



# AWARENESS ON ROOT CANAL SEALERS AMONG DENTAL STUDENTS

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**Article History:** Received: 26.07.2022

Revised: 24.08.2022

Accepted: 22.09.2022

**Abstract: Introduction:** Long-term success of a root canal treatment is based on the nature of the material used as a root canal sealer. The main components of a root canal filling are as follows: A solid core material and a sealer. The most widely used core material is gutta-percha, which takes up the majority of canal area, while the root canal sealer covers the space between the core material and the dentin wall, the voids within the core material, and the accessory canals, as well as acting as a lubricant, allowing for a fluid-tight seal. The aim of this study is to evaluate the knowledge and awareness of dental students about the various root canal sealants available for use in dentistry. **Materials and methods:** Questionnaire was prepared with the objective of finding out the knowledge on root canal sealers. This was shared online through google forms. The participants who undertook the survey were dental students from various colleges. They were encouraged to answer the set of 10 questions which majorly targeted awareness on root canal sealers. The results obtained were statistically analysed through SPSS software. **Results:** Majority, 65% weren't aware about different types of root canal sealers, only 35% were aware. Only 32% were aware about ZOE sealers, its antibacterial activity, and adverse effects like cytotoxicity, irritation, solubility in oral fluids. 34% were aware of MTA based sealers in treating trauma. Only 19.4% were aware about periapical repair ability of resin based sealers. 28.2% were aware that CH based sealers are the most biocompatible sealer. **Conclusion:** According to the findings of the present study it has been observed that there is low to moderate level of knowledge and awareness on root canal sealers. Further awareness about different properties of individual sealers and its uses in treatment must be carried out to improve the knowledge as it helps us to perceive successful treatment procedures.

**Keywords:** root canal treatment; root canal sealers; awareness; knowledge and dental students, eco friendly and innovative technology.

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**DOI: 10.31838/ecb/2022.11.07.010**

## INTRODUCTION

Root Canal is a procedure to restore and preserve a severely injured or poisoned tooth instead of removing it. The word "root canal" stems from the cleaning of the canals inside the root of a

tooth (Cobankara *et al.*, 2004). Decades earlier, the operation of root canals was always unpleasant. With dental advancements and local anaesthetics, most individuals with a root canal have little if any discomfort. In fact, living with a decayed tooth is possibly more difficult (Sukuroglu *et al.*, 2015). Extracting the missing tooth and replacing it with a dental implant, bridge or temporary partial denture are root canal options. Root canal therapy focuses on integrally connected root canal treatment phases: Microbial regulation, cleaning and shaping, and successful sealing of the root canal system (Grover *et al.*, 2013). Long-term success of a root canal treatment is based on the nature of the material used as a root canal sealer (Tong, 2010). The main components of a root canal filling are as follows: A solid core material and a sealer. The most widely used core material is gutta-percha, which takes up the majority of canal area, while the root canal sealer covers the space between the core material and the dentin wall, the voids within the core material, and the accessory canals, as well as acting as a lubricant, allowing for a fluid-tight seal (Bouillaguet *et al.*, 2008). The success of the treatment of the root canal depends on the exact completion of the final step. Owing to the involvement of several accessory canals and accessory foramina, which are mostly inaccessible to instrumentation, the root canal system is complex. Along with Gutta Percha, the root canal sealer is used for obturating root canals. Where no Gutta Percha is required, some root canal sealers can be complete sealers (Tilakchand, Jain and Naik, 2016)(Doneria *et al.*, 2017). Calcium hydroxide, epoxide-amine resins, barium sulphate, bismuth oxychloride and zinc oxide can be some of the different

base compositions of endodontic sealers (Rewal *et al.*, 2014)(Jagtap *et al.*, 2018; Fonseca *et al.*, 2019; Yamauchi, Watanabe and Okiji, 2020). Root canal sealers are used in conjugation with biologically acceptable semisolid or solid. The ability to produce a sound seal is essential, but the sealer must also be well tolerated by the periradicular tissues and relatively easy to control in order to achieve its optimal physical properties. Despite the fact that non-bonding root canal sealers have provided predictable clinical outcomes, the quest for alternative sealers that bind to root canal dentin as well as filling materials has continued (Trairatvorakul and Chunlasikawaiwan, 2008; Najjar *et al.*, 2019).

