Section A-Research paper

Title - Assessment of Knowledge and Awareness about Photo activated Pre-procedural rinses amongst Clinical Practitioners- A Cross Sectional Survey.

Dr. Magesh Kumar S MDS

Ph.D Scholar

Department of Periodontology

Faculty of Dental Sciences

Sankalchand Patel University

Visnagar, Gujrat

Mobile No: 7060027511

Email: drmagesh76@gmail.com

Dr. Hiral Parikh MDS, Ph.D

Professor and Head

Department of Periodontology

Faculty of Dental Sciences

Sankalchand Patel University

Visnagar, Gujrat

Mobile: 9825973584

Email: drhiral10@yahoo.co.in

Corresponding Author

Dr. Magesh Kumar S MDS

Ph.D Scholar

Department of Periodontology

Title - Assessment of Knowledge and Awareness about Photo activated Pre-procedural rinses amongst Clinical Practitioners- A Cross Sectional Survey.

Section A-Research paper

Faculty of Dental Sciences
Sankalchand Patel University
Visnagar, Gujrat
Mobile No: 7060027511
Email: drmagesh76@gmail.com

Abstract

Background: Dental office is often seen as a potential source for contracting airborne infections and this has been amplified with the emergence of COVID-19 like diseases. Conventionally used pre-procedural rinses have shown moderate success against airborne microorganisms. Therefore a search for newer novel therapeutic protocols is often necessary. Photodynamic therapy/Photo-activated Pre-procedural rinses are seen as better alternative to conventionally used pre-procedural rinses.

Aim: Assessment of knowledge and awareness of photodynamic therapy and photodynamic pre-procedural rinses amongst dental professionals.

Methodology: A cross sectional study was conducted amongst dental professionals. A self-administered questionnaire consisting of 22 questions was formulated and distributed amongst dental professionals. Participants were asked for their responses. Total of 111 dental professionals participated in the study. Data was tabulated and descriptive statistics was done.

Result – Out of 111 participants**,** 59.5% were specialists and 40.5% were general dental practitioners. 99.1% participants had knowledge about pre-procedural rinses and believed that it was an effective method of reducing bacterial/viral load in the oral cavity. 97.3%

participants used them in their routine clinical practice. 80.2% of the participants had knowledge about photodynamic therapy/photo-activated disinfection but 95.5% of them never used it in their clinical practice. Major reasons cited for the same includes non availability of the materials (35.1%), being expensive (14.4%) and not sure of the results (20.7%). 67.7% of the participants choose lasers as the best light source and 71.2% for methylene blue as photosensitizers. 55.1% and 55.9% respondents disagreed that blue light can be used as source for photodynamic therapy and common agents like H_2O_2, erythrosine be used as photosensitizers respectively. 85.6% preferred Chlorhexidine and Povidone-Iodine as clinical choice as pre-procedural rinses. 94.6% felt there was a need for more continuing dental education (CDE) programmes, workshop and training to incorporate Photo-disinfection into clinical practice.

Conclusion: Majority of participants were having knowledge about photodynamic therapy/photo-activated disinfection but they were unable to incorporate it into routine dental practice due to various factors encountered**.** 94.6% of the professionals felt that there was a dire need for Continuing Dental Education programmes, workshops and training in Photo-activated disinfection so that it can be used in routine clinical practice.

Keywords: Blue Light, Photodynamic Therapy, Photo activated disinfection, Pre-procedural rinses, Photosensitizers

Introduction:

Section A-Research paper

Dentistry presents as a high risk profession with various occupational hazards that includes biological, biomechanical, chemical, physical and psychological components. Biological hazards often places the dentist and his personnel assistant at an increased risk of contracting airborne diseases leading to greater morbidity and mortality in a short frame of time.[1,2] Dynamic dental equipment's can generate abundant amount of bioaerosols in the dental operatory. Bioaerosols are suspension of biological particles in a gaseous medium. Bioaerosols contain live microorganisms like bacteria, viruses, fungi and protozoa that are suspended in the air for longer period of time.[3]

