IDA Kochi for the benefit of its fraternity should be applauded and I wish all the brains behind this all success in bringing out this Journal

Jai IDA

**Dr. Anjana G.**
**Chief Editor, Kerala Dental Journal**
**IDA Kerala State**

# Messages

A scientific journal is a major milestone for any professional organization. It is a very proud and honourable moment for every member of IDA Kochi , as our lst scientific journal is being rolled out .

A journey from dream to reality .

The I[st] issue consists of - 3 Original articles. 2 Case reports and 3 Review articles. The great contribution by the authors is highly appreciated.

The consistent effort by our editor. Dr. .Meera Gopalakrishnan. Editor-in-charge. Dr. Subramaniam R. and the dedicated Editorial team to set the standards high is commendable.

May this journal add value and knowledge to the dentists and be of value to the community at large. .

Wishing the Journal of IDA Kochi all the best.

**Dr.Bindu Rachel Thomas**
**President**
**IDA Kochi**

Indian Dental Association, Kochi is giving birth to its first E-Journal other than it's print version today. The Journal of Indian Dental Association ,Kochi (JIDAK) is a peer-reviewed journal that publishes a wide variety of educational and scientific research in dental, allied dental and advanced dental education. By airing a journal in internet, I hope that JIDAK will be recognized internationally as the premier journal for academic dentistry. I really congratulate the Chief Editor. Dr Meera Gopalakrishnan and team for making this dream a reality. I wish all the best to the journal and expect JIDAK will carry the pride of IDA Kochi at a higher level.

**Dr. Siby T. Chennankara**
**Hon. Secretary**
**IDA Kochi**

# Chief Editors Message

The IDA Kochi branch has added one more feather to its illustrious cap by publishing the first ever scientific journal under the moniker - JIDAK.

As dentists, we have to keep ourselves abreast of the ever changing trends in treatment modalities and the rapid development and evolution taking place in the field of dentistry.

We, at the editorial board assure you that JIDAK will function like a beacon helping you to update your knowledge and hone your clinical skills, thus making you on par with the dental professionals across the international spectrum.

The editorial panel has taken pains to fill in the lacunae observed in other journals by focussing on the latest updates on research, reviews, materials and techniques from the wide range of disciplines within the domain of dentistry.

Also on the anvil is the introduction of an online version of JIDAK, which we are sure would enhance the accessibility of the journal worldwide and is a step towards embracing a paperless future trend.

On the occasion of the launch of this path breaking and novel initiative in the guise of this journal JIDAK, a warm note of gratitude is extended to IDA Kochi Office for their motivation and support.

I extend a special appreciation for the meticulous planning and execution by The Editor-in-charge Dr R Subramaniam for all the help rendered and the Co-editors who worked with me relentlessly to make this dream a reality. I express our Heartfelt gratitude to our guiding lights, the advisors to the Editorial board and all senior members of IDA Kochi for the continuous encouragement and support!

We solicit and look forward to help from all quarters to make JIDAK the benchmark reference manual for dentists both nationally and internationally!!!

JAI IDA

**Dr. Meera Gopalakrishnan**
**Chief Editor- JIDAK**
**IDA Kochi**

# CONTENTS

ORIGINAL RESEARCH ARTICLE

# EVALUATION OF ANTIMICROBIAL EFFICACY OF CHITOSAN AGAINST ENTEROCOCCUS FAECALIS : AN INVITRO STUDY


## ABSTRACT

**Background:** Enterococcus faecalis are considered the most resistant species of bacteria which are responsible for root canal treatment failures. Chitosan is a natural polysaccharide Research reveal that 0.2% chitosan has effectively removed smear layer from the root canals after instrumentation and has good antibacterial action. An ideal irrigant should have antimicrobial property comparable to NaOCl. This study was conducted to evaluate the antimicrobial efficacy of a higher concentration of chitosan (0.6%) against Enterococcus faecalis.

**Materials and Methods:** For preparation of the test solution (0.6% chitosan), 0.6g of chitosan was diluted in 100 ml of 1% acetic acid and the mixture was stirred for 2h using a magnetic stirrer until obtaining crystalline homogeneous solution. A sterile 96 micro titer well plate was labeled: Group I (control group) - 5.25% NaOCl, Group II (experimental group) - 0.6% Chitosan. A volume of 1 µl, 10 µl, 50 µl and 100µl of test material was pipetted into 10 wells each. Following which nutrient broth (100µl) was added and finally, microbial suspension (100µl) of E. faecalis was added to each well. After well -mixing, the plates were incubated at 370 C for 24 hours and Optical density (OD) reading was taken after incubation.

**Results:** Data was analyzed using one way ANOVA ( analysis of variance) at a significance level of 0.05, using SPSS version 12.0.1 for Windows (SPSS Inc., Chicago, IL, USA). The statistical analysis of the result revealed that 5.25% NaOCl had significantly better antibacterial action than 0.6% chitosan.

**Conclusion:** Within the limitations of the study it was concluded that 0.6% chitosan shows antimicrobial properties comparable to that of 5.25% NaOCl.


**Key words:** Sodium hypochlorite, chitosan, Enterococcus faecalis, antimicrobial.


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## INTRODUCTION

The success of endodontic treatment depends on the elimination of microbes from the root-canal system and prevention of reinfection. The root canal is shaped with hand and rotary instruments with continuous irrigation to remove the inflamed and necrotic tissue, microbes/biofilms, and other debris from the root-canal space.[1] Studies have demonstrated that large areas of the root-canal wall remain untouched by the instruments, emphasizing the importance of chemical means of cleaning and disinfecting all areas of the root canal.[2] Hence irrigation plays a central role in endodontic treatment. During and after instrumentation, the irrigants facilitate removal of microorganisms, tissue remnants; dissolve organic and inorganic matter and dentin chips from the root canal through a flushing and chelatingmechanism.[3]

Enterococcus faecalis are considered the most resistant species of bacteria which are responsible for root canal treatment failures. E. faecalis possesses certain virulence factors which include lytic enzymes, cytolysin, aggregation substance, pheromones and lipoteichoic acid. It has been shown to adhere to host cells, express proteins that allow it to compete with other bacterial cells and alter host responses.[4] In addition it is able to suppress the action of lymphocytes, potentially contributing to endodontic failure.[5]

Sodium hypochlorite has been used widely because of its ability to dissolve organic matter and its high antimicrobial potential. However it's toxic to the periapical tissues, weakens dentine by reducing its flexural strength and resilience thus making it more susceptible to deformation and possibly fracture.[6]

The ideal requirement of an irrigant includes the removal of both organic and inorganic material. In addition it is active only against the organic material; therefore other irrigants must be used to for the removal of the smear layer and dentin debris.[1]

Chitosan is a natural polysaccharide comprising of copolymers of glucosamine and N-acetylglucosamine which is biocompatible, biodegradable, shows bioadhesion and lacks toxi-city. Chitosan is obtained by the deacetylation of chitin, which is found in crab and shrimp shells.[7] Previous research revealed that 0.2% chitosan has effectively removed smear layer from the root canals after instrumentation and has good antibacterial action.[8]An ideal irrigant should have antimicrobial property comparable to NaOCl. So the aim of this study was to compare the antimicrobial efficacy of a higher concentration of chitosan (0.6%) to 5.25% NaOCl against E. faecalis.

## METHODOLOGY

### Test solution preparation:

0.6% chitosan solution was prepared by diluting 0.6g of chitosan in 100 ml of 1% acetic acid and the mixture was stirred for 2h using a magnetic stirrer until obtaining crystalline homogeneous solutions.

**Antimicrobial assay using micro titer plate method:**

**Broth dilution method:**

One of the most basic anti-microbial susceptibility testing method is the Broth micro-or macro-dilution. The procedure involves preparing two-fold dilutions of the antimicrobial agent (8, 16 and 32 mg/ml) in a liquid growth medium dispensed in tubes containing a minimum volume of 2m - macro dilution method or with smaller volumes (1 µl, 10 µl, 50 µl and 100µl) using 96-well micro titration plate-micro dilution method. This method helps to find the minimum inhibitory concentration (MIC) which is the lowest concentration of antimicrobial agent that completely inhibits growth of the organism in tubes or micro-dilution wells as detected by the unaided eye. In the present study we used Broth micro dilution method.

A sterile 96 micro titer well plate was labeled:Group I (control group) - 5.25% NaOCl, Group II (experimental group) - 0.6% Chitosan. A volume of 1 µl, 10 µl, 50 µl and 100µl of test material was pipetted into 10 wells each (Fig 1). Following which nutrient broth (100µl) was added and finally, microbial suspension (100µl) of E. faecalis (ATCC29212) was added to each well (Fig 2). Control dilutions (drug free wells) were also kept. After well -mixing, the plates were incubated at 370 C for 24 hours and Optical density (OD) reading was taken after incubation (Fig 3).

Optical density was obtained from subtracting the control OD from the sample OD.

% of inhibition= (Control OD- Test OD)/Control ×100

## RESULTS

**TABLE 1**

| MEAN VALUE | | | | |
|---|---|---|---|---|
| Concentration (µl) | 1 µL | 10 µL | 50 µL | 100 µL |
| % of inhibition | 44.01 | 80.51 | 82.30 | 94.77 |

Sample 1:The percentage of inhibition of E. faecalis at different concentration of 5.25% NaOCl

**TABLE 2**

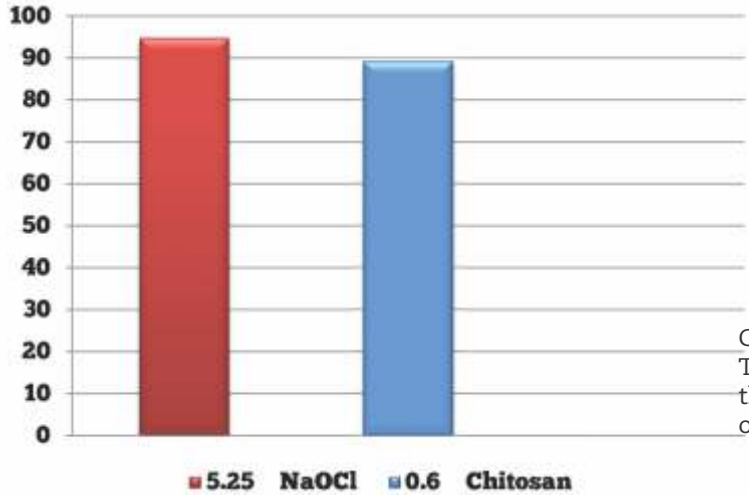
| MEAN VALUE | | | | |
|---|---|---|---|---|
| Concentration (µl) | 1 µL | 10 µL | 50 µL | 100 µL |
| % of inhibition | 57.9 | 73.8 | 77.21 | 89.28 |

Sample 2: The percentage of inhibition of E. faecalis at different concentration of 0.6% Chitosan

**TABLE 3**

| | | F | Sig. |
|---|---|---|---|
| 1 µL | Between Groups | 295.25 | .000* |
| 10 µL | Between Groups | 55.65 | .000* |
| 50 µL | Between Groups | 13.527 | .003* |
| 100 µL | Between Groups | 48.365 | .000* |

TABLE 3: Inter group comparison between 2 groups using ANOVA
*(P ≤ 0.05) – statistically significant.




Graph 1:
The graph representing the percentage of inhibition of E. faecalis at 100µl.