Previous literature on root canal sealers said that Zinc oxide eugenol and calcium hydroxide-based sealers were most commonly used (Rahman and Christiono, 2019). The root canal sealer should preferably be able to create an adequate connection between the core material and the root canal dentine, thereby eliminating leakage. It can also be non-toxic and have a preferably beneficial effect on periapical lesion recovery as well (Poggio *et al.*, 2017). According to Grossman, the optimal criteria of a sealer are fluid impermeability, adhesion to dentin walls, absence of cytotoxicity, non-toxic to periapical tissues in the event of sealer extrusion beyond the apex, radiopaque, non-staining, dimensionally solid, soluble in common solvent, insoluble in tissue fluids, bacteriostatic, sluggish environment, and neither mutagenic or carcinogenic (Roggendorf *et al.*, 2007). Sealers and binding materials work together to create hermetic seals (Goldberg *et al.*, 1985). Gutta percha and conventional zinc oxide eugenol sealers create a seal that is far from ideal. Unlike resin-based sealers, the setting reaction of zinc oxide-based eugenol sealers is a chelation reaction between eugenol and zinc oxide concentrations. For zinc oxide-based sealers, there is a delay in setting shrinkage (Ekici and Ömürlü, 2019). Zinc oxide sealers are the most widely used sealers by both origin and community service professionals, and resin-based sealers are more effective than other sealers, according to a report of a previous study. Root canal sealers are better known to private practitioners than among community-based practitioners.

Our team has extensive knowledge and research experience that has translated into high quality publications (Choudhari and Thenmozhi, 2016; Govindaraju, Jeevanandan and

Subramanian, 2017; Ravi *et al.*, 2017; Vikram *et al.*, 2017; Gupta, Ariga and Deogade, 2018; Hannah *et al.*, 2018; Kavarthapu and Thamaraiselvan, 2018; Pandian, Krishnan and Kumar, 2018; Ramamurthy and Mg, 2018; Ashok and Ganapathy, 2019; Ramesh *et al.*, 2019; Sharma *et al.*, 2019; Venu, Raju and Subramani, 2019; Wu *et al.*, 2019; Samuel, Acharya and Rao, 2020)(Öztan *et al.*, 2003)

Long term effectiveness of endodontic operation, three-dimensional impervious obturation of the root canal system is of prime therapeutic significance. The purpose of this research is to assess dental students' knowledge and understanding of the different root canal sealants available for use in dentistry.

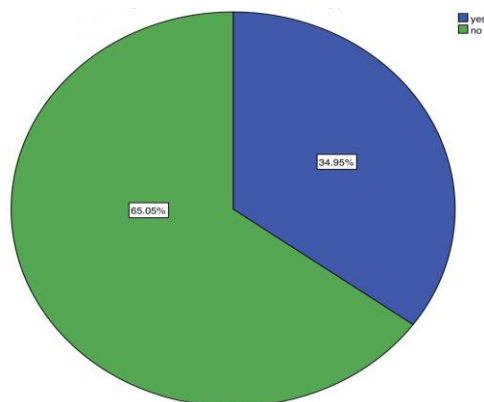
## MATERIALS AND METHODS

**Study setting:** The research is an online survey. The sampling size for this survey is about 100 students pursuing, dental education. The sampling method is simple random sampling. The measure to be taken to minimise sampling bias are survey software participants are randomly selected and avoid asking irrelevant questions. The internal validity depends on the independent variable. The external validity is to justify results.

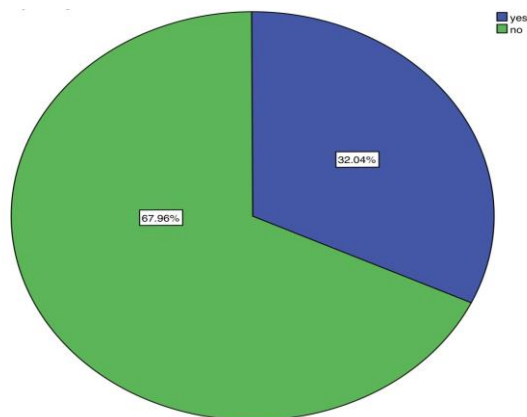
**Survey instruments:** The survey instrument which was a questionnaire was prepared after extensive review of the existing literature. Questionnaire was prepared with the objective of finding out the knowledge on root canal sealers. This was shared online through google forms. The participants who undertook the survey were dental students from various colleges. They were encouraged to answer the set of 10 questions which majorly targeted awareness on root canal sealers.

