



KNOWLEDGE AWARENESS PRACTICE ON THE USE OF BIOCERAMIC SEALERS AS NEW ALTERNATIVE TO CURRENTLY USED ENDODONTIC SEALERS AMONG DENTAL PRACTITIONERS

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ABSTRACT:

Background and aim: The increased use of bioceramic technology in endodontics has been raised nowadays. Bioceramic sealers have advantages like biocompatibility, non toxicity, dimensional stability and most importantly in endodontic applications. The aim of this study is to assess the knowledge, awareness and practice of Bioceramic sealers as new alternatives to currently used endodontic sealers. **Materials and methods:** Self-administered questionnaires related to knowledge, awareness and practice on Bioceramic sealers as a new alternative to currently used endodontic sealers along with sociodemographic details were prepared and it was distributed through an online survey link. Chi square analysis was used for inferential statistics. **Results:** From the study population 23% of the participants were male and 77% of the participants were females. About 91% of the participants felt bioceramic sealers can act as pulp capping agents and about 9% of the participants felt bioceramic sealers do not act as pulp capping agents. **Conclusion:** Bioceramic sealers are sealers that contain calcium silicate and/or calcium phosphate as their main compositions. Bioceramic sealers have the ability to achieve excellent hermetic seal, form a chemical bond with the tooth structure and have good radiopacity

Keywords: Bioceramic sealers, Obturation, Resin Sealers, Zinc oxide eugenol.

INTRODUCTION:

Over the past few decades, new technologies have been developed that allow dentists to perform improved endodontics. The reason for these changes is the introduction of advanced materials. The beauty is that in the area of endodontic material science is continuing to rise and, in fact, it has been changed. The increased use of bioceramic technology in endodontics has been raised nowadays, more specifically in the area of endodontic obturation^[1]. Bioceramic sealers are



materials which include ceramic materials which are designed for use in dentistry. The examples of bioceramics materials are mainly alumina, zirconia, bioactive glass, glass ceramics, coatings, composites, hydroxyapatite and resorbable calcium phosphates. In dentistry, bioceramics are used in dental implants, in periodontal treatment, alveolar ridge augmentation, maxillofacial surgery, pulp capping and apexification^[2]. Bioceramics are also used in dentistry for the purpose of filling up bony defects, root repair materials, apical fill materials, perforation sealing, as endodontic sealers and as aids in regeneration.

Bioceramic sealers are biocompatible and bioactive, favoring the survival, differentiation, and remineralizing function of osteoblasts^[2,3]. Therefore, they have the potential to be adjuvants in the remineralization of osteolytic lesions in apical periodontitis after adequate disinfection of the root canal system^[4]. Bioceramics can be classified as Bioinert which means they are non interactive with biological systems, secondly bioactive which means durable tissues that can undergo interfacial interactions with surrounding tissue, and thirdly biodegradable, soluble or resorbable which means Eventually replaced or incorporated into tissue. There are numerous bioceramic sealers currently in use. Bioceramic sealers have excellent biocompatibility properties due to their similarity with biological hydroxyapatite. Intrinsic osteoinductive capacity because of their ability to absorb osteoinductive substances if there is a bone healing process nearby.

It functions as a regenerative scaffold of resorbable lattices which provide a framework that is eventually dissolved as the body rebuilds tissue. Ability to achieve excellent hermetic seal, form a chemical bond with the tooth structure and have good radiopacity. Antibacterial properties as a result of precipitation in situ after setting, a phenomenon that leads to bacterial sequestration. There are two major advantages associated with the use of bioceramic sealers as root canal sealers. Firstly, their biocompatibility prevents rejection by the surrounding tissues. Secondly, bioceramic sealers contain calcium phosphate which enhances the setting properties of bioceramics and results in a chemical composition and crystalline structure similar to tooth and bone apatite materials, thereby improving sealer-to-root dentin bonding.^[5]

Bioceramic sealers may be an essential element in the indirect and direct pulp capping and pulpotomy procedures that are an integral part of endodontic therapy's goal of maintaining the vital pulp to ensure a healthy periradicular periodontium. For all these reasons, premixed bioceramic sealers are now the material of choice for pulp capping, pulpotomy, perforation repair, root-end filling, and obturation of immature teeth with open apices, as well as for sealing root canal fillings of mature teeth with closed apices.^[6] New bioceramic sealers have demonstrated the ability to overcome some of the significant limitations of earlier generations of endodontic materials. Most bioceramic materials have been shown to be biocompatible and have good physico-chemical characteristics, therefore having a potential use in clinical endodontics^[7]. The aim of the present study was to assess the knowledge, awareness and practice on the use of bioceramic sealers as a new alternative to currently used endodontic sealers among dental practitioners and specialists. Our team has extensive knowledge and research experience that has translate into high quality publications^{[8-17], [18-21], [22-26], [27]}



MATERIALS AND METHODS:

Study design:

A cross sectional study was conducted among 100 dental practitioners and specialists through an online survey from February to April 2021 among dental practitioners and specialists. Simple random sampling was used to select the study participants. Self administered questionnaire of close-ended questions was prepared and it was distributed among dental practitioners and specialists from February to April 2021 through the online survey “google forms”. Returning the filled questionnaire was considered as implicit consent as a part of the survey. Ethical approval for the study was obtained from the Institutional Review Board (IRB), Saveetha Dental College. The collected data were checked regularly for clarity, competence, consistency, accuracy and validity. Demographic details were also included in the questionnaire.