Graph 1: The graph representing the percentage of inhibition of E. faecalis at 100µl.

The results were statistically evaluated using one way ANOVA. The $p \leq 0.05$ showed that the results were statistically significant. The statistical analysis was performed using SPSS version 12.0.1 for Windows (SPSS Inc., Chicago, IL, USA). The results revealed that 5.25% NaOCl had better antibacterial action followed by 0.6% chitosan solution.

## DISCUSSION

Enterococcus faecalis is the most commonly implicated microorganism in asymptomatic persistent infections.[9] The highly complex nature of the organism poses a great challenge for endodontists. E.faecalispossess different virulence factors that avail their adhesion to host cells and extracellular matrix, which in turn facilitates tissue incursion, causes immune modulation and engenders toxin mediated damage.[10] It exhibits strong adhesion to collagen[11] and display resistance to chemomechanical preparation.[12] It can also survive in a quiescent phase with low metabolic activity for a long period of time.[13]

NaOCl has high antimicrobial property. Giardinoet al demonstrated that 5.25% NaOCl eliminated E. faecalisbiofilm in 30 seconds.[14] Dunavantet al, have shown that only NaOCl is able to kill the whole bacteria population organized in a biofilm.[15] Though sodium hypochlorite has been found to be the most potent endodontic irrigant but it has certain disadvantages like toxicity and to overcome this more biocompatible solution can be used. 0.2% chitosan is biocompatible, has good smear layer removal property and antibacterial action. But the search of an irrigant with better antibacterial action has lead to this study which compares a higher concentration of chitosan (0.6%) to NaOCl.

In this study NaOCl showed better results than 0.6% chitosan solution. In chitosan the cationically charged amino group may combine with anionic components such as N-acetyl muramic acid, sialic acid, and neuramic acid on the cell surface and suppresses growth of bacteria by impairing the exchanges with medium, chelating transition metal ions, and inhibiting enzymes.[16]

It binds to DNA and inhibits mRNA synthesis by penetrating toward the nuclei acid of microorganisms and interfering with the synthesis of mRNA and proteins.[16]

The results of this study was in concordant to a study done by Pankaj et al who checked the antimicrobial activity of chitosan and the data revealed that 0.25% chitosan and 0.5% chitosan has antimicrobial activity against E. faecalis and Candida albicans and showed no cytotoxicity.[17]

Several bioassays such as disk diffusion and well diffusion methods are commonly used to compare the anti microbial properties. But the dilution methods are the most appropriate ones for determination of the minimum inhibitory concentration (MIC) values.

One of the most basic anti-microbial susceptibility testing method is the Broth micro- or macro-dilution.[18] Unlike micro-dilution method, the main disadvantages of the macrodilution method are the tedious, manual undertaking, risk of errors in the preparation of antimicrobial solutions for each test, and the comparatively large amount of reagents and space required. Thus, the reproducibility and the economy of reagents and space that occurs due to the miniaturization of the test are the major advantages of the microdilution method.[19]

The results clearly demonstrated that the action of test irrigants could reduce the number of bacterial cells from the root canal. Bacterial reduction was significantly superior when NaOCl was used as irrigant. The present study demonstrates that the antibacterial efficacy of 0.6% chitosan is comparable to NaOCl. As 0.6 % chitosan is biocompatible, can effectively remove smear layer and has antimicrobial properties it can be used as an endodontic irrigant to overcome the deleterious effects of the conventional irrigants (NaOCl and EDTA) on dentine.[17]

## CONCLUSION

Within the limitations of the study it was concluded that 0.6% chitosan shows antimicrobial properties comparable to that of 5.25% NaOCl.

Figure 1:
Pipetting the test materials into the wells

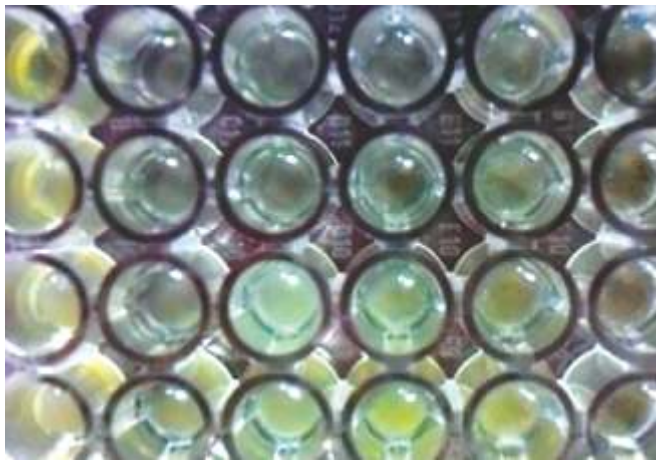


Figure 2:
Micro titer plates with the test materials


Figure 3:
Micro titer plate reader

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ORIGINAL RESEARCH ARTICLE

# KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING PHARMACOVIGILANCE AMONG STUDENTS, HOUSE SURGEONS AND TEACHING FACULTY IN A DENTAL COLLEGE IN KERALA


## ABSTRACT

**Background:** Adverse Drug Reactions (ADR's) are currently a problem of major concern . Studies reveal that ADR reporting in India is just less than 1% compared to world-wide figure of 5% . Adverse drug reaction reporting is the foundation of any pharmacovigilance system and the timely identification and reporting of ADRs to the regional or national drug-regulating authorities are critical. Dental students can play a pivotal role and bringing a paradigm shift in successful implementation of pharmacovigilance program provided they possess adequate knowledge and skill. The study objective was to assess the Knowledge, Attitude and Practices regarding Pharmacovigilance among students, house surgeons and teaching faculty in a Dental college in Kerala.

**Methodology:** The study was a cross-sectional questionnaire based survey. A prefabricated validity tested questionnaire was devised for use based on previous studies. The questionnaire consisted of questions on professional data designation, grade; and18 questions assessing the knowledge, attitude and practices on Pharmacovigilance. Results were expressed as a number and percentage of respondents for each. Chi-square test was performed to compare the response in relation to year of study and designation.

**Results:** The total sample size was 162. 28% knew that doctors, nurses, pharmacists and dentists can report Adverse drug reactions. About 25% knew about the existence of a pharmacovigilance program in India. 65% knew the regulatory body responsible for monitoring ADR's in India. About 96% felt that ADR reporting should be mandatory. 93.8% opined that pharmacovigilance should be taught in detail to health care professionals. About 35% reported to experiencing ADR's during their practice, yet none of the 162 respondents have reported an ADR to the pharmacovigilance centre. Only 2.5% had seen a reporting form and only 1.2% had received a prior training on reporting of the same.

**Conclusion:** The study showed that although the respondents had a positive attitude towards pharmacovigilance, their knowledge and practice was poor.



**Key Words:** Adverse drug reactions, pharmacovigilance, dental students, dentists, house surgeons.

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## INTRODUCTION

Adverse Drug Reactions (ADR's) are currently a problem of major concern.[1] They are noxious, unintended and undesirable effect that occur as a result of drug treatment at doses normally used in man for diagnosis, prophylaxis and treatment.[2] ADR are indeed complex issues requiring special attention; involving patients, medical and paramedical professionals, nurses, pharmaceutical companies, drug regulatory agencies and academic scientists.[1] ADR's affect patients of all age groups - young and old with varying degrees of morbidity and at times mortality.[1,3] ADRs are reported to be the 4-6th leading cause of death in United States of America (USA). The burden of ADRs is even higher in developing countries. The most common contributory factors being the widely prevalent self-medication, availability of adulterated and fake medicines.[3] Adverse drug reactions thus have a major impact on public health. Spontaneous ADR reporting is an important aspect in monitoring known and unknown adverse effects of medicines. Spontaneous reporting of ADRs has played a pivotal role in the detection of serious and unusual ADRs during marketing of the drug in actual practicing in the market. It can aid in preventing new medicine tragedies and enhancing the safety profile of drugs.[4]

Studies reveal that ADR reporting in India is just less than 1% compared to world-wide figure of 5%.[5] The World Health Organization (WHO) defines pharmacovigilance (PV) as "the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug-related problem". Pharmacovigilance aims at enhancing patient safety by assessing the risk-benefit profile of medicines (WHO,2002a). As such, adverse drug reaction (ADR) reporting is the foundation of any pharmacovigilance system and the timely identification and reporting of ADRs to the regional or national drug-regulating authorities are critical.[6]

To promote drug safety WHO started Program for International Drug Monitoring in 1961 and subsequent to that it promoted pharma covigilance program at country level in collaboration with Center for International Drug Monitoring, Uppsala.[7] The Uppsala Monitoring Centre (UMC), Sweden maintains the international database of ADR report received from different countries. India is an active participant in this program.[1,3,7]

Pharmacovigilance Programme of India (PvPI) was formed in July 2010.Its is established as a combined initiative of Central Drugs Standard Control Organization (CDSCO), New Delhi, MoHFW, Government of India, presently having 202 ADR reporting centres countrywide.[8]

Medical and Dental students can play a pivotal role and bringing a paradigm shift in successful implementation of pharmacovigilance program provided they possess adequate knowledge and skill.[7] The major lack of spontaneous reporting is due to decreases awareness among healthcare personnel regarding the same. The knowledge, attitude, and practice (KAP) studies are one of the best tools in assessment of ADR reporting among healthcare professionals and to understand their perspective towards Pharmacovigilance and safety of patients.[8]

Hence, this study was conducted with an objective of assessing the Knowledge, Attitude and Practices regarding Pharmacovigilance among students, house surgeons and teaching faculty in a Dental college in Kerala.

## METHODOLOGY

The study was a cross-sectional questionnaire based survey. The target population was the clinical dental students (Third year and Final Year undergraduate students), House surgeons and teaching faculty of Indira Gandhi Institute of Dental Sciences, Nellikuzhy, Kothamangalam, Kerala. A prefabricated validity tested questionnaire was devised for use based on previous studies.

The questionnaire was divided into two parts. The first part consisted of questions on professional data designation and grade. The second part contained 17 closed ended and 1 open ended questions assessing the knowledge, attitude and practices on Pharmacovigilance.

The questionnaires were distributed by the house surgeons posted in the Department of Public Health Dentistry. The respondents filled the questionnaire on their own and were asked to return the questionnaire immediately.

Necessary ethical clearance for the study was obtained from the Institutional Ethical Committee. The respondents were briefed about the study and informed consent was obtained from all the participants prior to the administration of questionnaire. The final study sample was 183.

### Statistical analysis

All returned questionnaires were coded and analysed. Results were expressed as a number and percentage of respondents for each question and were analysed using the SPSS Version 17 software. Chi-square test was performed to compare the response in relation to year of study and designation; and the level of significance was set at $p = 0.05$.

## RESULTS

Respondent's Profile: The study was conducted among the clinical dental students (III year and Final year BDS), house surgeons and teaching faculty of the institution. Table 1 shows the profile of the respondents.

Table 1: Profile of the respondents

| YEAR OF STUDY/DESIGNATION | NUMBER OF PARTICIPANTS n (%) |
|---|---|
| III YEAR BDS | 28 |
| FINAL YEAR BDS | 58 |
| HOUSE SURGEONS | 38 |
| FACULTY | 38 |
| TOTAL | 162 |

Table 2 shows the response to the questions assessing the Knowledge, Attitude and Practices regarding Pharmacovigilance. It is observed that 28% knew that doctors, nurses, pharmacists and dentists can report Adverse drug reactions. Only about 25% knew about the existence of a pharmacovigilance program in India. Sixty five percent of the respondents knew the regulatory body responsible for monitoring ADR's in India. About 96% felt that ADR reporting should be mandatory rather than voluntary and 93.8% opined that pharmacovigilance should be taught in detail to health care professionals.

