

# KNOWLEDGE AND ATTITUDES REGARDING USE OF CHAT GPT IN DENTISTRY AMONG DENTAL STUDENTS AND DENTAL PROFESSIONALS

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## ABSTRACT

ChatGPT is an advanced language model that uses deep learning methods to generate answers. The effectiveness of ChatGPT in healthcare education has been studied and has been shown to enhance the personalized learning experience, with the ability to improve communication skills and student involvement in the learning process. Because of ChatGPT's novelty and prospective applications in research and education, it is important to understand the factors that affect its acceptability. This is the first study that aimed to evaluate dental professionals' attitudes and knowledge regarding the adoption and use of ChatGPT. A total of 354 respondents took part in this study. The survey link was sent through social media and targeted dental students & dental professionals. It consisted of closed-ended questions regarding demographic details, ChatGPT in Dental education, research, practice, and conclusive questions. The knowledge of ChatGPT was maximal in respondents in the age group of 31-45 years (80%) & undergraduate students regardless of the year, had good knowledge. The attitude to use ChatGPT was maximum in 31-45 years (73.1%) followed by >45 years (75%). This study highlights the importance of usability, user-friendliness, technological knowledge and attitudes, and behavioral aspects for the effective use of ChatGPT in dentistry. Its extensive use in dental curriculum has the potential to revive academic research. In our study majority believed it has potential for advanced dentistry, especially in dental education and research. However, its optimal and ethical use needs to be taught to enhance its applicability.

**Key words:** ChatGPT, Artificial Intelligence, Dentistry, Dental professionals.

## Introduction

ChatGPT, an artificial intelligence (AI) program that generates text in response to written instructions has become quite popular as indicated by its availability on the web through open AI. AI has the potential to improve precision and accuracy while reducing the amount of time needed for various system components, its use in healthcare systems is essential [1]. Dental AI applications have been proven to be helpful in the analysis of medical imaging, especially in the identification and diagnosis of dental caries, periodontitis, and implantitis. They have also been found to help with surgical planning in oral and maxillofacial surgery [2]. Advanced AI-based tools could have a substantial impact on healthcare education, such as Generative Pre-trained Transformer (GPT)-based tools. Using the same techniques as the InstructGPT model, ChatGPT was taught through reinforcement learning with human input. ChatGPT has received a lot of interest since it went public on November 30, 2022, particularly in the field of education [3]. Proximal Policy Optimisation, a reinforcement learning technique, was used to train InstructGPT by maximizing the preferences of human annotators for particular prompts. Contrarily, ChatGPT has been expressly developed and instructed using dialogue-like prompts for enhancing dialogue-based output [4]. ChatGPT is an advanced language model that uses deep learning methods to generate

answers to inputs that resemble those of humans. The widely used and accessible ChatGPT is an example of the wide-ranging interest and scrutiny received in academia and among medical practitioners [5]. It can handle a variety of concepts because it is a versatile conversational agent, making it suitable for chatbots, customer support, and other applications [1]. Recently, the effectiveness of ChatGPT in healthcare education has been studied and it has been shown to enhance the personalized learning experience, owing to its ability to improve communication skills and students involvement in the learning process. The prospective applications of ChatGPT in the medical field include helping experts with clinical and laboratory diagnostics as well as generating relevant research ideas. However, these programs also have limitations and ethical issues like credibility and plagiarism [3]. ChatGPT's novelty and potential for use in dental education & research require an awareness of the elements that influence its acceptability. The revolutionary potential of ChatGPT in self-learning, feedback, and problem-solving requires research for a successful integration. Assessing the attitudes of dental professionals provides insight into benefits and technology preparedness & also assists in addressing ethical concerns about using ChatGPT responsibly. The purpose of this study was to assess the knowledge and attitude of dental professionals in the adoption and use of ChatGPT.

**Materials and Methods**

*Study participants*

The participants were recruited by convenience sampling through the contacts of the authors. The survey link was sent through WhatsApp and Facebook groups targeted to dental students & dental professionals. The survey was open from 06 September 2023 and was closed on 30 September 2023. A total of 354 respondents took part in this study. Participation was voluntary and anonymous without any incentive given for participation. The survey consisted of 28 closed-ended questions divided into sections of demographic details, ChatGPT in Dental education, ChatGPT in Dental Research, ChatGPT in Dental practice, and conclusive questions. This study was approved by the Institutional Review Board (IRB), with the approval number 164, granted on 05 September 2023.