Statistical analysis:

Data was analyzed with the SPSS version (22.0). Descriptive statistics as percent were calculated to summarize qualitative data. Chi square test was used to analyze and to check the association and a p value of 0.05 was said to be statistically significant. Finally, the result was presented by using bar charts, pie charts and percentage tables.

RESULTS:

The present study was conducted to gain knowledge, awareness and practice on the use of bioceramic sealers as a new alternative to currently used endodontic sealers among dental practitioners and specialists. In the present study surprisingly about 23% of the participants were male and 77% of the participants were female [figure 1]

About 93% of the participants were aware of endodontic procedures, 7% of the participants were not aware[Figure2].About 91% of the participants felt bioceramic sealers can also act as pulp capping agent,9% of the participants felt bioceramic sealers does not act as pulp capping agent[Figure 3]About 96% of the participants felt bioceramic sealers showed antibacterial activity, 4% of the participants felt bioceramic sealers do not show any antibacterial activity[Figure 4]. About 93% of the participants felt this study was very useful. 73% of the participants are aware that bioceramic sealers act as pulp capping agents. [Figure 5]

DISCUSSION:

Bioceramic-based materials have been recently introduced in endodontics, mainly as repair cement^[28,29] and as root canal sealer^[30,31]. Bioceramics are the result of the combination between calcium silicate and calcium phosphate that are applicable for biomedical and dental use. According to manufacturers, bioceramic materials show alkaline pH, antibacterial activity, radiopacity, and biocompatibility. Thus, the main advantages of bioceramic materials in dental application are related with their physical and biological properties. Bioceramics are biocompatible, nontoxic, non shrinking, and chemically stable within the biological environment. Another advantage of the material is its ability during the setting process to form hydroxyapatite



and ultimately a bond between dentin and filling material. In the present study 93% of the participants were aware of several endodontic procedure^[32] had a higher level of knowledge about treatment and prognosis of procedural accidents than about the causes and prevention. In the present study 84% of the participants are aware and they preferred bioceramic sealers in RCT^[33] Bioceramic-based root canal sealers are considered to be an advantageous technology in endodontics. Bioceramic-based sealers were found to be biocompatible and comparable to other commercial sealers. In the present study about 91% of the participants felt that bioceramic sealers are used as root canal sealing agent^[34,35]. Also, bioceramic material may be an essential element in the indirect and direct pulp capping as well as pulpotomy procedures that are an integral part of endodontic therapy as a goal of maintaining the vital pulp to ensure a healthy periradicular pulp and periodontium. The first endodontic use of this class of materials was in the form of Mineral Trioxide Aggregate (MTA), used for perforation repair and root end filling^[36].

The present study is a novel study, hence there is no existing previous studies. Limitation of the study is less sample size. In future an extensive study with large sample size and varied population can be used to assess the knowledge, awareness and practice on the use of bioceramic sealers as a new alternative to currently used endodontic sealers.

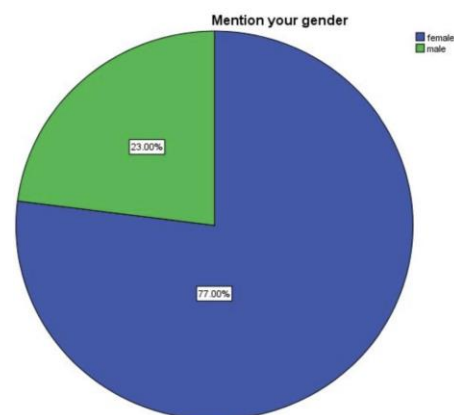


FIG 1: Pie chart representing, 23% of the participants were male (green) and 77% of the participants were female (blue)

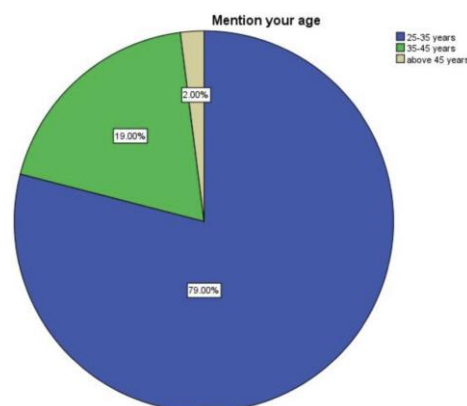




FIG 2: pie chart representing about 79% of participants were between 25 to 35 years (blue), about 19% of participants are in between the age group of 35 to 45 years (green). About 2 % of participants belong to the age group above 45 years.