About 35% reported to experiencing ADR's during their practice, yet none of the 162 respondents have reported an ADR to the pharmacovigilance centre. Only 2.5% had seen a reporting form and only 1.2% had received a prior training on reporting of the same. All respondents believed ADR reporting and monitoring will benefit the patients. Eighty four per cent opined that confidentiality of the patient must be maintained while reporting ADR's. About 46% were confident enough to report ADR to concerned authority.

Inferential analysis revealed the teaching faculty had significantly higher knowledge regarding the topic compared to house surgeons and students.

**Table 2: Response to the questions assessing the Knowledge, Attitude and Practices regarding Pharmacovigilance.**

| QUESTION | RESPONSE %(n) |
|---|---|
| 1. The healthcare professionals responsible for reporting ADR's in a hospital is/are (can tick multiple options). | Doctors 41.2% (66)<br>Nurses 24% (40)<br>Pharmacist 8.6% (14)<br>Dentist 19.6% (32)<br>All of the above 28% (46) |
| 2. Do you know regarding the existence of a national Pharmacovigilance Programme in India? | YES 40 (24.1%)<br>NO 122 (75.3%) |
| 3. In India which regulatory body is responsible for monitoring ADRs? | (a) Central Drugs Standard Control Organization (CDSCO) 108<br>(b) Indian Council of Medical Research(ICMR) 26 (16.04%)<br>© Indian Clinical Research Institute (ICRI) 16 (9.80%)<br>(d) Medical Council of India(MCI) 16 (9.80%) |
| 4. At present ADR reporting is voluntary, do you feel that it should made mandatory | Yes 156 (96.30%)<br>No 6(3.70%) |
| 5. Do you think Pharmacovigilance should be taught in detail to healthcare Professionals? | Yes 152 (93.80%)<br>No 10 (6.20%) |
| 6. What is your opinion about establishing ADR monitoring centre in every hospital? | (a) Should be in every hospital 124 (76.50%)<br>(b) Not necessary in every hospital 12 (7.40%)<br>(c) One in a city is sufficient 16 (7.70%)<br>(d) Depends on number of bed size in the hospitals 10 (4.80%) |
| 7. Have you ever experienced adverse drug reactions in your patient during your professional Practice? | Yes 58 (35.8%)<br>No 104 (64.2%) |
| 8. Have you ever reported ADR to the Pharmacovigilance centre? | (a) Yes 0 (0%)<br>(b) No 162 (100%)<br>(c) Don't know where to submit the ADR reporting form<br>(d) Don't know how to fill up the ADR reporting form |
| 9. Have you ever seen the ADR reporting form? | Yes4 (2.5%)<br>No 158 (97.5%) |
| 10. Have you ever been trained on how to report Adverse Drug Reaction (ADR)? | Yes 2 (1.2%)<br>No 160 (98.8%) |

| QUESTION | RESPONSE %(n) |
|---|---|
| 11. Do you think proper ADR reporting and monitoring will benefit the patient? | Yes 162 (100%)<br>No 0 (0%) |
| 12. Do you feel that patient confidentiality should be maintained while reporting ADR | Yes 136 (84%)<br>No 26 (16%) |
| 13. Do you worry about legal problem while thinking about ADR reporting | Yes 76 (47.5%)<br>No 84 (52.5%) |
| 14. Do you feel that ADR reporting is a time consuming activity with no outcome? | Yes 30 (18.8%)<br>No 132 (81.2%) |
| 15. Which of the following factor discourage you from reporting ADRs?<br>(You may tick multiple reasons) | a) Did not know how to report<br>b) Not knowing where to report<br>C) Lack of access to ADR Reporting forms<br>d) Patient confidentiality issues<br>E) Legal liability issues<br>F) Concerns about professional liability |
| 16. Are you confident enough to report an ADR to concern authority | Yes 74 (45.7%)<br>No 88 (54.3%) |

## DISCUSSION

Drug therapy is a quintessential part in medical management of diseases. Although its benefits are many, there are a considerable number of side effects and adverse effects associated with drug usage.[7] The dark history in 1961 by use of the drug thalidomide in pregnancy causing the birth of thousands of congenitally deformed babies led to the initiation of first organized international efforts to address drug safety issues. Further, this episode introduced the adoption of tougher testing, rigorous drug approval and monitoring systems like United States Food and Drug Administration (FDA). The expansion of scientific knowledge in drug safety is attributable to greater awareness and academic interest in this field.[9]

India is one of the largest drug consuming populations in the world. Estimates indicate that about 60,000-80,000 brands of drugs available in the Indian market that are irrationally prescribed and misused.[10] It is thus a responsibility of all health care professionals, including the nurses and pharmacists to take active participation in pharmacovigilance thereby reducing the morbidity and mortality associated with ADR's. Although many studies have been reported assessing the KAP among health care professionals, pharmacist and nurses, studies on dental students are a countable few. Hence this study was undertaken.

The study revealed that only 28% of the respondents knew who all were the health care professionals responsible for reporting ADR's. The result is comparable to the results of studies conducted among tertiary health care professionals in Chennai in 2017 (33%)[8] and among dental students in Malaysia in 2015 (27%)[11]. The results are in contrast with the studies conducted among medical students in Telangana in 2016[9] and dental practitioners in Aurangabad in 2017[12], where the corresponding figures were 47% and 74.52% respectively. The high knowledge reported in the Aurangabad study may be due to the fact that the study samples were dental practitioners.

Only 27.5% knew regarding the existence of Pharmacovigilance program in India. The

results are similar to results obtained among dental teaching faculty in a dental college, attached to a medical college in Madhya Pradesh where the awareness was among 27%.[13] It is noteworthy that over 64% had knowledge regarding the regulatory body responsible for monitoring ADR's in India - Central Drugs Standard Control Organisation. The results are comparable to the studies conducted among tertiary health care professionals in Chennai[8] and medical students in Telangana[9]. The results are much better compared to studies conducted among dental practitioners in Aurangabad[12] and tertiary health care professionals in Vadodara[4] where the knowledge reported was 10% and 36% respectively.

A vast majority (96%) felt that ADR reporting should be mandatory rather than voluntary. The observation is different compared to Malaysia study (84%).[11] Regarding the inclusion of pharmacovigilance as a topic in the undergraduate curriculum, about 94% agreed to, however in many other studies conducted among medical students, health care professionals and dental students[7-9,11], the figures are close to 80%, except Aurangabad study where it was 98%[12]. Only 34% of the respondents have experienced adverse drug reactions in patients during practice.

A very significant observation is that none of the respondents have ever reported a case of ADR's, an observation similar to Aurangabad study[12]. However, studies conducted in tertiary health care establishments have reported cases of ADR's[7,8,9]. Only 2.5% have seen the ADR reporting form and only 1.2% have received proper training on how to report an ADR. This shows the gap of knowledge as far as the dental curriculum and practice is concerned unlike the field of medicine. The main reason could be the absence of the topic in the dental undergraduate curriculum.

With all the respondents agreeing that proper monitoring and reporting of ADR will benefit the patient, the attitude regarding the same is highly positive. Thus an inclusion of the topic in the curriculum can improve the practice of reporting ADR's. Furthermore, on enquiring the factor(s) that discourage the respondents, it is clearly noted that lack of awareness is the mainstay. Patient confidentiality issues, legal liability issues and professional liability concerns are not major factors responsible.

## CONCLUSION

The study reveals that although the attitude of the respondents about pharmacovigilance was good, the knowledge and practice was poor. It is high time that these topics are given priority in the undergraduate syllabus to encourage adverse drug reactions reporting and helping the dental fraternity towards pharmacovigilance.

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ORIGINAL RESEARCH ARTICLE

# EFFECT OF CALCIUM HYPOCHLORITE ON SHEAR BOND STRENGTH OF DENTIN BONDING SYSTEM

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## ABSTRACT

**Aim:** To determine the effect of dentin deproteinization using 10% calcium hypochlorite on the shear bond strength of total-etch adhesive.

**Materials and Methods:** The occlusalsurface of twenty extracted human maxillary premolar teeth were sectioned to expose superficial dentin. The samples were etched and randomly divided into two groups consisting of 10 teeth each. In Group 1 (control) dentin bonding agent was applied. In group 2, samples were deproteinized with 10% calcium hypochlorite prior to the application of bonding agent. After completion of the adhesive procedures in accordance with the manufacturer's instructions, resin composite was inserted into a plastic tube placed on the specimen and light-polymerized as per manufacturer's instructions. All specimens were stored at 37°C in water for 24 hours, and the specimens were transferred to the universal testing machine, and shear bond strength analysis was done at a crosshead speed of 1.0mm/min.

**Results:** Statistical evaluation revealed that there was a significant enhancement in shear bond strength with the application of calcium hypochlorite after acid etching (mean 41.06MPa).

**Conclusion:** Within the limitations of the present study, it was concluded that the removal of unsupported collagen fiber with calcium hypochlorite after acid etching significantly improved the bond strength.

**Keywords:** Dentin deproteinization, calcium hypochlorite, shear bond strength

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## INTRODUCTION

Adhesive dentistry has undergone a rapid revolution over the past few years with advancement in bonding techniques. The goal of adhesive procedures is to form and maintain a tight adhesive-dentin interface that remains stable for a long duration, providing retentive strength, marginal seal, and clinical durability. [1]

The dentin acid etching, first proposed by Fusayama (1979) allowed the complete elimination of the smear layer and smear plugs, demineralize the dentin, thus exposing the collagen fibrils. This facilitates the penetration of adhesive systems into intertubular and intratubular collagen network, resulting in the formation of a hybrid layer and resin tag respectively.[2] The creation of a hybrid layer, also called resin-infiltrated dentin-layers (RIDL) has been considered the most efficient adhesion mechanism in dentin bonding agents (DBAs).[3] However if the exposed collagen is not adequately infiltrated by adhesive resins, collagenolytic enzymes like cysteine cathepsins and matrix metalloproteinases are activated causing degradation of collagen.[4,5] Regardless of the advancement in adhesive techniques, the hybrid layer created on the variable and dynamic organic dentin phase is not perfect and may fail over time, inducing marginal discolorations, microleakage, loss of retention and failure of the composite restoration.[6-10]

Various methods have been proposed to enhance the durability of resin-dentin bonds like the use of inhibitors of collagenolytic enzymes, improving impregnation of resin monomers, increasing the degree of conversion, use of the hydrophobic coating. Some researchers have proposed the utilization of deproteinizing agents for the removal of collagen fibers.[11,12] Numerous studies have evaluated the effects of sodium hypochlorite (NaOCl) as a deproteinizing agent on interfacial strength, and positive results have been achieved.[13-15] The disadvantages generated by the use of 10% sodium hypochlorite to deproteinize acid-etched dentin include the formation of a fragility zone and the cytotoxicity of sodium hypochlorite, which are aggravated by the depth of the dentin, and the intolerable taste and odor, additionally, the fatty acids produced with the use of NaOCl can harm the resin-dentin bonding mechanism.[16]

Hence to overcome the disadvantages of sodium hypochlorite, in the present study we used 10% calcium hypochlorite as a deproteinizing agent. Calcium hypochlorite has certain advantages over sodium hypochlorite. It is relatively stable and has greater available chlorine than NaOCl (up to 65% available chlorine). Owing to its lower cytotoxicity it can be used at a higher concentration than sodium hypochlorite. Also unlike NaOCl, it does not produce fatty acids; furthermore, calcium is present in its composition, which is hypothetically more favorable to be incorporated in the hybrid layer.[16]

The aim of the present study was to investigate the influence of dentin deproteinization with Calcium hypochlorite on the shear bond strength of the bonding system.