**Data analysis:** The data was gathered and statistically analyzed using SPSS tools. A chi square test was used to determine if there was a correlation, and a p value of 0.05 was considered statistically important. The type of analysis used here is descriptive analysis and association statistics through Chi Square analysis. Skin color, gender, mood, and personality are the independent variables. The dependent variables are knowledge, awareness, root canal sealer.

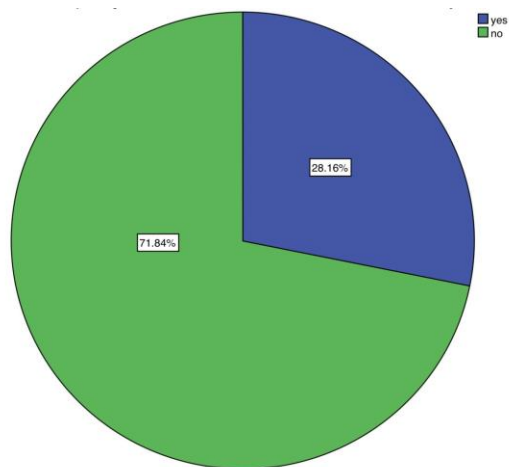
## RESULTS



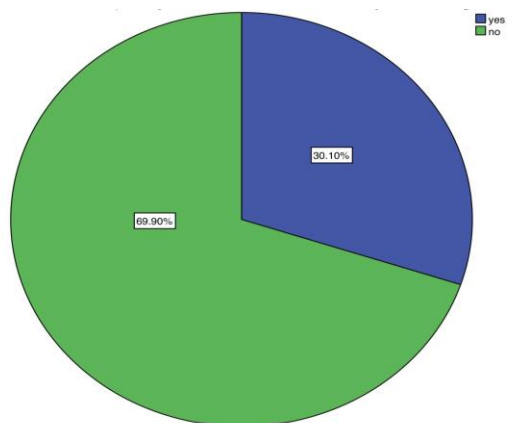
**Figure 1:** The pie chart depicts the awareness of various types of root canal sealers. Majority (65.05%, green) weren't aware about this whereas only few (34.95%, blue) were aware.



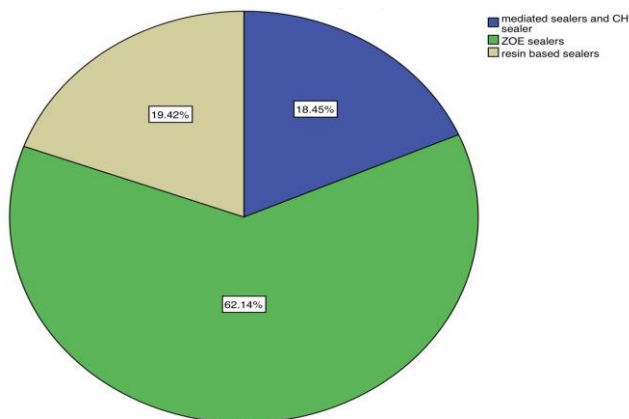
**Figure 2:** The pie chart depicts the awareness of zinc based sealers as the most common endodontic sealers. Majority (67.96%, green) said no, they weren't aware while the remaining (32.04%, blue) said yes, they were.



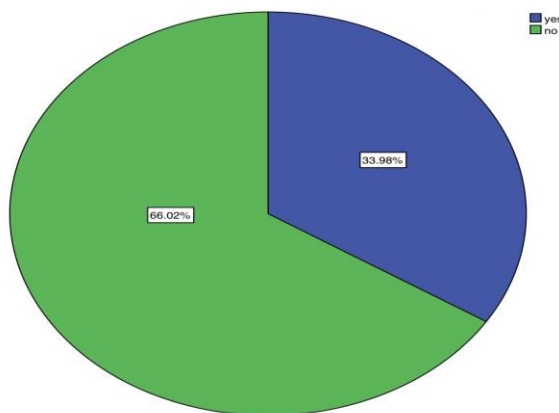
**Figure 3:** The pie chart depicts the awareness of CH based sealers as the most biocompatible sealers. Minority (28.16%, blue) were aware whereas the majority (71.84%, green) weren't.