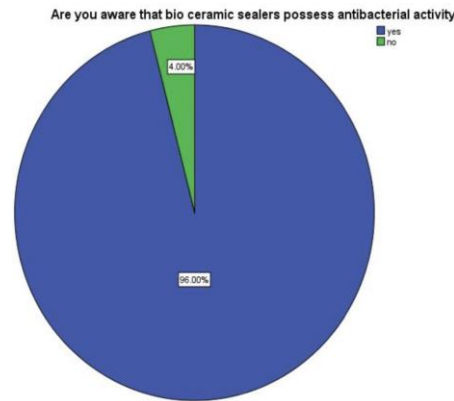


Fig3: Pie chart representing About 96% of the participants felt bioceramic sealers showed antibacterial activity (blue), about 4% of the participants felt bioceramic sealers do not show any antibacterial activity (green).

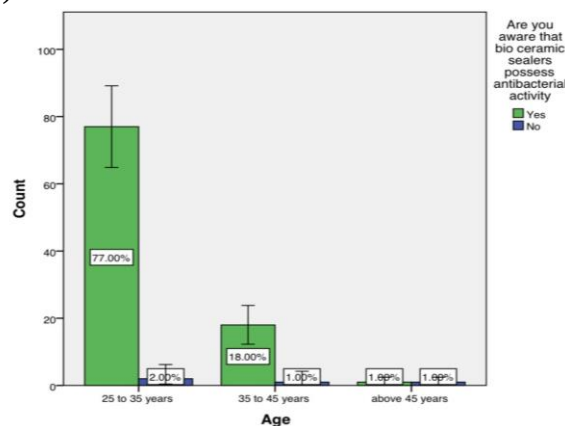


Fig4: Bar chart represents the association between the age of the participants and awareness about bioceramic sealers possessing antibacterial activity. X axis represents the age in years and Y axis represents the awareness of respondents in percentage. Blue represents yes and green represents no. In the age group of 25 - 35 years, 77% of the participants are aware. In the age group of 35 - 45 years, 18% of the participants are aware. In the age group of above 45 years, 1% of the participants are aware. People who belong to the age group of 25 - 35 years are more aware about bioceramic sealers possessing antibacterial activity. Pearson chi square value is 0.003 which is less than 0.05. Hence it is statistically significant.

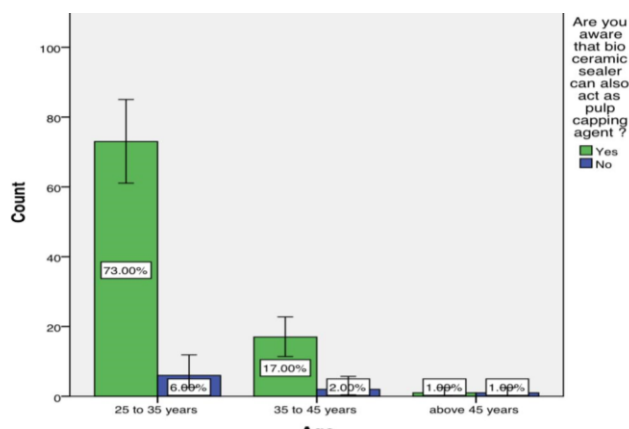


Fig 5: Bar chart represents the association between the age of the participants and awareness that bioceramic sealers act as pulp capping agent. X axis represents the age in years and Y axis represents the awareness of respondents in percentage. Blue represents yes and green represents no. In the age group of 25 - 35 years, 73% of the participants are aware. In the age group of 35 - 45 years, 17% of the participants are aware. In the age group of above 45 years, 1% of the participants are aware. People who belong to the age group of 25 - 35 years are more aware that bioceramic sealers act as pulp capping agents. Pearson chi square value is 0.005 which is less than 0.05. Hence it is statistically significant.

CONCLUSION:

Bioceramic sealers are sealers that contain calcium silicate and/or calcium phosphate as their main compositions. Bioceramic sealers have the ability to achieve an excellent hermetic seal, form a chemical bond with the tooth structure and have good radiopacity. Antibacterial properties as a result of precipitation in situ after setting. In the present study, the knowledge, awareness and practice on the use of bioceramic sealers as a new alternative to current was satisfactory. For further improvement awareness should be created.

Authors contribution:

Monesh Babu - Contributed to conception, design, data acquisition and interpretation, drafted and critically revised the manuscript.

Dr. Sankeerthana Kolli - Contributed to conception, design, and critically revised the manuscript. All authors gave final approval and agreed to be accountable for all aspects of the work.

Conflict of interest: The authors declare no conflict of interest.

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