## MATERIALS AND METHODS

### Preparation of 10% calcium hypochlorite

Preparation of 10% calcium hypochlorite solution was done by dissolving 10gram calcium hypochlorite powder in 100 mL of distilled water. (Fig 1)

### Sample preparation

Twenty extracted human maxillary premolar teeth were taken and stored in 0.1% thymol solution. Roots of the samples were embedded in self-cure acrylic resin and the occlusal surface was wet ground using a series of silicon carbide discs to prepare flat superficial dentin. (Fig 2)

All the samples were etched with 37% phosphoric acid (Scotchbond Multi-purpose Etchant, 3M), blow dried and randomly divided into two groups consisting of 10 teeth each. (fig 4)

Group 1: control group- fifth-generation bonding agent (Adper single bond 2) was applied as per manufacturer's instructions.

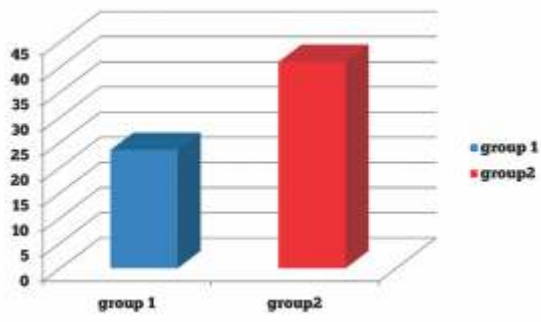
Group 2: Calcium hypochlorite group- Samples were deproteinized with 10% calcium hypochlorite (Nice Chemicals Pvt. Ltd.) for 1

min, washed off with distilled water and blot dried prior to the application of bonding agent. (Fig 5)

Fifth generation dentin bonding agent, Adper single bond 2 (3M ESPE), was applied according to manufacturer's instructions (Fig 6). Upon completion of the adhesive procedures, standardized plastic tubes of 4mm height and 3mm diameter were placed onto the dentin surface. The resin composite Filtek Z-250 (3M ESPE, A3 shade) was inserted into the plastic tube as two increments and each increment was light-polymerized for 40 seconds. The plastic tube was removed to expose the resin cylinder (Fig 7). All specimens were stored at 37°C in water for 24 hrs before testing, to simulate the oral environment. After storage, the specimens were transferred to the universal testing machine individually to carry out shear bond strength analysis at a crosshead speed of 1.0 mm/min. (fig 8)

## RESULTS

Data were statistically analyzed using Student t-test for mean comparison of shear bond strength between groups at a significance level of 0.05. The statistical analysis was performed using SPSS version 12.0.1 for Windows (SPSS Inc., Chicago, IL, USA). The results are summarized in table 1. The obtained p-value 0.000 (<0.01) implies that highly significant difference exists between the two groups.




Graph 1.The graph representing shear bond strength values of the two groups

It is evident from the graph that the application of calcium hypochlorite has markedly improved the bond strength of the adhesive system.

## DISCUSSION

There is a general concurrence that resin-dentin bonds created by contemporary hydrophilic dentin adhesives degenerate over time.[8,17] It is arduous to obtain stable adhesion between dentin and resin due to the complex structure and biological activity of dentin.[18] The high organic content along with the tubular structure and outward flow of fluid make dentin bonding utterly difficult task.[19] Clinically, it is important to augment the adhesion between dentin and resin to increase the longevity of restorations, to prevent marginal leakage thus reducing the chance for secondary caries.

Table 1: Statistical analysis of shear bond strength values of the two groups

| | N | Mean(MPa) | Std. Deviation | P value |
|---|---|---|---|---|
| Group1 Control | 10 | 23.54010 | 1.456378 | 0.000 |
| Group 2 Calcium hypochlorite | 10 | 41.02750 | 1.558993 | |

The adhesion mechanism for dentin bonding agents is micromechanical in nature, resulting from the infiltration of resin into the bare collagen on the acid demineralized dentin surface.[20] The action of collagen fibers in dentin adhesion has been questioned. Some authors reported that collagen does not contribute to adhesion and may interfere with the bonding mechanisms because of their frail structure after etching. Also, the adhesive resin is not capable of infiltrating the whole exposed collagen. The uninfiltrated collagen at the base of the hybrid layer can undergo hydrolytic degradation over time leading to bond failure[21,22].

Various deproteinization methods have been attempted to overcome these disadvantages. Most of them have various disadvantages like cytotoxicity, intolerable taste and odor and reduction in bond strength.[23,24] In the present study we used an alternative deproteinizing agent calcium hypochlorite which is a substance used for industrial sterilization and water purification treatments.[25] It is economical and easily available. It exhibits antibacterial properties and the ability to promote soft-tissue dissolution in the same level of NaOCl.[26,27] There are no reports in the literature of other studies in which this solution has been used to evaluate its effect on shear bond strength of adhesive resins. Hence 10% of calcium hypochlorite was chosen as a deproteinizing agent in the present study.

Calcium hypochlorite powder in a freshly prepared aqueous solution, the following reaction occurs: Ca(OCl)2 2H2O = 2 HOCl+ Ca(OH)2 (Dutta and Saunders, 2012). Ferreira et al evaluated the microleakage after deproteinization using calcium hypochlorite and sodium hypochlorite. No significant differences were obtained between the test and control groups.

The shear bond strength of resins to dentin depends on the distribution of stress within the bonded assembly. Stress distribution, in turn, depends upon the mechanics of the test and the mechanical properties of the substrate. Acid-etching of mineralized dentin reduces its modulus of elasticity from a relatively stiff 17 GPa to a very low value of 5 GPa due to the removal of apatite crystallites. Impregnation of resin into demineralized dentin partially reinstates the stiffness of the dentin.[28-30]

In the present study, deproteinization with Calcium hypochlorite caused a remarkable enhancement in the shear bond strength. This may be due to the action of calcium hypochlorite on demineralized dentin that modifies the chemical composition of the surface by removing organic matter. The Calcium hypochlorite solution when applied to dentin, there is an increase in the amounts of calcium and a decrease in the amount of carbon. This may be favorable for the mineralization process and the formation of an amorphous calcium phosphate phase within the hybrid layer because these two elements represent the primary inorganic components of dentin. Thus new apatite crystallites or crystallites of calcium phosphate and calcium carbonate can form. These crystals may attach to the surface by ionic bonds or may simply be encompassed by the adhesive and are incorporated in the hybrid layer.[31] This contributes to increased bond strength. Therefore in the present study, we observed deproteinization with calcium hypochlorite after acid etching significantly improves the shear bond strength with the total-etch technique.

## CONCLUSION

Within the limitations of the present study, it can be concluded that the removal of unsupported collagen fiber with 10% Calcium hypochlorite after acid etching results in improved bond strength.

**Fig 1. Sectioning of tooth**


**Fig 2.Scotchbond Multi-purpose Etchant, 3M**
**Filtek Z 250**
**Bonding agent(Adper single bond 2 (3M ESPE)**

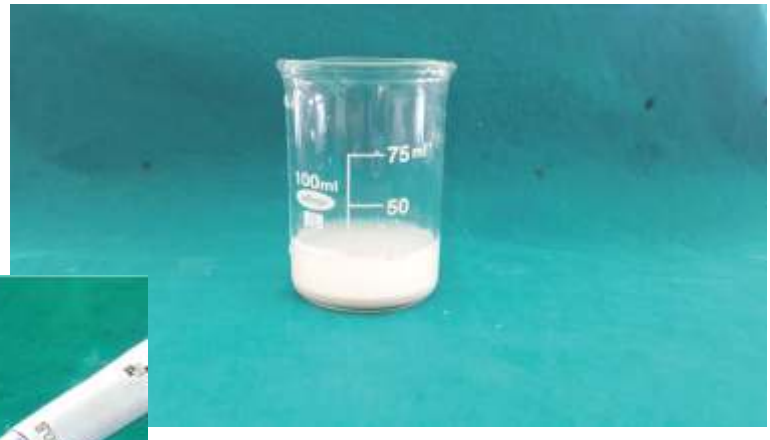



**Fig 3. 10% calcium hypochlorite solution**

**Fig 4. Application of etchant**

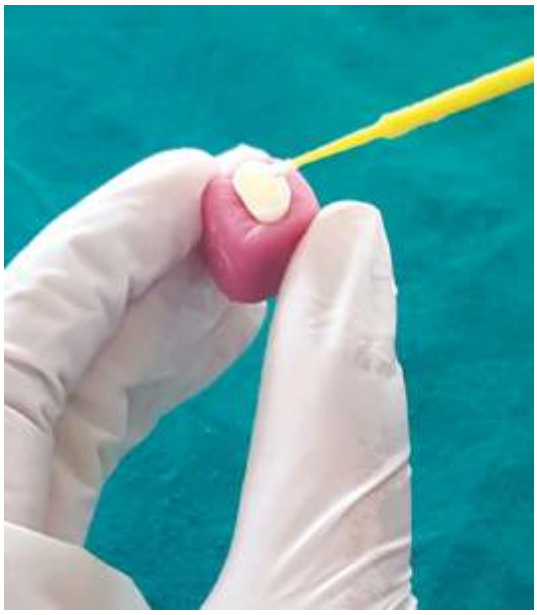


**Fig 5.**
**Application of calcium hypochlorite solution**

**Fig 6.**
**Application of bonding agent**

**Fig 7.**
**Total samples after composite build up**


**Fig 8.**
**Universal testing machine**

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# CHAIR SIDE DIAGNOSTICS IN PERIODONTICS : A REVIEW

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## ABSTRACT

The success of any periodontal treatment depends on accurate initial diagnosis. Traditional clinical measurements used for periodontal diagnosis are often of limited usefulness as they are indicators of previous periodontal disease rather than present disease activity. Hence, there is a need for developing novel diagnostic kits that can detect active disease, predict the disease progression and to evaluate its response to periodontal therapy. Different chair side diagnostic kits are discussed in this review which would be helpful for proper diagnosis, evaluating a disease prognosis and proper treatment planning.

**Key words:** Periodontal disease, diagnostic, chair side tests

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## INTRODUCTION

Periodontal disease is an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment and bone loss and is characterized by pocket formation and/or gingival recession. In the past few decades evidences have showed that periodontitis does not affect all people and that it need not progress in a continuous manner and can be a specific problem, the understanding of the nature of the disease has been altered. Despite our increased understanding of the etiology and pathogenesis, the diagnosis and classification of the disease are still based almost entirely on traditional clinical assessments.[1,2] "Periodontal Diagnosis" is an important tag that a clinician ties on the periodontal disease condition of the patient, capturing all his past experience with the condition in question. The entire constellation of signs and symptoms, along with a detailed history is elicited, documented and interpreted to reach at a diagnosis. Most often an accurate diagnosis is, the very first concrete step towards the planning and execution of an appropriate individualized treatment plan, contributing significantly towards the success of the therapy.[2,3,4] Traditional clinical measurements (probing pocket depth, bleeding on probing, clinical attachment loss, plaque index, radiographs) used for periodontal diagnosis are often of limited usefulness in that they are indicators of previous periodontal disease rather than present disease activity.[3]

The 1990s have seen the emergence of a multitude of diagnostic tests based on physical, chemical, microbiological and immunological methodologies. The philosophy behind the emergence of such tests is that the earlier active disease is diagnosed, the less invasive, time consuming, and therefore costly the required treatment, and the better the long term prognosis for patients with destructive disease.[3,4] Furthermore, with the recognition that risk groups and unpredictable disease patterns exist, the benefits of objective testing for initial diagnosis and for the long-term maintenance of periodontal patients become clear. For periodontal diagnosis, the ideal diagnostic test should be[5].