Various preventive protocols like rubber dam, high volume evacuator (HVE), pre-procedural rinses, mechanical aerosol reduction and filtration systems, HEPA filters, UV light have been used to minimize bioaerosols within the dental operatory. [4,5] Pre-procedural oral rinses are widely accepted protocol in the field of dentistry that is quite effective and economical. Various antiseptics are used as pre-procedural rinses like chlorhexidine, Povidone-Iodine, essential oils to reduce the bioburden in bioaerosols. But there is only moderate evidence in the literature regarding the use of pre-procedural mouth rinses for reduction of the number of microorganisms in dental bioaerosols. [6]

Photodynamic therapy is a novel therapeutic procedure that employs a non-toxic dye termed a Photosensitizer (PS) in the presence of light of a suitable wavelength and molecular oxygen produces cytotoxic species.[7] Photodynamic therapy has been extensively used in the fields of dermatology, oncology and dentistry.[8] Commonly used agents in dentistry like H_2O_2, Erythrosine, Curcumin can effectively be used as photosensitizers. Therefore the current

study was conducted to assess the knowledge and awareness of photodynamic therapy and photodynamic pre-procedural rinses amongst dental professionals.

Material and Methods

A descriptive cross sectional survey was conducted among dental professionals with the aim of assessing the knowledge and awareness regarding photodynamic therapy and photodynamic activated disinfection. Data collection was carried out by using a self administered questionnaire consisting set of 22 close ended questions, prepared both in electronic form using Google forms and manually. Questionnaire was validated by the independent subject experts. All the forms with the incomplete responses were excluded and a total of 111 participant's responses were considered for final data preparation. Data was tabulated and descriptive statistics was performed.

Results

Out of 111 participants**,** 59.5% were specialists and 40.5% were general dental practitioners. 99.1% participants had knowledge about pre-procedural rinses and believed that it was an effective method of reducing bacterial/viral load in the oral cavity. 97.3% participants used them in their routine clinical practice. 80.2% of the participants had knowledge about photodynamic therapy/photo-activated disinfection but 95.5% of them never used it in their clinical practice. Major reasons cited for the same includes non availability of the materials (35.1%), being expensive (14.4%) and not sure of the results (20.7%). 67.7% of the participants choose lasers as the best light source and 71.2% for methylene blue as

photosensitizers. 55.1% and 55.9% respondents disagreed that blue light can be used as source for photodynamic therapy and common agents like H_2O_2, erythrosine be used as photosensitizers respectively. 85.6% preferred Chlorhexidine and Povidone- Iodine as clinical choice as pre-procedural rinses. 94.6% felt there was a need for more continuing dental education (CDE) programmes, workshop and training to incorporate Photo-disinfection into clinical practice.

Table : Questionnaire used in this study

S.N	Questions	Responses	%
1	Qualification	MDS BDS	59.5 40.5
2	Years of Experience	< 5yrs 5-10 10-20 >20	61.3 19.8 16.2 2.7
3	Do you have any kind of knowledge about Pre-procedural rinses	Yes No	99.1 0.9
4	Have you ever used Pre-procedural rinses for your patients before any non-surgical/surgical therapy	Yes No	97.3 2.7
5	Do Pre-procedural rinse with mouth washes effectively reduce bacterial/viral load in the oral cavity	Yes No	99 1
6	Which of the following mouthwashes can be used as pre-procedural rinse	Chlorhexidine Povidone-Iodine Cetylpyridinium chloride (CPC) Essential Oils	91.9 87.4 14.4 9.9
7	Do you have any kind of knowledge about Photodynamic Therapy (PDT)/ Photo- activated disinfection	Yes No	80.2 19.8