The survey development process involved a literature review followed by questionnaire development, validation, and pilot testing to ensure clarity. The results were analyzed and tabulated. Frequency and percentage were calculated. To assess the knowledge and attitude of dental professionals towards ChatGPT, statistical analysis using the Chi-square test was done.

**Results and Discussion**

The respondents predominantly belonged to the age group of 17-30 Years (82.8%) followed by >45 years. The majority were females (73.2%). Around 63% belonged to the undergraduate category followed by faculty (16.1%) and then postgraduates (12.4%). More than 87% said that they like using technology like ChatGPT for dental practice, learning, and research & 90% believed that it has the potential to enhance efficiency and productivity in dentistry. As high as (89.3%) of respondents had heard of ChatGPT among whom 80% were familiar with its applications (**Table 1**).

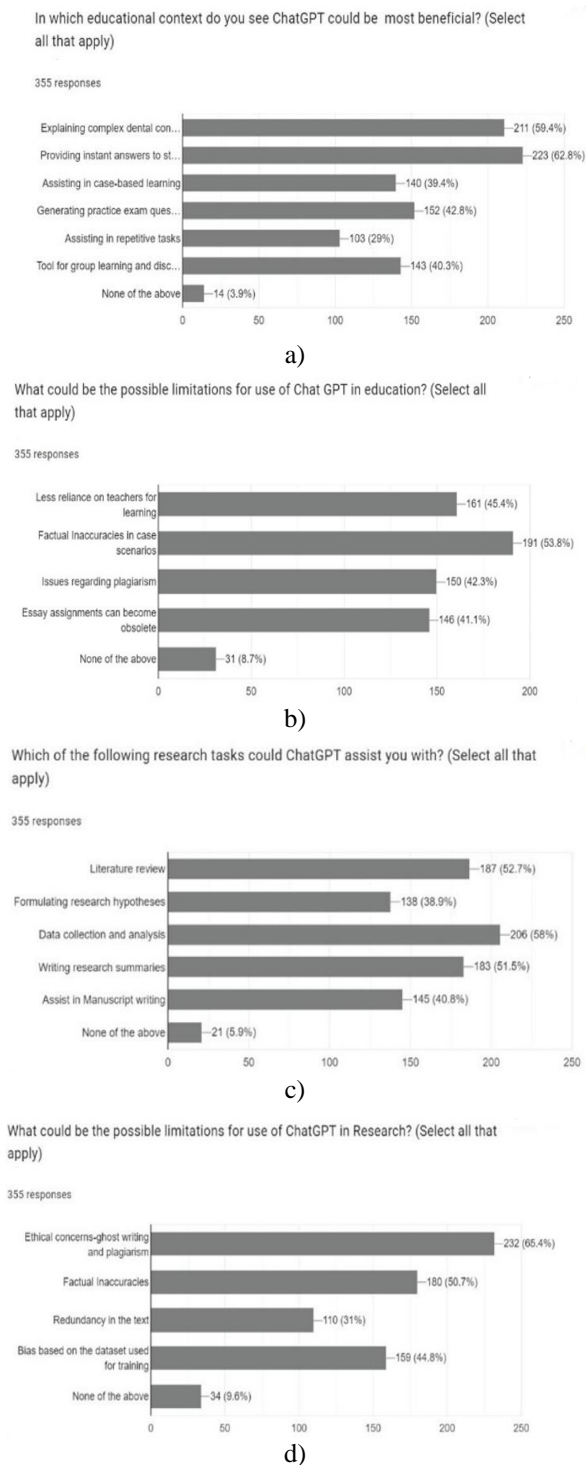
**Table 1.** Characteristics of the study respondents (n=354)

| Category          | Number (%) |
|-------------------|------------|
| <b>Age</b>        |            |
| 17 to 30          | 293 (82.8) |
| 31 to 45          | 41 (11.6)  |
| >45               | 20 (5.6)   |
| <b>Gender</b>     |            |
| Male              | 95 (26.8)  |
| Female            | 259 (73.2) |
| <b>Occupation</b> |            |
| Undergraduate     | 222 (62.7) |
| Postgraduate      | 44 (12.4)  |
| Faculty Member    | 57 (16.1)  |
| Practioner        | 31 (8.8)   |

|  |            |
|--|------------|
| <b>Have you heard of ChatGPT previously?</b>   |            |
| Yes  | 316 (89.3) |
| No   | 38 (10.7)  |
| <b>Are you familiar with ChatGPT or similar AI-based conversational tools?</b>                     |            |
| Yes  | 281 (79.4) |
| No   | 73 (20.6)  |
| <b>Do you like using technology for dental Practice, learning, and research, like ChatGPT?</b>     |            |
| Yes  | 307 (86.7) |
| No   | 47 (13.3)  |
| <b>Do you think ChatGPT has the potential to enhance efficiency and productivity in dentistry?</b> |            |
| Yes  | 317 (89.5) |
| No   | 37 (10.5)  |