1. Quantitative.
2. Highly sensitive method capable of analyzing a single periodontal site in health as well as disease.
3. Reproducible.
4. Highly specific.
5. Simple to perform.
6. A rapid, one or two stage procedure.
7. Non-invasive.
8. Versatile in terms of sample handling, storage and transport.
9. Amendable to chairside use.
10. Economical.
11. Dependent upon simple and robust instrumentation.

Several methods have been employed to detect putative periodontopathogens in clinical samples. These include cultural methods, microscopy, immunofluorescent assays, enzyme-linked immunosorbent assays, trypsin-like protease assays, DNA probes[6] and the PCR[7].

Among these tests, chairside periodontal kits provide immediate reports as compared to traditional laboratory procedures.

Chairside periodontal test kits can be categorized as

- Microbiological test kits
- Biochemical test kits
- Genetic kits

## MICROBIOLOGICAL TEST KITS

The microbiological tests have the potential to support the diagnosis of various forms of periodontal disease, to serve as indicators of disease initiation and progression and to determine which periodontal sites are at higher risk for active destruction. The bacteriological tests (Microscopy, Culture, Omnigene, Affirm DP and Evalusite) are mainly aimed at spirochetes, A. actinomycetemcomitans, P.gingivalis and P.intermedia. Microbial tests can also be used to monitor

periodontal therapy directed towards the suppression or eradication of periodontopathogenic organisms.

## Omnigene

These are DNA probe systems for a number of known periodontopathogensubgingival bacteria. A paper point sample of sub-gingival plaque is placed in the container provided and mailed off to the company for assay. Probes are available for the detection of A. actinomycetemcomitans, P. gingivalis, P. intermedia, F. nucleatum, C. rectus, T. denticolaand E. corrodens. Reports are provided within very short time periods (few hours to few days).[2,8]

**Evalusite**

Evalusite is a kit that employs a novel membrane-based enzyme immunoassay for the detection of three putative periodontopathogens: Aa, Pg and Pi. A sub-gingival sample is collected using paper points and added to a sample tube. The eluent is then added to the kit, which employs a sandwich-type ELISA (enzyme-linked immunosorbent assay); a pink spot is displayed if the test organism is present. The main weaknesses of this test kit reside in (1) the assumption that the three detected organisms are causing disease; (2) it is a multistage test; (3) it has a subjective calorimetric end point and (4) there is no permanent record of the results [2,9].


## Perioscan®

Perioscan is a diagnostic test kit that utilizes the BANA (N-benzoyl-DLarginine-2-naphthylamide)-hydrolysis reaction, developed to detect bacterial trypsin-like proteases in the dental plaque .A trypsin-like activity has been identified in strains of P. gingivalis, T. denticola, T. forsythia and some Capnocytophagiastrains[2,10,11]. BANA is an example of a substrateconjugated beta-nepthylamine (p-NA), which is hydrolyzed by this trypsin-like enzyme to release free p-NA. The latter is a chromophore and reacts with a variety of dyes (e.g. Fast-Garnet GBC) to produce colored products. Subgingival plaque is collected and placed on a BANA-containing strip, which is then folded to contact a second strip containing the "Fast- Black" dye reagent. The folded card is placed inside an oven for 15 min at 55°C and any blue-black color that appears is scored positive for the above species. The sensitivity of the method has recently been improved.[12] The main disadvantage of this technique is that it relies upon plaque sampling and assumes that the test organisms identified as being present signify active disease. This is known not to be the case for all patients and sites. Furthermore, results are qualitative and rely upon the operator's

assessment of the calorimetric end point. One of the potential difficulties of this test is that it may be positive at clinically healthy sites and might remain so after treatment.

## BIOCHEMICAL TEST KITS

Biochemical test kits used in periodontics analyze the gingival crevicular fluid (GCF).

### Perio 2000 System

Various pathogenic bacteria (T. denticola, P. gingivalis, P. intermedia, and T. forsythia) are able to produce sulfates, thereby producing significant levels of these volatile sulphur compounds can directly degrade periodontal structures aggravating periodontitis. Hence, Diamond Probe/Perio 2000 system is designed to display the sulfide level digitally at each site.[1,13]

### Prognostik

This test is an assay for elevated levels of elastase in crevicular fluid. The presence of elevated levels of elastase in the crevicular fluid may thus be indicative of active disease sites.[14] Although a relationship between elastase levels in crevicular fluid and periodontal disease activity has been reported, the position is still far from clear.[1]

### Periocheck

It is the rapid chairside test for neutral proteases in GCF such as elastases, proteinases, and collagenases.[14] The levels of these enzymes in GCF have been noted to increase with the development of gingivitis as well as sites of established periodontitis. However, limited longitudinal studies evaluated the utility of these markers as indicator of periodontal disease.

### Perioguard

This commercial test kit is based on detection of aspartate aminotransferase (AST) which is released from dead cells of periodontium to the gingival crevicular fluid (GCF). The test kit consists of a tray with two test wells for each tooth and appropriate reagents for conducting the test.[1,15]


### Pocket Watch

The pocket watch was developed as a simple method ofanalyzing AST at the chairside.[16] AST activity determined by pocket watch provides

not only an index of cell death but also the extent of the destructive pockets.

## GENETIC TEST KITS

Various gene polymorphisms are considered to be risk factors for the initiation or progression of periodontal disease. In 1997, Kornman et al. [17] found an association between the polymorphism in the genes encoding for interleukin-1α and interleukin-1β and increased severity of periodontitis. Identification of the genetic polymorphism is difficult but now some chairside kits are available for its detection.

### Periodontal Susceptibility Test Genetic Susceptibility Test(PST)

Periodontal susceptibility test is the first and only genetic test that analyzes two interleukin 1 (IL 1) genes for variations that identify an individual's susceptibility to overexpression of inflammation and risk for periodontal disease. The initiation and development of the disease may not be due to IL 1 genetic susceptibility, but rather it may lead to earlier or more severe disease. This test does not provide information for just a single disease or is it useful to ascertain a diagnosis of a specific disease. The IL 1 genetic test can be used to differentiate certain IL 1 genotypes associated with different levels of inflammatory responses to identify individuals at risk for severe periodontal disease even before age 60.[1,18]

## CONCLUSION

The availability of chair side diagnostic kits will aid in early diagnosis and treatment. The newer commercially available chairside tests offer exciting prospects in general practice. In certain situations, these supplemental tests may be particularly valuable in establishing the endpoint of therapy before placing patients on a periodontal maintenance program. Further research and developments are required in this field. The novel tests need to be validated according to gold standards such as alveolar bone loss in large numbers also being of economic value to both patient and practitioner.

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# ZIRCONIA CROWNS IN PEDIATRIC DENTISTRY: A REVIEW

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## ABSTRACT

Aesthetic Restorations of Primary teeth presents the Pediatric Dentist multiple challenges. There are different types of restorations for complete crown coverage, like polycarbonate crowns, acid etched crown, stainless steel crown (SSC), open–faced SSC with veneer placed on chair side and commercially veneered SSC. Each of these techniques presents technical, functional or esthetic compromises that intricate their efficient and effective usage. During the last decade, zirconium dioxide (zirconia, ZrO2) ceramics, which have superior technical properties and aesthetic advantages have been used as an alternative material. Recently, zirconium dioxide ceramic prefabricated crown has gained acceptance in the treatment of primary teeth. Prefabricated zirconia crown offers more esthetic and biocompatible full coverage for primary incisors and molars. They are anatomically contoured, metal free, bio-inert, and caries resistant. The choice of full coverage restoration for primary teeth must provide good esthetics in addition to restoring function and durability. This article presents an overview of zirconia crowns in Pediatric dentistry.

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## INTRODUCTION

Esthetic management of extensively decayed primary anterior teeth requiring full coronal coverage restoration is usually challenging to the pediatric dentists especially in very young children. Many esthetic options have been tried over the years each having its own advantages, disadvantages and associated technical, functional or esthetic limitations.[1]

Some techniques used for restoring complete crown coverage include polycarbonate crowns, acid etched crown, stainless steel crown (SSC), open–faced SSC with veneer placed on chair side, and commercially available preveneered SSC. The effective and efficient usage of these techniques is complicated due to technical, functional, or esthetic hurdles. Prefabricated zirconia crown (EZ-Pedo, Loomis, CA, USA; NuSmile ZR Primary Crowns, Houston, TX, USA; Hu-Friedy Mfg. Co., LLC, Chicago, IL, USA; Kinder Krowns, St. Louis Park, MN, USA; Cheng Crown, Exton, PA, USA; Zirkiz-Hass Corp. Korea) is an exceptionally strong ceramic crown and offers more esthetic and biocompatible full coverage for primary incisors and molars. They are anatomically contoured, metal free, completely bio-inert, and resistant to decay.[2] Advent of Zirconia crowns have provided a treatment alternative to address the esthetic concerns and ease of placement of extra-coronal restorations on primary anterior teeth.

### CLASSIFICATION[3]

Based on method of cementation to tooth

- Bonded crowns - polycarbonate crowns, strip crowns, pedo jacket crowns, Art glass crowns
- Luted crowns - stainless steel crowns with facing, Kinder Krowns, Cheng crowns, Nu-Smile crowns, Dura crowns, Whiter Biter crowns, PedoCompu crowns, High density polyethylene veneered crowns

### Based on the material of the crowns

- Polymer - polycarbonate crowns, strip crowns
- Pre veneered stainless steel-Nu-smile Signature
- Zirconia- EZ pedo, Nu-Smile ZR
- Aluminium veneered with tooth colored material – Pedo pearls

### ZIRCONIA CROWNS

Zirconia is well-known polymorph that occurs in three different forms: monoclinic (M), tetragonal (T), and cubic (C). Pure zirconia is monoclinic at room temperature and remains stable up to 1170°C. Above this temperature, it transforms into tetragonal and then into cubic phase at 2370°C. During cooling, the tetragonal phase transforms back to monoclinic in a temperature ranging from 100°C to 1070°C. The phase transformation taking place while cooling is associated with a volume expansion of approximately 3%-4%.[4] Zirconia has a unique ability to resist crack propagation by being able to transform from one crystalline phase to another, and the resultant volume increase stops the crack and prevents it from propagating.[5]

Zirconia has demonstrated high wear resistance, excellent biocompatibility, and superior corrosion resistant. Three type of zirconia are currently used in dentistry; these are yttria stabilized tetragonal zirconia polycrystal (Y-TZP), magnesia partially-stabilized zirconia and zirconia toughened alumina. Y-TZP is a monolithic zirconia that consists of equiaxed partially stabilized tetragonal grains.[4] Because of the superior mechanical properties of Y-TZP ceramics, these materials have a wide range of clinical applications, from implant abutments and single-tooth restorations to fixed partial dentures involving several elements.[6,7] The use of zirconium dioxide ceramic prefabricated crown for the treatment of primary teeth has begun recently. The greatest advantage of zirconia crowns is their excellent esthetics, which is far superior to other pediatric crown options.