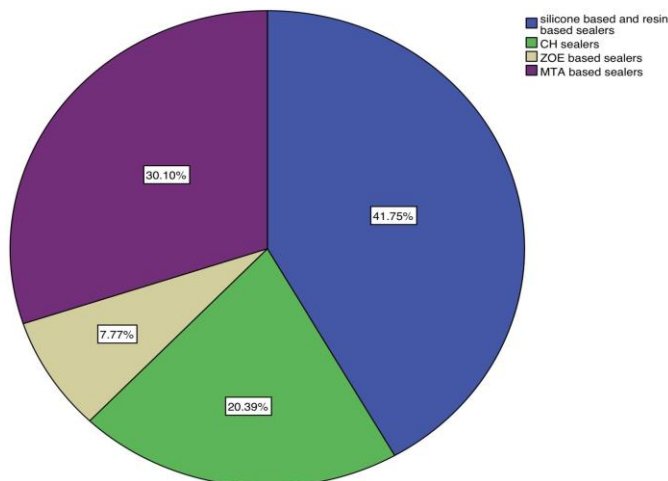
**Figure 4:** The pie chart depicts the awareness of best apical sealing ability of resin based sealers. Most of the population (69.90%, green) weren't aware whereas as few (30.10%, blue) were aware.



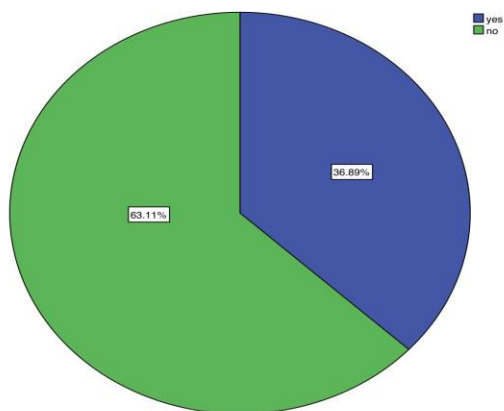
**Figure 5:** The pie chart depicts the preference of sealers for effective treatment of infected periapical lesions. Majority (62.14%, green) went along with ZOE based sealers, few (18.45%, blue) chose mediated sealers and CH sealer whereas remaining (19.42%, brown) goes along with resin based sealers.



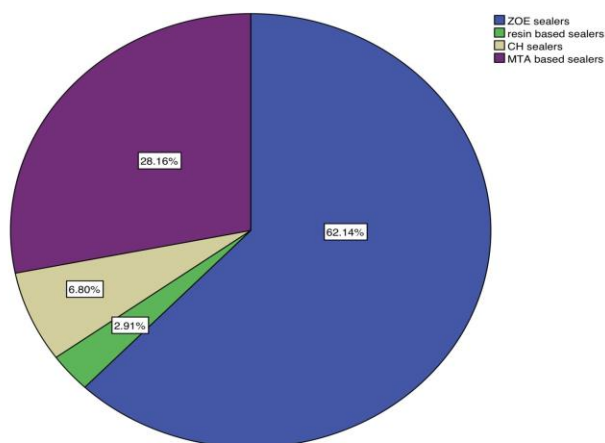
**Figure 6:** The pie chart depicts the awareness of MTA based sealers as a choice for treating trauma. Majority (33.98%, blue) said yes, they were aware whereas the remaining (66.02%, green) said no.



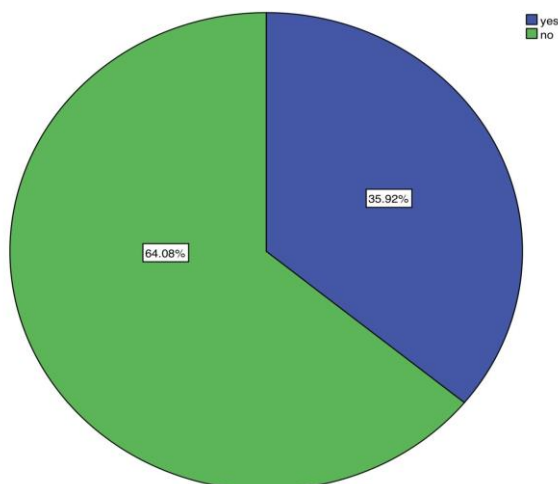
**Figure 7:** The pie chart depicts the knowledge of sealers for periapical repair ability of root canal. Majority (41.75%, blue) thought that it was silicon and resin based sealer, few(7.77%, brown) thought it was ZOE sealers, some (20.39%, green) went along with CH based sealers whereas remaining (30.10%, pink) said it was MTA based sealers.



