

**AWARENESS ON USE OF POLYMER BUR IN DEEP CARIES MANAGEMENT
AMONG GENERAL DENTAL PRACTITIONERS - A SURVEY**

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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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ABSTRACT:

Objective:

Polymer bur is a quite important rotary instrument which is made up of poly ether-ketone-ketone, and it is mostly used to remove decayed dentine without damaging the healthy tooth structure. This mechanism is based on the hardness level of the instrument being lower than the hardness level of the healthy dentin.

MATERIALS AND METHODS:

This is a cross sectional study conducted among general dental practitioners through a questionnaire. The questionnaire consists of 15 questions and was circulated among dental practitioners with the help of an online survey link. After getting the results, the data was analysed using a software known as spss and then graphs were generated according to the results.

RESULTS:

According to the results obtained, 90% of the participants were aware that polymer bur comes under the category of rotary instruments as the remaining 10% were unaware about this. 83% of the participants agreed to the statement polymer bur is capable of conserving dentin that can be further remineralised whereas the remaining 17% disagree with the statement. P value is 0.64 which is statistically not significant.

DISCUSSION:

In a study done by Gaddam Divya et al stated that more amount of bacterial remnants were present after excavation with polymer bur

CONCLUSION:

From the data collected we can say that dental practitioners are aware about the importance of using a polymer bur in the clinic. But using polymer burs in general practice is quite hard due to some of its disadvantages such as, one time use, hard to sterilize and it is also considered to be expensive.

Key words: Caries;Dentin safe burs;Ecofriendly; Polymer bur,Pulpal cavity.

INTRODUCTION:

Polymer bur is a new technology that proposes to conserve the Dentin that is capable of remineralisation^[1]. Polymer bur is normally used for Deep caries lesions, selective carious tissue removal, where tissue remains in the pulpal cavity area and sealed beneath a restoration^[2]. For selective removal, the current standard technique is to subjectively remove carious dentin until only hard dentin remains peripherally, and soft, leathery or firm dentin in pulp-proximal areas^[3].

An alternative method for caries removal is usage of self limiting polymer burs because it helps in dentine protection. These are manufactured from medical-grade polyether-ketone-ketone^[4]. For conventional caries removal, cavity is prepared with the help of burs on a high-speed handpiece to gain access to the carious lesion, and a low-speed handpiece to remove carious dentine^[5]. Steel bur excavation and Conventional rotary techniques help in removing large amount of sound tissue, leaving behind some amount of various tissues which may lead to overextension of the oral cavity or removing healthy tissue or by applying pressure and heat on the pulp which may lead to the need of using local anesthetics^[6]. which creates an

aversion in many patients, especially in children, these are the reasons why polymer burs should come into use^{[[7]]}. Polymer burs contains reinforced blades which are used along with a slow-speed handpiece in order to excavate carious degraded dentine^{[[8]]}. These burs are said to have a hardness of 50 KHN which is the reason why their cutting edges only remove caries infected dentin without harming healthy dentin^{[[9]]}. Our research and knowledge have resulted in high-quality publications from our team^{[[10-23]]}

Many studies have been conducted on the importance of polymer bur, some include^{[[24]]},^{[[25]]},^{[[26]]} and^{[[27]]}. In almost all these studies, the authors have stated that polymer burs are more efficient in removing caries dentine than other types of burs^{[[28]]}. The main aim of this survey is to analyse the participant's awareness level about the usage of polymer burs in deep caries management among the general dental practitioners.

MATERIALS AND METHODS:

Study Design

A cross sectional survey was conducted among general dental practitioners to evaluate their knowledge and awareness level about usage of polymer burs in clinical practice. The study population was 100 participants. The participants did the survey willingly and no inducements were given to them. The survey was launched in the month of March, 2021. Ethical approval and consents were obtained from the participant before starting the survey.

Survey Methodology

The questions were prepared only after extensive literature. The questionnaire was well reviewed and adjustments were made to improve the clarity of questions and to eliminate vague responses. The survey consisted of both open and close ended questions. It consists of a brief introduction about research objectives. 15 questions were circulated to the participants through Google Forms.