Kinder Krowns were introduced in 1989 and are known for offering the most natural shades and contour for the patient. Kinder Krowns aims to provide the most natural, lifelike, and anatomically correct crown as possible. They have a highly characterized incisal edge, scientifically developed shades, and finely feathered margins. The finely feathered margins help create an esthetic emergence profile. These crowns are available for anterior and posterior teeth and they come as zirconia Kinder Krowns or a preveneered Kinder crown. Zirconia Kinder Krowns have an internal retention system in the form of retention bands which locks the restoration to the tooth after cementation. These retention bands also increase the total surface area for the cement to bond to both the tooth structure and the

crown. The preveneered crowns are less time consuming to use and comparatively less technique sensitive. It has a strengthened stainless steel crown with feathered margins. It comes in two different lengths which is the regular length and short length for clinicians to choose based on their tooth preparations. The shades offered for the preveneered Kinder Krowns are Pedo 2 and Pedo 1 shade. Pedo 1 is a lighter-bleached shade compared to Pedo 2 while Pedo 2 gives a more natural look compared to the Pedo 1 shade. It has a universal contour, whereby the clinician is able to decide to make the crown a left or right by selectively rounding off the mesial or distal corner. Also, it has an incisal lock for better bonding and retention.[8]

NuSmile crowns are introduced in the year 1991. They are also made of stainless steel with an even more natural appearing tooth-colored coating. They are indicated for full-coverage restorations when a crown is needed for durability and to protect remaining tooth structure. They come in two styles which are the NuSmile Signature and NuSmile ZR. The NuSmile Signature crowns are anatomically correct with a natural tooth-colored coating which is an alternative to the traditional stainless steel and composite strip crowns. NuSmile ZR, on the other hand, is made from a high-grade monolithic zirconia ceramic which offers superior esthetic and durability compared to the NuSmile Signature. NuSmile crowns come in a universal style where the anterior crowns are fabricated with both point angles slightly square. The clinician may round off either angles to make it a right- or left-sided crown. They come in extra light or light pedo shade. Light crowns are comparatively more yellow compared to the original pedo shade.[8]

EZ Pedo crowns were developed by Dr. Jeffrey P. Fisher and Dr. John P. Hansen. They are metal-free prefabricated crowns which are made of zirconia. They have superior esthetics, strength, durability, and are completely bioinert. It is also resistant to decay and plaque accumulation. EZ Pedo crowns is constructed with a Zir-Lock® ultra feature which functions to increase the internal surface area to increase bonding. This is because zirconia does no flex, so inherently there will be areas in the subgingival margin where the crowns are open. The Zir-Lock® ultrafeature basically provides mechanical undercuts that lock the crown in place and helps to retain cement at the crown margins to prevent cement loss, prevent microleakage, and also to keep harmful bacteria out. In addition to the in-built retention, then crowns are also treated with aluminum oxide blasting for additional adhesion properties.[8]

## DISCUSSION

Tooth preparation and cementation procedure are important clinical steps in a crown placement. The presence of adequate clearance, proper angulations, and visible knife edge finish lines helps to preserve gingival health and less plaque accumulation. Adequate preparation of the tooth will significantly improve esthetics, crown fit reduces chances of veneer fracture and saves chair time. The tooth should be prepared to fit the crown so that the crown fits the tooth passively without using pressure. The preparation of tooth for zirconia crown takes more time, and so this crown not recommended for children who are fearful and unable to cooperate for longer procedures. It is difficult to adjust a zirconia crown because it is ceramic and cannot be trimmed with scissors like a traditional SSC, it is necessary to use a high speed, fine diamond burs with lots of water because excessive heat could cause fractures in the crown's ceramic structure. Occlusal and interproximal adjustments are not recommended, as these will remove the crown's glaze and possibly create a weak area of thin ceramic. It is very important that zirconia crowns fit passively because they are made of solid zirconia and do not flex, attempt to sit with force will result in fracture and adjustment with bur result in microfracture. The appropriate size crown should fit passively and completely subgingivally without distorting the gingival tissue.[9,10]

Another concern for zirconia crown is cementation. Etching and bonding of zirconia are not possible because of lack of silicone of glass ceramic. Sandblasting has been reported to introduce microcrack into zirconia, etching with phosphoric acid or hydrofluoric acid have no effect on overall retention of restoration. Conventional or self-adhesive resin cements have been recommended as luting agent for zirconia crowns.[11,12] A much-simplified technique has been recommended using a

bioceramic luting cement, ceramic crown, and bridge. This biomimetic material has high pH to resist acid and bacteria, is biocompatible and does not require an optimal condition for a good seal.[13]

Some drawbacks which limit the use of zirconia crowns are that it requires significantly more time to prepare the tooth for fitting the crown. Bleeding from the gum, due to anxiety or inflammation, may hinder the setting of the cement used to bond the zirconia crown to the tooth. With crying or inability to sit still and fully cooperate for the procedure, an SSC would be preferable; since the preparation of the tooth and fitting an SSC takes much less time, but with the latest innovations manufacturers are trying to minimize these factors. Ez-Pedo has introduced Zir-Lock ultra, mechanical undercuts to increase crown retention. Another point to consider is that zirconia crowns not contaminated with blood or saliva have better adhesion to cement and to solve this problem NuSmile came up with the try-in pink crown.[11]

In vitro study was done by Townsend et al., to measure the fracture resistance of three commercially available zirconia crowns for primary molar and compare it with the thickness of the zirconia crowns and the measured fracture resistance of preveneered SSCs. It was found that the increase in force is correlated with crown thickness. The forces required to fracture thepreveneered SSCs were greater than the forces required to fracture all manufacturers' zirconia crowns.[14]

In other randomized clinical trial by Waliaet al., compared the restoration failure, tooth wear of opposing teeth and gingival health of three esthetic full-coronal restorations (composite strip crowns, preveneered SSCs, and prefabricated primary zirconia crowns) in carious and traumatized primary maxillary incisors. The retention rate was highest for zirconia crowns (100%) followed by preveneered SSCs (95%). Strip crowns were the least retentive (78%) because of highly sensitive technique zirconia crowns showed low-grade abrasion in four opposing teeth. Teeth restored with resin composite, and preveneered SSC showed an increase in mean gingival index score, while corresponding values decreased in zirconia crowns at 6-month follow-up.[15]

Abdulhadi B S et al conducted a randomized clinical trial which compared the clinical outcomes of two full coronal restorations-stainless steel crowns [SSCs] and zirconia crowns Nu/ZR) in carious primary molars teeth. Assessment of gingival health relative to interventions showed that both Zirconia and SSC have significant changes through all time points. However, Zirconia performed better at the 3rd month with 80% compared to SSC with only 13.3% improvement of gingival health. At 6th month, all samples under group zirconia were improved whereas only 73.3% from SSC showed improvement. The remaining samples had positive changes at the 12th month. Regarding the plaque retention also the Zirconia Crowns shows improve performance than SSC. The study concluded that Zirconia crowns performed better regarding gingival response to the material of restoration and plaque retention despite its high cost.[16]

Holsingeret al did a retrospective analysis to evaluate the clinical success and parental satisfaction with anterior pediatric zirconia crowns. Crowns were evaluated for retention, gingival health, color match, contour, marginal integrity, and opposing tooth wear. The average crown age at time of examination was 20.8 months. Sixteen crowns (36 percent) displayed gingival inflammation and color mismatch. Parents reported high satisfaction with the color, size, and shape of the crowns. Eight-nine percent of parents reported that they would highly recommend these crowns. It was concluded from the study that Zirconia crowns are clinically acceptable restorations in the primary maxillary anterior dentition. Parental satisfaction with zirconia crowns is high.[17]

An In vitro study by Al Shobber MZ et al compared the fracture resistance of four commercially available esthetic crowns-NuSmile Primary crowns (NuSmile, Houston, Tex. USA); Preveneered Cheng Crowns, (Orthodontic Technologies Inc., Houston, TX) ; NuSmile ZR (NuSmile, Houston, Tex. USA); and Cheng Crowns zirconia (Orthodontic Technologies Inc., Houston, TX). It was found that Zirconia crowns showed the highest fracture resistance with NuSmile zirconia crowns to being able to resist fracture even under intense pressure of load compared to Cheng Crowns zirconia.[18]

## CONCLUSION

Long-term clinical evaluations are a critical requirement to understand the reliability of zirconiapediatric crowns. However, prefabricated zirconia crowns could be an easy, restorative option to traditional stainless steel and composite strip crowns due to their unparalleled advantages in the near future. Zirconia crowns offer excellent esthetics, superior durability, and easy placement compared to other full coverage coronal restorations.

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REVIEW ARTICLE

# EARLY CHILDHOOD CARIES – AN INEVITABLE CHALLENGE


## ABSTRACT

Early Childhood Caries or ECC is a virulent form of caries affecting the primary teeth of infants and preschool children. The clinical features of ECC are unique. They range from white spots found on the facial surfaces of the maxillary incisors, mandibular molars and rarely the mandibular incisors. The other types are the mild to moderate and the moderate to severe. Though numerous preventive and treatment modalities are available, seldom are they harnessed. The preventive and management strategies include delaying and reducing the bacterial load, diet counseling, maintenance of good oral hygiene, use of sealants, interim therapeutic restorations (ITR), use of silver diamine fluoride and restorative treatment. A combined multifaceted approach with good team work would help in combating this multifactorial disease.



**Keywords :** Early Childhood caries, remineralization, primary tooth

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## INTRODUCTION

From time immemorial dental caries has been a matter of concern in the forefront of dentistry. A multifactorial disease caused by oral bacteria and mediated by dietary sugars and carbohydrates. It is a dynamic process of demineralization and remineralization that can progress or regress depending on the multitude of variables.[1]

In dentistry, most often one of the areas overlooked are the innocent, pearly white primary teeth. These little pearls can however turn into dark, black stumps causing pain and infection. It would alter the eating habits of the child leading to iron deficiency anemia. It could affect the emotional psyche of the child by interfering with the child's social smile and evoking a low self-esteem right from childhood that may grow into adulthood and cause social problems. Early Childhood Caries or ECC is a virulent form of caries affecting the primary teeth of infants and preschool children. Decay affects teeth sequentially as they erupt, beginning on the maxillary incisors followed by maxillary and mandibular molars. Progression is rapid resulting in pain and infection.

The American Academy of Pediatric Dentistry (AAPD) defines ECC as the presence of one ormore decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfacesin any primary tooth in a child 71 months of age or younger. In children younger than 3 years of age, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC).[2]

## CLINICAL FEATURES

The clinical features pose a unique presentation.

Initially, they appear as white spots on the facial surfaces of the maxillary incisors, mandibular molars and rarely the mandibular incisors are affected.

The demineralized lesions become frank lesions within 6- 12 months causing cavities.

The mild to moderate type comprise of isolated lesions involving the molars along with or without the incisors usually in children aged 2-5 years.

The moderate to severe type involve labiolingual carious lesions affecting maxillary incisors with or without molar caries and the mandibular incisors are unaffected.