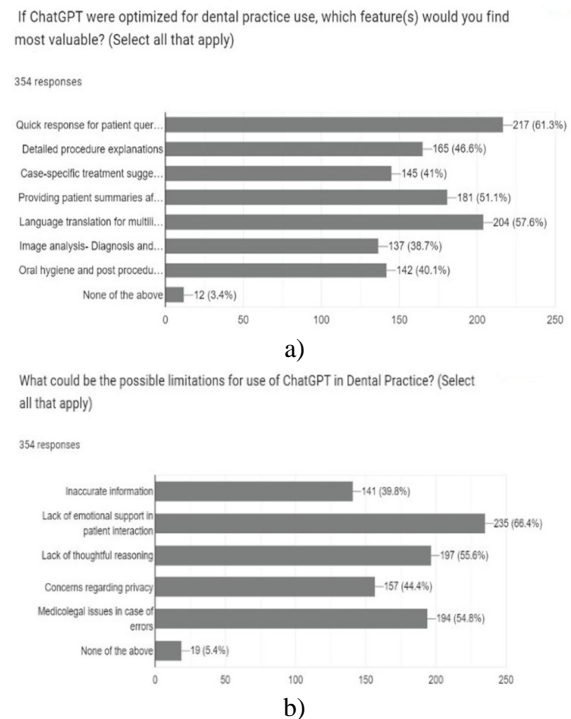
With regards to questions related to ChatGPT in dental education, 82% were aware that it could have a role in enhancing education in dentistry, and around 94.6% rated ChatGPT as having high to moderate potential to enhance education. Around 50% said that they would consider integrating ChatGPT into the dental education curriculum. Most respondents said that ChatGPT was beneficial for providing instant answers to student queries (63%), explaining complex dental concepts (60%), generating practice exam questions (43%), as a tool for group learning and discussion (40%) and for assisting in case-based learning (39%) and repetitive tasks (29%). The possible limitations mentioned included factual inaccuracies in case scenarios (54%), less reliance on teachers for learning (45%), issues regarding plagiarism (42%), and essay assignments becoming obsolete (41%) (**Figures 1a and 1b**).

With regards to the role of ChatGPT in dental research, around 89% of the respondents felt that it could have a role in enhancing research-related tasks in dentistry. When asked about tasks ChatGPT would help in, most respondents said that it would assist in data collection and analysis (58%), followed by a literature review (53%) & writing research summaries (51%) as well as for assistance in manuscript writing (41%) & formulation of research hypothesis (39%). Around 6% felt that it could not help in any research-related task. Around 47% felt that relying on ChatGPT would prevent them from acquiring critical thinking skills & 48% had concerns about using ChatGPT in reference to plagiarism and 40% felt it may lead to plagiarism or copyright infringement accusations. The common limitations that respondents said were ethical concerns for ghostwriting and plagiarism (65%), factual inaccuracies (51%) followed by redundancy in the text (31%), and bias based on the dataset used for training (45%) (**Figures 1c and 1d**).



**Figure 1.** Graphical representation of responses regarding the use and limitation of ChatGPT in Dental education and research

The features of ChatGPT that could help in dental practice as per respondents, included a quick response to patient queries (61%), language translation for multilingual patients (58%), detailed procedural explanations (47%), case-specific treatment suggestions (41%), oral hygiene and post-procedural instructions (40.1%). The limitations include lack of emotional support and patient interaction (66%), lack of thoughtful reasoning (56%), medicolegal issues (55%) & concerns regarding privacy (44.4%) & inaccurate information (40%) (Figure 2).



**Figure 2.** Graphical representation of responses regarding the use and limitation of ChatGPT in Dental Practice

Around 82.4% said that they would want to integrate ChatGPT into their dental practice for tasks like patient education and appointment scheduling. Only 16% said that they would use ChatGPT to stay updated with the latest advances in dentistry. However, 84% said that they would use ChatGPT to obtain quick answers for information in practice. Around 77% did not have reservations about ChatGPT’s capacity to offer accurate information, while 30% believed that it may not be accurate (Table 2).