Data Analysis

Only completed filled online forms were included in this study. The filled responses were verified by the 2 viewers and collected on the same day. The entered data was analyzed using SPSS Software. Descriptive analysis was performed to calculate frequencies of categorical variables.

RESULTS:

Survey population was sufficient enough to reach a conclusion regarding the awareness level of general dental practitioners about the usage of polymer bur in clinical practice. This survey was conducted among dental practitioners. Out of 100 responses given 54% of the participants are females and the remaining 46% are male. 54% of the participants who have done the study belong to the age group 25 -30, 31% of the participants belong to the age group 35 -40, 50%

of the participants belong to the age group 20 to 25 the remaining 5% of the participants belong to the age group 40 to 45.

90% of the participants are aware that polymer bur comes under the classification of rotary instruments whereas the remaining 10% of the participants are unaware about this fact (**Figure 1**). 71% of the participants are aware that polymer bur is made up of Poly ether ketone whereas the remaining 29% of the participants are unaware about this fact (**Figure 2**). 83% of the participants agreed to the statement [polymer bur is capable of conserving dentin that can be further remineralised] where the remaining 17% disagree to the statement (**Figure 3**). 72% of the participants agreed with the statement [polymer bur shows more amount of bacterial remnants after excavation] whereas the remaining 28% disagreed with the statement (**Figure 4**). 89% of the participants were aware that polymer bur reduces microorganism levels in caries dentin whereas the remaining 11% of the participants were unaware about this fact (**Figure 5**). 79% of the participants agreed with this statement [polymer bur can not cut hard healthy dentin] whereas the remaining 21% of the participants disagree with this statement (**Figure 6**).

60% of the participants agreed with this statement [polymer bur is 93% carious free] whereas the remaining 40% of the participants disagree with the statement. 92% of the participants are aware that the working time of polymer bur in carious removal is 15.11 minutes whereas the remaining 8% of the participants are unaware about this fact. 56% of the participants stated that polymer bur is not used in clinical practice because it is hard to sterilise, 15% of the participants stated that polymer bur is not used because it is expensive, 10% of the participants stated that polymer bur is single use whereas the remaining 19% of the participants do not use polymer bur because of all these reasons (**Figure 7**). 52% of the participants think that polymer bur is better than diamond bur because it helps in reducing heat generation, 19% of the participants stated that polymer bur reduces the chance of pulpal exposure, 12% of the participants stated that polymer bur helps in reducing dentin loss whereas the remaining 17% of the participants think that all the options are correct (**Figure 8**).

Considering the commercial availability, 62% of the participants stated that they will start using polymer bur if it is commercially available, 29% of the participants stated that they will not use it even if it is commercially available since they are not sure about its efficiency in caries removal.

DISCUSSION:

Conventional burs are normally used to remove decalcified enamel and dentin, but they will not be able to differentiate between carious and normal dentin, and this the main reason why the conventional burs are not used in conservative procedures. CMCR and polymer burs are two invasive techniques which are normally used to remove selective infected dentin^{[[29]]}.

Polymer bur is an important rotary instrument which is constructed from polymer ketone-ketone, and it is used to remove selective decayed dentin without damaging the healthy teeth

structure^[30]. This mechanism is based on the hardness level of the instrument being lower than the hardness level of the healthy Dentin. This bur helps in reducing the amount of dentinal tubules being cut which leads to less pain sensation compared to using conventional burs^{[[31]]}. In a study done by Jeannine Lehmann et al 2019 stated that, the average time to excavate a cavity with polymer bur is 254 (+ or - 148) sec and 202 (+ or - 129) sec with tungsten carbide bur. The difference in time was not statistically significant ($p>0.05$)^{[[32]]}. So from this study we come to understand that polymer bur is more efficient than other burs.

In a study done by Krishna Aswathi et al 2017 stated that, there was a statistically significant reduction in the mean microbial count before and after treatment in the polymer bur group and carie-care group. The reduction in mean microbial count was found to be significantly higher in the polymer bur group compared to caries-care group^{[[33]]}.

CONCLUSION:

The present day dental practitioners are very much aware about the use and importance of polymer burs in clinical practice. Even though they have knowledge about it, still most of them do not use it in their daily practice because of various reasons. So in order to improve the efficacy of dental treatment in future, various awareness programs and workshops have to be conducted, to understand the use of polymer burs in caries removal.