The severe type affects all teeth including the lower incisors.[3]

The American Dental Association (ADA), American Academy of Pediatric Dentistry (AAPD) and American Academy of Pediatrics (AAP) recommend that all children have their first preventive dental visit and establishment of a dental home by 1 year of age. A dental home is defined as an ongoing, comprehensive relationship between the dentist and the patient (and parents), inclusive of all aspects of oral health delivered in a continuously accessible, coordinated and family centered way.[4,5]

This would enable children to have access to regular dental visits and implementation of customized, tailor made plans to prevent and manage the disease with referral to specialists when appropriate. The role of anticipatory guidance is immense.

## Prevention and management strategies

### Delaying and reducing the bacterial load

The vertical transmission of mutans streptococci from the mother or caregiver to the infant has been a cause of major concern. Strong correlation between salivary mutans streptococci counts in mothers and their children have been reported.[6]

Hence the sharing of utensils and spoons should be discouraged to prevent transmission of the pathogenic bacteria. Mothers and caregivers should be motivated to seek dental care and improve their oral heath in the prenatal period ideally. The role of anticipatory guidance is immense. Xylitol in the form of gums have shown to reduce the carious bacteria abundantly.[7] Use of povidone - iodine and chlorhexidine mouthwashes can reduce the S.mutans and allied microbial load significantly.

### Diet Counseling

Parents should be recommended to reduce the frequency of exposure to sugars both in foods

and drinks to meal times. A balanced, healthy diet rich in vegetables and fruits should be encouraged. At will breast feeding at night should be avoided. The use of a bottle or sippy cup to bed with anything other than water should be avoided.[8]

## Maintenance of good oral hygiene

Good oral hygiene should be maintained with emphasis on proper tooth brushing, adequate use of fluorides both topically and professionally applied when and where appropriate. The use of remineralising agents has a huge role to play in the prevention and management strategies.

After every feed, the oral cavity should be rinsed with plain water. A gauze can be used to clean the mouth and the newly erupted teeth.[6]

A bimonthly topical application of a 10% povidone - iodine solution to the dentition of babies at high risk for ECC increased disease-free survival.[9]

The use of anticariogenic agents especially twice daily brushing with fluoridated toothpaste and frequent application of fluoride varnish, may reduce the development and progression of caries.[10,11]

Remineralising agents like CPP-ACP (casein phosphopeptide- amorphous calcium phosphate) laden varnishes and tooth pastes can be used.[11] The role of tooth mousse in remineralization is laudable.

## Sealants

Deep pits, fissures and grooves should give alarm bells and be under systematic supervision and recall. Sealants can be given and recall is very important. In cases of minimal caries invasion remineralization of the tooth structure is a good option.

When mild progression of caries occur into the dentin and while arrest has not been achieved, interim therapeutic restorations (ITR) or silver diamine fluoride treatment may be performed. Restorative treatment is deferred if stabilization of the disease process is achieved.[12,13]

## Interim Therapeutic Restorations (ITR)

The ITR procedure involves removal of caries using hand or rotary instruments with caution not to expose the pulp. Following preparation, the tooth is restored with an adhesive restorative material such as glass ionomer or resin- modified glass ionomer cement. Greatest success with single surface or small two surface restorations has been reported.[14]

## Silver diamine fluoride (SDF)

SDF is marketed as a 38% silver diamine fluoride in a colourless liquid with a pH of 10. Studies have consistently concluded that SDF is more effective for arresting caries than fluoride varnish. A side effect is the discolouration of demineralized or cavitated surfaces. Patients and parents should be advised regarding this before hand. Recently, the FDA has approved SDF as a device for reducing tooth sensitivity.[15]

## Restorative treatment

Restorative treatment should be performed when the tooth structure has been destroyed by the carious process. Pharmacological management using nitrous oxide, sedation and general anaesthesia may be used in the uncooperative young patient and in patients with special health care needs.[14]

Restorative treatment, pulp therapy and provision of stainless steel crowns after pulpotomy and pulpectomy can be performed depending on the extent of carious invasion.[16]

Stainless steel crowns have unmatched durability and have stood the test of time. In case of ECC, the early victims are the primary anterior teeth. These usually exist in a domain of neglect though their importance is manifold. After initiating an endodontic treatment procedure in these primary anterior teeth they should be aesthetically maneuvered with strip crowns, polycarbonate crowns or zirconia crowns.

## Zirconia Crowns

Zirconia crowns are a good bet. They have demonstrated good aesthetics and retention. It is a simple, practical effective and promising alternative for rehabilitation of decayed primary teeth.[17]

## CONCLUSION

In these exciting times of rapid knowledge

generation in the oral health domain, accurate caries risk assessment at the population level and "precision dentistry" at the person level are both desirable and achievable, but they must be based on high-quality data and rigorous methodology.[18]

The gold standard for a contemporary treatment approach to Early Childhood Caries remains prevention and early intervention. This begins right from the womb involving the participation from the gynecologist, pediatrician, medical practitioner, general dentist and the pediatric dentist in unison.

This would be a giant leap towards unwrapping this age old enigma.

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CASE REPORT

# PALATAL ROTATION FLAP FOR CLOSURE OF ORO-ANTRAL FISTULA : A CASE REPORT


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## ABSTRACT

Oroantral fistula can occur following extraction of tooth with close proximity of roots to the sinus. It need to be addressed early due to risk of infection to the maxillary sinus and associated patient discomfort. Various options are available for the closure of OAF, like buccal advancement flap, buccal fat pad graft, tongue flaps etc. Here we are discussing a case where post extraction OAF was closed using palatal pedicled rotation flap, with successful closure of the fistula and uneventful healing.



**Key words** : Oro-antral fistula , palatal rotational flap , maxillary sinus , sinus regimen.

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## INTRODUCTION

Oral fistula (OAF) is defined as existence of pathological epithelised tract between the oral cavity and maxillary sinus which has its origin either from iatrogenic complications or from dental infections, osteomyelitis, radiation therapy or trauma. Oroantral fistula (OAF) most commonly occurs as a complication of maxillary molar or premolar extraction (48%). The primary reason is the anatomic proximity of the root apices to the sinus floor or projection of the roots within the maxillary sinus[1]. It is characterized by the presence of epithelium arising from the oral mucosa and/or from the antral sinus mucosa that, if not removed, could inhibit spontaneous healing. Oroantral communications (OAF) of less than 4 mm in diameter tend to close spontaneously, whereas those larger than that accompanied by inflammation of the sinus, alveolus or, periodontal regions require surgical closure[2]. Closure of communication can be achieved using different flaps which show both advantages and limitations.

Maxillofacial reconstruction involves the prudent utilisation of an array of local tissue rearrangement and regional flaps. The closer the flap donor site is to the defect, the less morbidity is associated with the reconstructive surgery. Flaps from local tissue also carry the advantages of having similar colour and texture. Therefore, the palatal flap remains popular in reconstructing intraoral defects; moreover, the palatal flap is the only available flap that can provide keratinized mucosa for defect reconstruction[3].

The palatal flap was initially described in 1922 by Victor Veau to address oronasal fistulas associated with cleft repair. It was later popularized by Millard for palatal lengthening during cleft repair in the 1960s; however, it was Gullane and Arena who used the flap for post ablativedefect[4]. Recent modifications emphasize on use of palatal flap in surgical closure of oroantral fistula.

## CASE REPORT

A 35 old female patient was referred to our institute for management of oroantral fistula. The patient gave a history of extraction of upper left first molar fifteen days back. She presented with nasal regurgitation of fluids, halitosis and pain in the region. The clinical examination showed an oroantral fistula of 10mm in relation to 26 region. There was active discharge from the sinus intraorally. A clinical diagnosis of OAF was made. IOPA was taken and supported the clinical diagnosis.

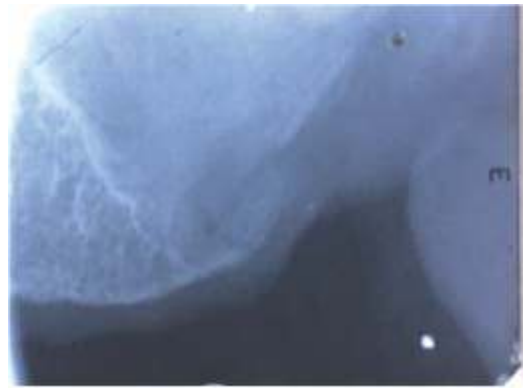

Figure 1. IOPA of 26 region

## SURGICAL PROCEDURE

The patients were given antral regimen for a week for sinus infection and associated symptoms. All the surgeries were performed under local anaesthesia with 2% lignocaine and 1:80000 adrenaline. After preparation of the surgical site, greater palatine and posterior superior alveolar nerve block was given . A circular incision with a 3mm margin was made around the fistula to excise completely the epithelial layer and inflammatory tissue within the opening before raising a flap. Thorough saline irrigation of sinus was done until a clear discharge obtained.

The palatal flap was planned according to the site and size of the defect. The palatal fibro-

Figure 2: Circular incision

Figure 3: Incision for palatal flap

mucosa was incised to raise a partial thickness mucoperiosteal flap having a posterior base supplied by the greater palatine artery. The anterior extension of the flap was made wide to exceed the diameter of the bony defect and sufficiently long to allow lateral rotation. The periosteal layer was left over the bone to enhance secondary healing. Once the flap is elevated, it is rotated and sutured on the donor site without any tension using 3-0 vicryl. A bactigrass dressing was stabilized over the donor site with coe- pak. The patient was prescribed Amoxicillin and clavulanic acid, anti-inflammatory analgesics, antihistamines, and decongestant nasal drops for five days. They were instructed to avoid strong sneezing and not to use a straw while drinking and was kept under a soft diet. The patients were followed weekly during the first month, which showed no wound dehiscence and predicable secondary healing at the donor site with fibrin cover in the first post op week. By the second week defect was fully covered with granulation tissue, there was no pain or signs of infection. Absolute take up of the flap and healing of the donor site similar to that of normal mucosa was achieved in three months.

Figure 4: Rotated flap

## DISCUSSION

Oroantral fistula is an abnormal epithelized communication between the oral and sinus cavity through perforation in the sinus wall. It commonly occurs after extraction of maxillary posterior tooth with close sinus approximation. Other causes are trauma, enucleation of cyst and tumours in the maxilla, due to osteomyelitis and as a complication of implant surgery. Oroantral fistula can be either alveolar, sublabial or palatal. Signs of a fresh OAF during dental extraction is root disappearance and positive nose blowing test, where as the symptoms of fresh OAF is nasal regurgitation of fluids, epistaxis, air escape from mouth to nose, enhanced column of air, alteration of vocal resonance, and extruciating pain in and around sinus. Symptoms of established OAF is pain, purulent nasal discharge, post nasal drip, fever, malaise, antral polyp etc.

In a patient having healthy sinus, an OAC less than 4-5mm in diameter will most likely heal spontaneously. In case of larger perforations, treatment methods include the use of local flaps, distant flaps and grafting procedures such as palatal, buccal, or combined mucoperiosteal flaps[5]. None of these methods were proved to be superior to the other.