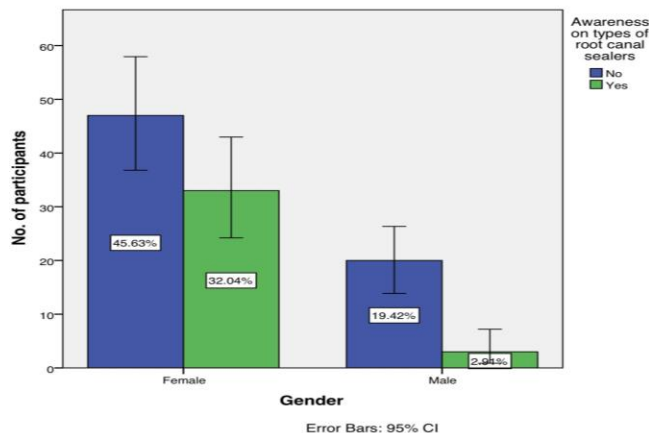
**Figure 8:** The pie chart depicts the awareness of antibacterial activity of ZOE based sealers. Majority (63.11%, green) wasn't aware while the minor population (36.89%,blue) was aware.



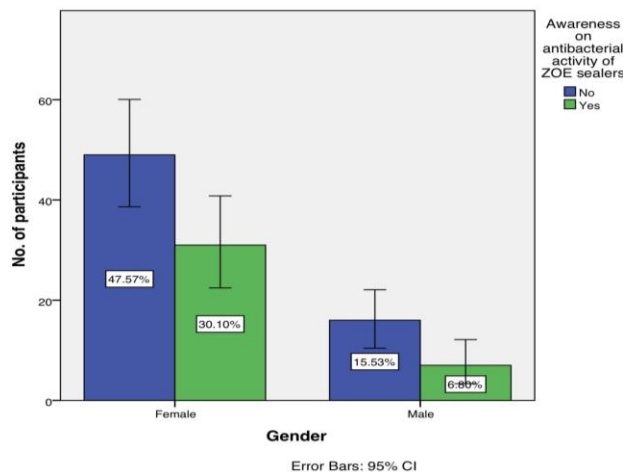
**Figure 9:** The pie chart depicts the preference of dental sealers by practitioners. Majority (62.14%, blue) thinks it is ZOE sealers, some (28.16%, pink) thinks it was MTA based sealers, few (2.91%, green) think it was resin based sealers whereas remaining (6.80%, brown) think it was CH sealers.



**Figure 10:** The pie chart depicts the opinion on redoing the root canal. Majority (64.08 %, green) does not agree with this whereas the remaining (35.92%, blue) agrees with this.



**Figure 11:** The bar graph shows gender wise awareness on types of root canal sealers. The X axis represents gender whereas Y axis represents awareness of different types of root canal sealers. Blue represents yes and green represents no. Among females the majority (45.63%) were not aware whereas few (32.04%) were aware. Among males, the majority (19.42%) were not aware whereas few (2.91%) were aware. The chi square value is 3.599, df is 1 and p value obtained was 0.068 (>0.05). Hence, statistically not significant. Majority of the females are aware about types of root canal sealers when compared to males.



**Figure 12:** The bar graph represents gender based awareness on antibacterial activity of ZOE sealers. The X axis represents gender whereas Y axis represents awareness on antibacterial activity of ZOE sealers. Blue represents yes and green represents no. Among females the majority (47.57%) were not aware whereas few (30.10%) were aware. Among males, the majority (15.53%) were not aware whereas few (6.80%) were aware. The chi square value is 7.163, df is 3 and p value obtained was 0.133 (>0.05). Hence, statistically not significant. Majority of the females are aware about antibacterial activity of ZOE sealers when compared to males.