Limitations:

This survey was only circulated among dentists who belonged to tamilnadu which is considered to be the major drawback of this study because it concentrates on the results obtained from one kind of population, we could have got different results if the survey was circulated among different populations.

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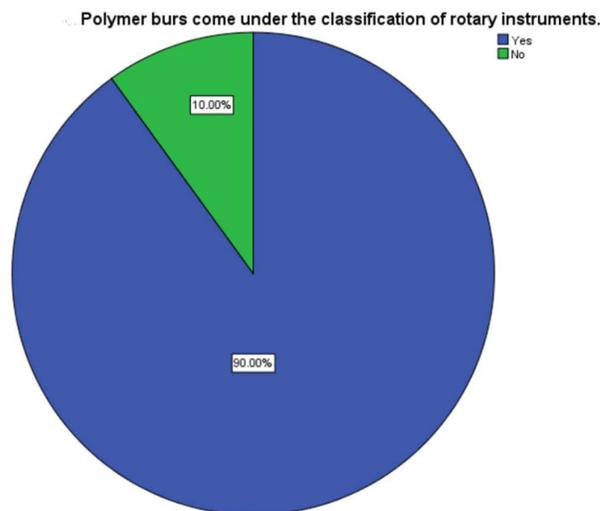


Figure 1: The pie chart shows responses to the question “Polymer bur comes under the classification of rotary instruments”. The majority of the participants are aware (90%, blue) whereas the remaining 10% are unaware about this fact (Green).

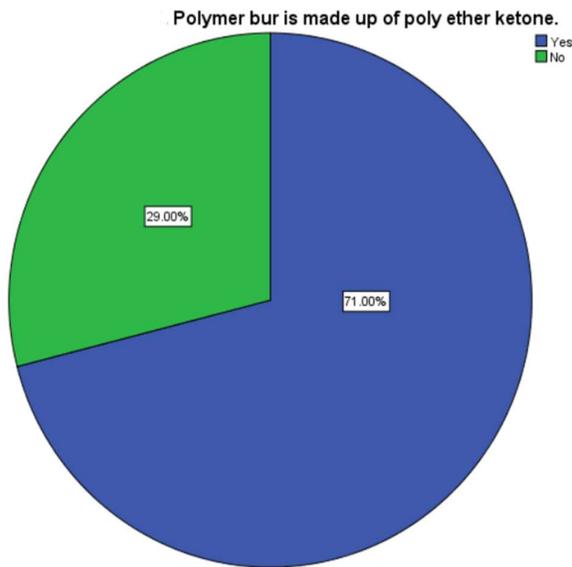


Figure 2: The pie chart shows responses to the question “Polymer bur is made up of poly ether ketone”. The majority of the participants are aware (71%, blue) whereas the remaining 29% are unaware about this fact (Green).

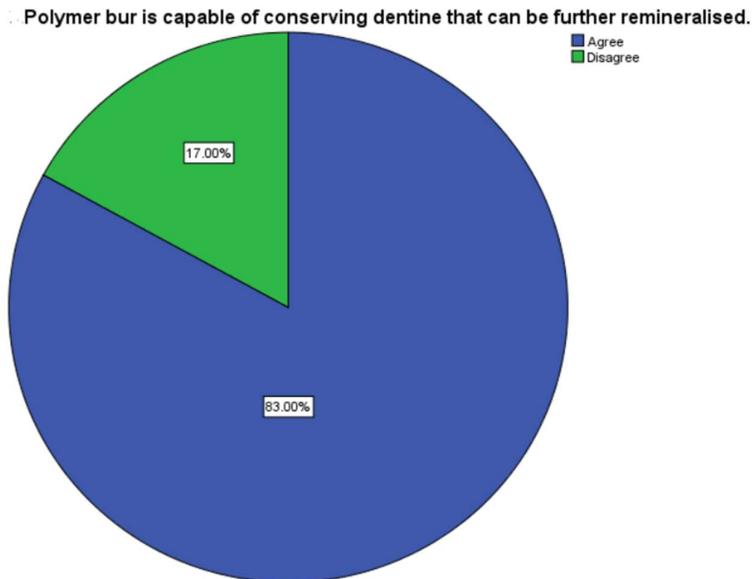


Figure 3: The pie chart shows responses to the question “Polymer bur is capable of conserving dentine that can be further remineralised”. The majority of the participants have agreed to this statement (83%, Blue) whereas the remaining 17% disagree with this statement (Green).