**Table 2.** Component Analysis

| Component   | Number (%)     |
|---|----------------|
| <b>ChatGPT in Dental Education</b>  |                |
| Are you aware that ChatGPT could have a role in enhancing education in dentistry? | yes 289 (81.6) |

|  |                    |            |
|--|--------------------|------------|
|  | No                 | 65 (18.4)  |
| How would you rate the potential of ChatGPT to enhance dental education?   | High potential     | 106 (29.9) |
|  | Moderate potential | 229 (64.7) |
|  | Low Potential      | 12 (3.4)   |
|  | No Potential       | 7 (2)      |
| Would you consider integrating ChatGPT into the dental education curriculum?   | Yes                | 169 (47.7) |
|  | No                 | 30 (8.5)   |
|  | May be             | 155 (43.8) |
| <b>ChatGPT in Dental Research</b>  |                    |            |
| Do you believe that ChatGPT could have a role in enhancing research-related tasks in dentistry?                                | Yes                | 314 (88.7) |
|  | No                 | 40 (11.3)  |
| Do you feel that relying on ChatGPT would prevent you from acquiring critical thinking skills?                                 | Yes                | 164 (46.3) |
|  | No                 | 42 (11.9)  |
|  | May be             | 148 (41.8) |
| Do you think that using ChatGPT could lead to plagiarism or copyright infringement accusations?                                | Yes                | 170 (48)   |
|  | No                 | 41 (11.6)  |
|  | May be             | 143 (40.4) |
| <b>ChatGPT in Dental Practice</b>  |                    |            |
| How likely are you to integrate ChatGPT into your dental practice for tasks like patient education and appointment scheduling? | Not Likely         | 62 (17.6)  |
|  | Very Likely        | 207 (58.6) |
|  | Likely             | 84 (23.8)  |
| Would you use ChatGPT to stay updated with the latest advancements in dentistry?   | Yes                | 55 (15.6)  |
|  | No                 | 298 (84.4) |
| How likely are you to use ChatGPT to obtain quick answers or information in your dental practice?                              | Not Likely         | 56 (15.9)  |
|  | Very likely        | 206 (58.4) |
|  | Likely             | 91 (25.8)  |
| Do you have reservations about ChatGPT's capacity to offer accurate information?   | Yes                | 124 (35.1) |
|  | No                 | 81 (22.9)  |
|  | May be             | 148 (41.9) |

Around 55% thought that ChatGPT has the potential to advance dentistry if used ethically and responsibly. Most respondents believed that ChatGPT is most beneficial for dental education (72%), dental research (63%), and dental

practice (26%). 191 respondents said that they would consider using ChatGPT for dental education, research, and practice-related tasks (**Table 3**).

**Table 3.** Conclusive Questions

| <b>Conclusive Questions</b>   |                   |             |
|---|-------------------|-------------|
|   | <b>Number (%)</b> |             |
| Do you think ChatGPT has the potential to advance dentistry per se if used ethically and responsibly? | Yes               | 194 (55.1)  |
|   | No                | 26 (7.4)    |
|   | May be            | 132 (37.5)  |
| In which area(s) do you believe ChatGPT could be most beneficial                                      | Dental Education  | 253 ( 71.7) |
|   | Dental Research   | 222 (62.9)  |
|   | Dental Practice   | 92 (26.1)   |
|   | None              | 12 (3.4)    |
|   | Yes               | 191 (54.3)  |

|   |        |            |
|---|--------|------------|
| Would you consider using ChatGPT for dental education, research, or practice-related tasks? | No     | 20 (5.7)   |
|   | May be | 141 (40.1) |

The knowledge of ChatGPT was maximal in respondents in the age group of 31-45 Years (80%) followed by 17-30 years (65%). Males and females demonstrated almost similar knowledge while faculty members & undergraduates

followed by practitioners showed good knowledge. The undergraduate students regardless of the year, had good knowledge regarding ChatGPT. None of the results were statistically significant ( $p < 0.05$ ) (Table 4).