## DISCUSSION

When asked about the understanding of different kinds of root canal sealers. The majority (65.05 %) were unaware of this, although just a small percentage (34.95 %) were (figure 1). When questioned about zinc-based sealers' recognition as the most popular endodontic sealers. 67.96 % said no, they didn't know, while the 32.04 % said yes, they did (figure 2). Concerns about the biocompatibility of CH-based sealants. The majority of 71.84 % were unaware, while just 28.16 % were conscious (figure 3). On becoming aware of resin-based sealers' best apical sealing performance. The majority of the population, 69.90 %, was unaware, while just 30.10 % were (figure 4). When asked the sealer he prefers for treating contaminated periapical lesions, he said that he prefers sealers. The majority of

respondents (62.14 %) preferred ZOE-based sealers, followed by mediated sealers and CH sealers (18.45 %), and resin-based sealers (19.42 %) (figure 5). Centered on knowledge of MTA-based sealers as a treatment option for trauma. Only 33.98 % of respondents said they were conscious, while the remaining 66.02 % said no (figure 6). About the use of root canal sealers for periapical root canal repair. 41.75 % believed it was a silicon and resin-based sealer, 7.7 % ZOE sealers, 20.39 percent CH sealers, and the remaining 30.10 % MTA sealers (figure 7). The majority, 63.11 %, were unaware of the antibacterial action of ZOE-based sealers, while the smaller population, 36.89 %, were (figure 8). When asked about awareness on preference of dental sealers 62.14% thinks it is ZOE sealers, 28.16% thinks it was MTA based sealers, 2.91% think it was resin based sealers whereas 6.80% think it was CH sealers (figure 9). On



the subject of re-doing the root canal. The majority of 64.08 % do not agree with this, while the remaining 35.92 % do (figure 10). The bar graph represents gender based awareness on types of root canal sealers. Among females the majority (45.63%) were not aware whereas few (32.04%) were aware. Among males, the majority (19.42%) were not aware whereas few (2.91%) were aware. The bar graph represents gender based awareness on antibacterial activity of ZOE sealers. Among females the majority (47.57%) were not aware whereas few (30.10%) were aware. Among males, the majority (15.53%) were not aware whereas few (6.80%) were aware (figure 12).

In the present study it has been observed that males are more aware about the various types of root canal sealers than females (figure 11) whereas in the survey of the previous study it was noted that most students had strong knowledge of endodontic sealers and an interesting dental subject. They also observed that female students are slightly more knowledgeable about root canal sealers compared to male students (Ravikumar and Sharma, 2017). In one of the queries the participants were asked about the common preference of dental sealers among practitioners. Majority of the participants choose ZOE sealers (62.14%). When similar questions were asked in a previous study 50% of the participants had chosen ZOE sealers (Katge, Patil and Rusawat, 2016). In a previous survey by Karthika et al., 2019 it was found that when it came to endodontic sealers, 86 % of the participants claimed they were aware of their different properties. 78 % knew about calcium hydroxide-based sealers, while 54 % knew about MTA-based sealers and 42 % knew about biodentine (Karthiga Senthil, 2020). Whereas in the present study only 28.2% are aware about CH based sealers, 30.1% about resin based sealers and only 34% know about MTA based sealers. In the present study 69.9% of the participants were aware About the ceiling ability of resin based sealers (69.9% ). In a similar study of previous literature it has been said that 50% of the participants are aware about the effectiveness of resin based sealers in sealing (Upadhyay, Tyagi and Khangara, 2017).

One of the research's limitations is that the sample size (100 participants) is small, so the results may differ from those of other studies. The study may not be completely accurate, and it is also only a snapshot of reality. It is not very deep. This study gives different information about root canal sealers, it's types, uses, advantages and disadvantages of different types of sealers. Future, this survey could be extended among different types of population with large sample sizes.

## CONCLUSION

According to the findings of the present study it has been observed that there is low to moderate level of knowledge and awareness on root canal sealers. Further awareness about different properties of individual sealers and its uses in treatment must be carried out to improve the knowledge as it helps us to perceive successful treatment procedures.

**Acknowledgement:** The author would like to thank the study participants for their participation and kind cooperation.

**Conflict of interest:** The author declares that there was no conflict of interest in the present study.

## FUNDING SOURCE

The present study was supported by the following agencies

- Saveetha dental college
- SIMATS, Saveetha university
- Amethyst bio labs private limited.

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