8	If yes, then what was the source of information	Textbook Articles Teachers CDE Programmes	13.3 36 45
9	Have you ever used Photo-activated Disinfection in your Clinical Practice	Yes No	4.5 95.5
10	If No, the reasons for it	Not aware of the treatment protocol Not sure of the results Expensive Non availability of material/equipment All of the above	19.8 20.7 14.4 35.1 42
11	Are you aware that Photodynamic Therapy(PDT) is extensively used in medical fields like Oncology, Dermatology and also in Dentistry	Yes No	77.3 22.5
12	Photodynamic Therapy(PDT)/ Photo-activated Disinfection utilizes Light of suitable wavelength and Dyes called Photosensitizers	Yes No	91 9
13	Which are the most preferred Light sources that can be used in Photodynamic Therapy(PDT)/ Photo-activated Disinfection	Tungsten filament quartz halogen bulb Argon Laser Diode laser Light emitting diodes(LED) Organic Light emitting diodes (OLED) Quantum Dot Light emitting diodes (QLED) All of the above	4.5 8.1 67.6 54 8.1 8 16.2
14	Which of the following chemical agents can be used as Photosensitizers	Toulidine Blue Methylene Blue Rose Bengal Hydrogen peroxide Erythrosine Tetracyclines Curcumin All of the above	67.6 71.2 8.1 12.6 42.2 2.7 7.2 11.7
15	Blue light from Composite Curing Gun can be used as a light source for Photodynamic Therapy(PDT)/ Photo-activated Disinfection	Yes No	44.1 55.5

16	Which is the most effective wavelength for Photodynamic Therapy(PDT)/Photo-activated Disinfection	420-490nm 520-530nm 630-940nm All of the above	39.6 20.7 25.2 14.4
17	Blue light alone is quite effective in eliminating pathogenic microrganisms in the oral cavity	Yes No	29.7 70.3
18	Can commonly available agents like Hydrogen Peroxide and Erythrosine plaque disclosing agents be used as photosensitizers	Yes No	44.1 55.9
19	Erythrosine Plaque Disclosing dye / Hydrogen Peroxide when used with Blue light from Composite Curing Gun is very effective and better alternative to adjunctive use of antibiotics to treat periodontal disease/ reduce bacterial and viral load from the oral cavity	Yes No	42.3 57.7
20	What will be your clinical choice for Pre procedural rinse	Chlorhexidine/Povidone-Iodine Photodynamic Therapy(PDT) with Blue light along with Erythrosine Plaque Disclosing dye / Hydrogen Peroxide	85.6 14.4
21	Do you feel there is a need for CDE Programmes/Workshops/Training on PDT to use it on a regular basis in clinical practice	Yes No May be	94.6 2.5 2.9
22	Would you like to Replace conventional Chlorhexidine/Povidone-Iodine with Photodynamic Therapy(PDT)/ Photo-activated Disinfection in your Routine clinical practice	Yes No May be	34,5 9 56.8

Discussion

To our knowledge this is the first study conducted to assess the knowledge and awareness of photodynamic therapy and photodynamic pre-procedural rinses amongst dental professionals. Photodynamic therapy has varied applications in the field of medicine and all sub specialities of dentistry. Photodynamic therapy has been effectively used in the treatment of malignant lesions of head and neck, pathological lesions caused by bacterial, fungal and viral lesions in the oral cavity, disinfection of the root canal, disinfection of the periodontal pocket and in peri-implantitis. [8]

The study revealed that majority of the respondents were having knowledge about photodynamic therapy/photo-activated disinfection, but were not aware that common equipment like Light Cure composite gun and agents like H2o2 , erythrosine can be utilized successfully in day to day clinical practice. 99% of the participants had the knowledge that pre-procedural rinses reduce bacterial/viral load in the oral cavity. Pre-procedural scrub and mouth rinses are widely accepted and are considered as beneficial for reduction of bacterial/viral load in saliva and aerosols generated by the dental procedures.[9]

80.2% of them had knowledge of photodynamic therapy/photo-activated disinfection but 95.5% never applied it clinically. Major reasons cited for not clinically utilizing the procedure were non availability of the materials, expensive and not sure of the results

Literature have reported the use of various light sources and photosensitizers ranging from very economical to expensive alternatives.[10,11] Diode Lasers, Organic Light emitting

diodes, Quantum Dot light emitting diodes are quite expensive as compared to Light Emitting diodes (Light Cure Composite Gun). ~~which is quite economical~~. Photosensitizers like Toluidine Blue, Methylene Blue, Rose Bengal are expensive, not easily available in contrast to hydrogen peroxide, erythrosine, tetracycline and Curcumin which are easily available and inexpensive. 55.1% of participants held the opinion that blue light is not a source of light for photodynamic therapy. Contrary to their believe, study have shown that blue light alone is quite effective in eradicating microorganisms.[13] 55.9% opined that agents like H_2O_2 and erythrosine cannot be used as photosensitizers. Feuerstein et al[13]and Manohar Bhat et al [12] have shown that H_2O_2 and erythrosine are efficacious as photosensistizers.