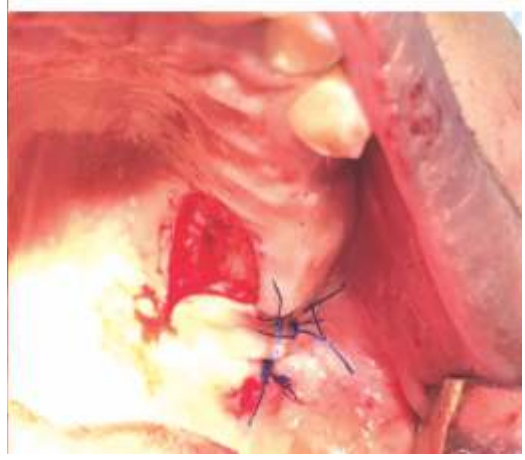

Figure 5: Sutured flap

However, certain advantages and disadvantages do exist. According to Lore, small oroantral fistula 1 to 2 mm, usually close spontaneously, fistula from 3 to 4 mm are usually successfully closed with a buccal flap and fistulae 5 mm and larger require a more extensive surgical procedure using a large palatal flap[6]. Different techniques have been described in literature for the closure of oroantralfistula, with the first and most used being Rehrmannbuccal advancement flap. Egyedi in 1977 first described the use of buccal fat pad graft[7]. The major disadvantage of Rehrmann flap is the loss of sulcus depth. In Moczair flap buccal pedicle is laterally displaced, causing less reduction in sulcus depth and is commonly used in when edentulous area is there in and around the area of OAF. Buccal fat pad is the most discussed in current literature, used commonly for larger and posteriorly located defect. Advantage of buccal fat pad is that it is highly vascular, can reepithelise, no loss of sulcus depth can be harvested near the repair site. Palatal pedicle flap for closure of oroantral fistula was first described in 1939 by Ashley. The relatively simple anatomy of the palatal flap is one of its many advantages. It can be a flap of choice for smaller and moderate size defect, since it does not effect the buccal vestibular height. Some authors suggest the use of palatal flap for OAF of larger the 10 mm[8]. Palatal flap has the advantage of having generous thickness and texture ,resistant to laceration and abundant keratinised mucosa. Eventhough the palatal flap has limited elasticity it can provide satisfactory displacement to close the defect. Donor site discomfort is another disadvantage, which can be managed with dressings that cover the defect. Palatal flap can be straight advancement, rotational advancement, hinged and island flap.

The palatine mucosa is underlined by the sub mucosa that is closely adherent to the periosteum. The periosteum is attached to the bone of the hard palate by dense sharpey`s fibers. The palatal flap is an axial flap based on the greater palatine artery. The connection between the two greater palatine arteries across the midline has been termed the macronet and allows the entire flap to be based on a single greater palatine arterial supply[9].This anatomy greatly increases the

**METHODS TO CLOSE OROANTRAL FISTULA**

| | | | |
|---|---|---|---|
| AUTOGENOUS | SOFT TISSUE FLAP | LOCAL | Rehrmannbuccal advancement flap, Moczairbuccal sliding flap, Buccal transposition flap, Buccal fat pad6, Palatal transposition flap, Palatal submucosalfalp, Palatal island flap, alatal submucosal island flap, Hinge [Inversion]flap, Buccal and palatal bipedicled[bridge] flap, Tunnel palatal flap, anteriorly based palatal flap etc. |
| | | DISTANT | Tongue flap, Nasolabial flap, Buccinatormyomucosal island flap, Temporalis myofascial flap |
| | BONE GRAFT | Chin, Retromolar region,Zygoma,Illiaccrrest | |
| ALLOGENOUS | | Fibrin glue, Dura | |
| XENOGRAFT | | Collagen, Gelatin, Bio-O97ss, Bioguide | |
| SYNTHETHIC MATERIAL | | Gold, Aluminium, Tantalum, Hydroxyapatite | |
| OTHERS | | Acrylic splints, Guided tissue regeneration, Interseptalalveolotomy, Pro -Laminin gel , third molars | |

Table 1: Methods of closure of OAF

versatility of the flap. Straight advancement flap does not provide sufficient mobility, whereas palatal rotation advancement flap have the ability to rotate 180 degrees and to be placed in the oral cavity mucosal side up or down allows be considered as a reliable back up procedure in the event of failure of other techniques nearly 360-degree availability along the entire pedicle[10].

Rotation about a 180 degree axis and ability to invert the flap allow coverage in any direction. With this versatility noted, one of the most significant limitations of this the flap is short distance that it may travel to a defect. The flap is limited by its neurovascular supply, which emerges from the bony canal of the greater palatine foramen.

Mobilization and rotation of the flap can lead to kinking, for which Kruger has suggested a v - shaped excision along the lesser curvature[11]. Some times this back cut given to avoid kinking can cause necrosis jeoparadising the blood supply. When a partial thickness flap is rasied, the overlying periosteum enhanced healing and reduced healing time. The design of the flap used in our case was in such a way that the length to width ratio is 2.1.Terminal part of the greater palatine artery is a nasopalatine branch, which ascends through the incisive foramen and anastomoses with the septal branches of the sphenopalatine artery. Thus a retrograde flow through the nasopalatine artery can occur when the greater palatine neurovascular bundle is transacted. An appropriate length/width ratio is important for the success of palatal flap. The length/width ratio is below 2.15 is desirable, whereas significant edge necrosis and repair failure is seen with a ratio above 2.49[12]. Considering the wide variety of options for the reconstruction of post traumatic and post ablative intraoral defects, the palatal flaps hold many advantages over other forms of reconstruction. It has been used successfully with minimal morbidity for reconstruction of defects within the reach of the flap. The cases presented here in demonstrate the versatility of the flap.

## CONCLUSION

From our experience we can conclude that palatal rotation flap is a reliable flap for the repair of oroantral fistula. The easy mobilization of the palatal rotation flap and its excellent blood supply and minimal donor site morbidity make it an ideal flap.

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# GINGIVAL DEPIGMENTATION : A CASE REPORT

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## ABSTRACT

A beautiful smile definitely enhances the personality of an individual and reveals self-confidence. The harmony of the smile is determined not only by the shape, position, and colour of the teeth but also by the gingival tissues. The colour of the gingiva depends on varying degree of melanin deposition. Gingival melanin pigmentation is a common aesthetic problem. This problem is aggravated in patients with a gummy smile or excessive gingival display. Various techniques of depigmentation have been explained in the literature to treat this entity. Here we present a case of hyperpigmentation treated with scalpel, and electrosurgical procedure in a split mouth design with a note on comparison of healing.

**Key Words**

Gingival Depigmentation, Melanin, Electosurgery, Healing, Hyperpigmentation.

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## INTRODUCTION

The harmony of the smile is determined not only by the shape, the position and the colour of the teeth but also by the gingival tissues. Gingival health and appearance form an essential component of an attractive smile.[1] Gingival pigmentation varies among different ethnic groups. Among same race, the depth of colour depends on density of melanin and degree of melanoblastic activity.[2] Melanin pigmentation results from melanin granules, which are produced by melanoblasts. Melanin hyperpigmentation of gingiva usually referred by patients as black gums is considered to be unaesthetic. This problem looks exaggerated in patients with a "gummy smile" or excessive gingival display while smiling. Gingival depigmentation is a periodontal plastic surgical procedure whereby the gingival hyperpigmentation is removed or reduced by various techniques. The foremost indication for depigmentation therapy is the demand by a patient for improved aesthetics.[3]

### Techniques available for aesthetic depigmentation includes [3]:

a) Abrasion with diamond bur,

b) Slicing with scalpel,

c) Cryosurgery,

d) Electrosurgery,

e) Gingivectomy with free gingival autograft,

f) Acellular dermal matrix allografts,

g) Various types of lasers have been used for cosmetic therapy of gingival melanin depigmentation.

This case presents the comparison of conventional surgery by scalpel and electrosurgery for removal of gingival hyperpigmentation including patient's comfort, operator's ease, complications, outcome and prognosis.

## CASE REPORT

A 23 years old female patient reported to the department of Periodontology, Amrita school of dentistry, with the chief complaint of "black" coloured gums. Patient requested for any kind of aesthetic treatment which could make his "black" coloured gums look better. Medical history was non-contributory.

Intra- oral examination revealed that he had deeply pigmented gingiva (Fig.1). A complete medical, family history and blood investigations were carried out to rule out any contraindication for surgery. The entire procedure was explained to the patient and written consent was obtained.

A split mouth design including two different depigmentation techniques were adopted. The depigmentation treatment procedure was carried out with conventional scalpel surgery upper anterior teeth and in upper posterior left posterior depigmentation was done with electrosurgical electrode.

After adequate local anesthesia, maxillary anterior pigmented gingiva up to the first premolar was deepithelized with a scalpel blade (No.15) by a slicing method (Fig. 2). Depigmentation was carried out from mucogingival junction towards tip of interdental papilla. Care was taken to avoid pitting of gingival surface or to remove too much tissue. Care was also taken to remove all remnants of melanin pigment as thoroughly as possible. Electrosurgical technique was performed with the loop electrode (Fig.3). In all the steps the electrode was activated and moved in a concise "shaving" motion. Extreme care was exercised to avoid contacting the tooth surface. Periodontal Pack was placed and post-surgical instructions were given to the patient along with the prescription of anti-inflammatory analgesics. The patient was reviewed at the end of one week (Fig.4 and 5). The healing process was uneventful on scalpel surgical area than compared to electrosurgically treated sites. Areas of raw wound surface were visible on electrosurgical treated site. The patient did report discomfort at the electrosurgical site. Patient was reviewed at the end of two weeks slight pain was experienced by the patient in area treated with electrosurgical treated site.

## DISCUSSION

Oral pigmentation occurs in all races of man. The intensity and distribution of pigmentation of the oral mucosa is variable, not only between races, but also between different areas of the same mouth. Melanin pigmentation is frequently caused by melanin deposition by active melanocytes located mainly in the basal layer of the oral epithelium. Pigmentation can be removed for aesthetic reasons [3].

Different treatment modalities have been used for this purpose.[4] Selection of a technique for depigmentation of the gingiva should be based on clinical experience, patient's affordability and individual preferences. Scalpel surgical technique is highly recommended in consideration of the equipment constraints that may not be frequently available in clinics. It is known that the healing period for scalpel wounds is faster than other techniques.[5]

Electrosurgery requires more expertise than scalpel surgery. Prolonged or repeated application of current to tissue induces heat accumulation and undesired tissue destruction. Contact with periosteum or alveolar bone and vital teeth should be avoided. [6] In the present report it was associated with better healing response than electrosurgical treated site. The healing period of scalpel wounds was shorter than with diode laser and electrosurgery. In area treated with scalpel, the tissue had not been subjected to the effects of thermocoagulation and burn from electrosurgery.

Also there is lack of bleeding and clot formation in the electrosurgery, which was present after use of scalpel and forms the "first phase" of healing. There was an inherent delay in epithelial migration and a denatured zone is formed within the connective tissue after electrosurgery probably due to lateral heat generated within the tissue by the active electrosurgery electrode. Prolonged or repeated application of current to tissue induces heat accumulation and undesired tissue destruction.

## CONCLUSION

The depigmentation procedure was successful and the patient was satisfied with the result. Hence we conclude that depigmentation of hyper pigmented gingiva by scalpel surgery is simple, easy to perform, cost effective and above all it causes less discomfort. While electrosurgical procedure provided blood free working area, contouring and festooning was easy with various electrodes. As far as healing was concerned, it was relatively better with scalpel surgery compared to electro surgery at the end of one week.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

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