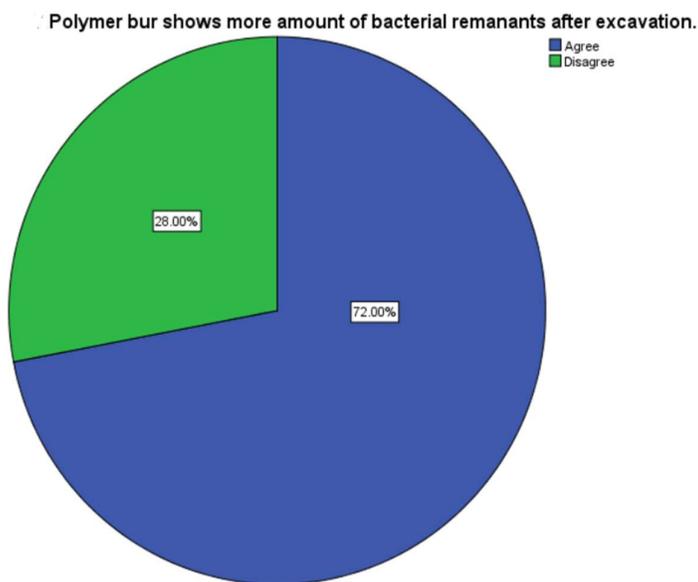


Figure 4: The pie chart shows responses to the question “Polymer bur shows more amount of bacterial remnants after excavation”. The majority of the participants have agreed to the statement (72%, Blue) whereas the remaining 28% disagree with this statement (Green).

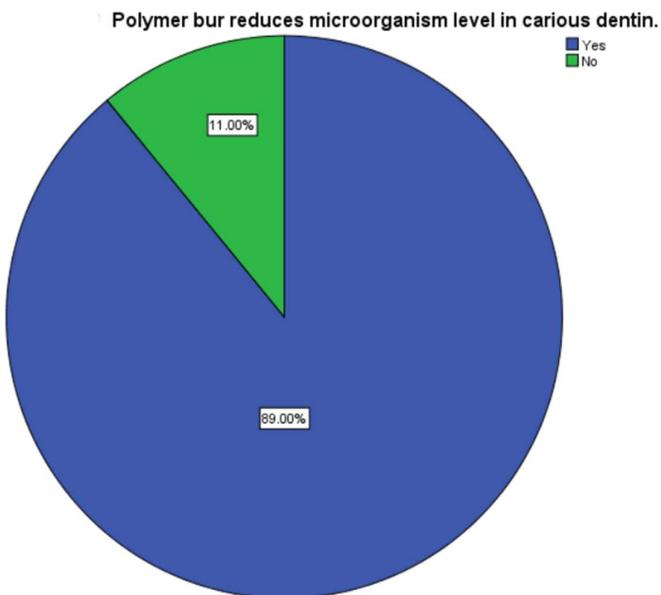


Figure 5: The pie chart shows responses to the question “Polymer bur reduces microorganism levels in carious dentine”. The majority of the participants are aware (89%, Blue) whereas the remaining 11% of the participants are unaware (Green).