85.6% of practitioners preferred the traditionally used of pre-procedural mouth rinses like Chlorhexidine and Povidone-Iodine as their choice for pre-procedural rinses. Studies have shown that these have a moderate success against microorganisms present in the bioaerosols.

94.6% practitioners had opinion that there is a dire need for Continuing Dental Education programmes, workshops and training in Photo-activated disinfection so that it can be used in routine clinical practice for increased procedural success and enhanced outcome.

Conclusion

Majority of participants were having knowledge about photodynamic therapy/photo-activated disinfection but they were unable to incorporate it into routine dental practice due to various

factors encountered**.** 94.6% of the professionals felt that there was a dire need for Continuing Dental Education programmes, workshops and training in Photo-activated disinfection so that it can be used in routine clinical practice.

References

1. Vodanonc M, Galic I, Kelmendi S, Chalas R. Occupational health hazards in contemporary Dentistry- A Review. Medical Sciences 2017;44:25-41.
2. Zemouri C, de Soet H, Crielaard W, Laheij A. A scoping review on bioaerosols in health care and the dental environment. PLOS ONE 2017;12(3):e0178007.
3. Samaranayake LP, FakhruddinKS, Buranawat B, Panduwawala C. The efficacy of bioaerosol reducing procedures used in dentistry: A Systematic Review. ActaOdontologicaScandinovica 2021;79(1):69-80.
4. Dutil S, Meriaux A, Chantale de Latremoille.M, Lazare L, Barbeau J, Duchaine C. Measurement of airborne bacteria and endotoxin generated during dental cleaning. Journal of Occupational and Environmental Hygiene 2009;6:12-130.
5. Nishitha A, Sindhu R. A review on the current trends to reduce exposure to bioaerosols in operative dentistry. Annals of R.S.C.B 2021;25(6):1594-1603.
6. Costa Marui V, SilveiraSouta ML, Silva Rovai E, Alexandra Romita G, Chambrone L, Mendes Pannuti C. Efficacy of pre-procedural mouthrinses in the reduction of microorganisms in aerosol: A Systematic Review. The Journal of American Dental Association 2019;150(12):1015-1026.

7. Sperando FF, Huang YY, Hamblin MR. Antimicrobial Photodynamic therapy to kill gram-negative bacteria. Recent Pat Antiinfect Drug Discov 2013;8(2):108-120.
8. Stajer A, Kajari S, Gajdacs M, Musah-Troje. A, Barath Z. Utility of photodynamic therapy in dentistry: Current Concepts. Dent J 2020;8(42)1-22.
9. Testori T, Wang HL, Basso M, Bordini G, Dian A, Vitelli C et al. COVID 19 and Oral Surgery: A Narrative review of pre-operative mouthrinses. ActaStomatol Croat 2020;54(4):431-441.
10. AntoninaCalin M, Parasca SV. Light Sources for Photodynamic inactivation of bacteria. Lasers Med Sci 2009; 24: 453-460.
11. VishwasKhandge N, Sucheta P, Yogesh D, Kulkarni A, Dhruvi I. Photodynamic Therapy(Part 1: Applications in Dentistry). Int J Laser Dent 2013;3(1)7-13.
12. Bhat M, Acharya S, Venkata Prasad KV, Kulkarni K, Bhat A, Bhat D. Effectiveness of erythrosine- mediated photodynamic antimicrobial chemotherapy on dental plaque aerobic microorganism: A Randomized Controlled Clinical Trial. J. Indian Soc Periodontol 2017;21: 210-215.
13. Dai T, Gupta A, Murray CK, Vrahas MS, Tejos GP, Hamblin MR. Blue light for infectious diseases: Propionibacterium acnes, Helicobacter pylori and beyond? Drug Resist Updat 2012;15(4):223-236.
14. Feuerstein O, Moreinos D, Steinberg D. Synergistic Antibacterial effect between visible light and hydrogen peroxide on Streptococcus mutans. Journal of Antimicrobial Chemotherapy 2006; 57:872-876.