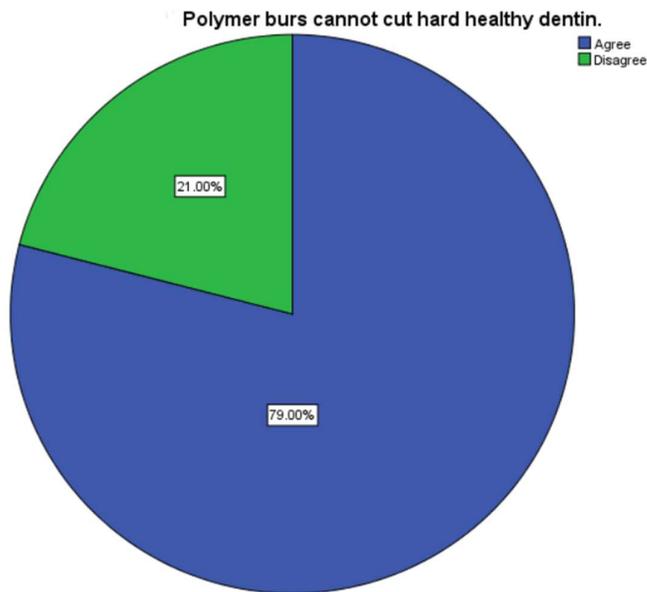


Figure 6: The pie chart shows responses to the question “Polymer bur cannot cut hard healthy dentin”. The majority of the participants have agreed with this statement (79%, Blue) whereas the remaining 21% of the participants disagree with this statement (Green).

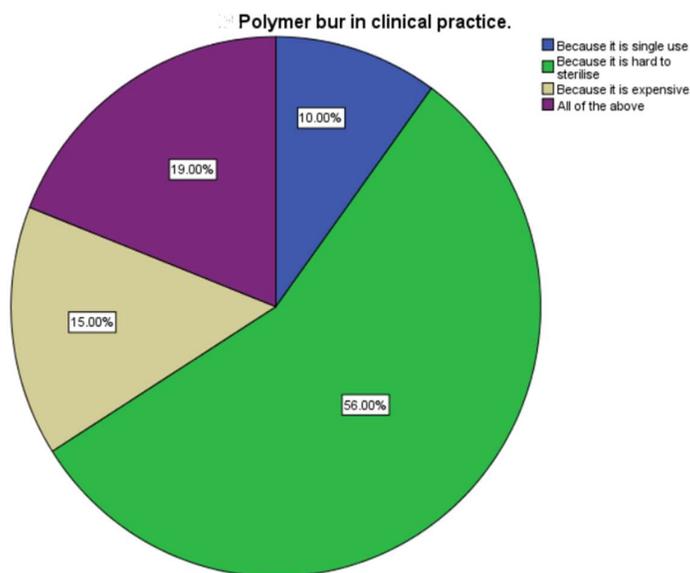


Figure 7: The pie chart shows responses to the question “Polymer bur not used in clinical practice”. The majority of the participants stated that polymer burs are not used in clinical practice because it is harder to sterilise (56%, Green), 15% of the participants stated that polymer bur is not used because it is expensive (Yellow), 10% of the participants stated that

polymer bur is single use (Blue) whereas the remaining 19% of the participants do not use polymer bur because of all these reasons (Purple).

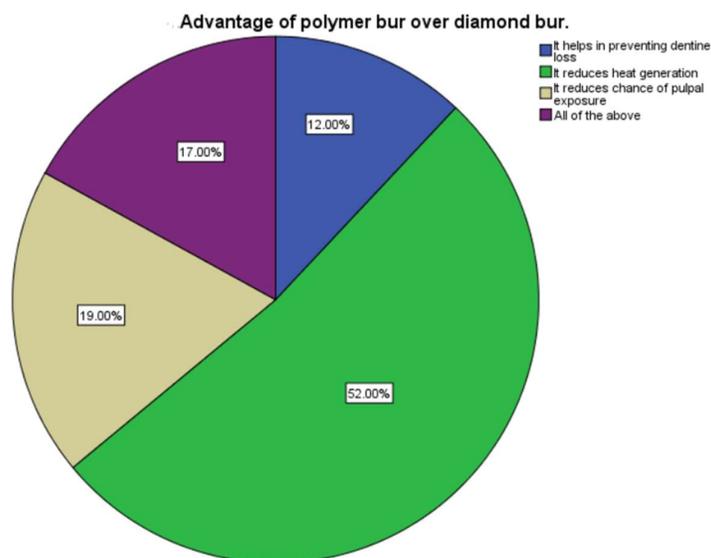


Figure 8: The pie chart shows responses to the question “Advantages of polymer bur over diamond bur”. The majority of the participants stated that polymer bur reduces heat generation (52%, Green), 19% of the participants stated that polymer bur reduces the chance of pulpal exposure (Yellow), 12% of the participants stated that polymer bur helps in reducing dentin loss (Blue) where as the remaining 17% of the participants think that all the options are correct (Purple).