**Table 4.** Knowledge regarding ChatGPT

| Category                     | No Knowledge (Total n = 12) | Average Knowledge (Total n = 107) | Good Knowledge (Total n = 135) | p Value |
|------------------------------|-----------------------------|-----------------------------------|--------------------------------|---------|
| <b>Age</b>                   |                             |                                   |                                |         |
| 17 to 30 (n=293)             | 10 (3.4%)                   | 93 (31.7%)                        | 190 (64.8%)                    | 0.35    |
| 31 to 45 (n=41)              | 1 (2.4%)                    | 7 (17%)                           | 33 (80.4%)                     |         |
| >45 (n=20)                   | 1 (5%)                      | 7 (35%)                           | 12 (60%)                       |         |
| <b>Gender</b>                |                             |                                   |                                |         |
| Male (n=95)                  | 2 (2.1%)                    | 28 (29.4%)                        | 65 (68.4%)                     | 0.692   |
| Female (n=259)               | 10 (3.8%)                   | 79 (30.5%)                        | 170 (65.6%)                    |         |
| <b>Occupation</b>            |                             |                                   |                                |         |
| Undergraduate (n=222)        | 8 (3.6%)                    | 66 (29.7%)                        | 148 (66.6%)                    | 0.764   |
| Postgraduate (n=44)          | 2 (4.5%)                    | 16 (36.3%)                        | 26 (59%)                       |         |
| Faculty Member (n=57)        | 2 (3.5%)                    | 14 (24.5%)                        | 41 (71.9%)                     |         |
| Practitioner (n=31)          | 0 (0%)                      | 11 (35.4%)                        | 20 (64.5%)                     |         |
| <b>Undergraduate student</b> |                             |                                   |                                |         |
| 1st BDS (n=85)               | 5 (5.8%)                    | 29 (34.1%)                        | 51 (60%)                       | 0.778   |
| 2nd BDS (n=52)               | 1 (1.9%)                    | 12 (23%)                          | 39 (75%)                       |         |
| 3rd BDS (n=6)                | 0 (0%)                      | 2 (33.3%)                         | 4 (66.6%)                      |         |
| 4th BDS (n=7)                | 0 (0%)                      | 2 (28.5%)                         | 5 (71.4%)                      |         |
| Interns (n=73)               | 2 (2.7%)                    | 21 (28.7%)                        | 50 (68.4%)                     |         |

The attitude to use ChatGPT was maximum in 31-45 years (73.1%) followed by >45 years (75%) which corresponded to faculty members (70.1%) and practitioners (77.4%). It was almost similar in both males and females. The high

attitude to use ChatGPT was presently seen in 3<sup>rd</sup> & 4<sup>th</sup> BDS students. None of the results were statistically significant ( $p < 0.05$ ) (Table 5).

**Table 5.** Attitude regarding ChatGPT

| Category          | Low Attitude (Total n = 108) | High Attitude (Total n = 246) | p Value |
|-------------------|------------------------------|-------------------------------|---------|
| <b>Age</b>        |                              |                               |         |
| 17 to 30 (n=293)  | 92 (31.3%)                   | 201 (68.6%)                   | 0.72    |
| 31 to 45 (n=41)   | 11 (26.8%)                   | 30 (73.1%)                    |         |
| >45 (n=20)        | 5 (25%)                      | 15 (75%)                      |         |
| <b>Gender</b>     |                              |                               |         |
| Male (n=95)       | 30 (31.5%)                   | 65 (68.4%)                    | 0.791   |
| Female (n=259)    | 78 (30.1%)                   | 181 (69.8%)                   |         |
| <b>Occupation</b> |                              |                               |         |

|                              |            |             |       |
|------------------------------|------------|-------------|-------|
| Undergraduate (n=222)        | 67 (30.1%) | 155 (69.8%) | 0.51  |
| Postgraduate (n=44)          | 17 (38.6%) | 27 (61.3%)  |       |
| Faculty Member (n=57)        | 17 (29.8%) | 40 (70.1%)  |       |
| Practitioner (n=31)          | 7 (22.5%)  | 24 (77.4%)  |       |
| <b>Undergraduate student</b> |            |             |       |
| 1st BDS (n=85)               | 32 (37.6%) | 53 (62.3%)  | 0.382 |
| 2nd BDS (n=52)               | 12 (23%)   | 40 (76.9%)  |       |
| 3rd BDS (n=6)                | 0 (0%)     | 6 (100%)    |       |
| 4th BDS (n=7)                | 0 (0%)     | 7 (100%)    |       |
| Interns (n=73)               | 23 (31.5%) | 50 (68.4%)  |       |

The guidelines for research, teaching, and institutional practice may vary while utilizing ChatGPT. It is difficult to determine the exact and combined effects that each component has on ChatGPT's learning. There may be positive changes in student motivation with ChatGPT use [6]. In our study, the respondents predominantly belonged to the age group of 17-30 years and the majority were student category followed by faculty members. This highlights that most of the respondents are undergraduates, interns & postgraduates. Around 90% of the total respondents in the present study were familiar with and knew about applications of ChatGPT in dentistry and they would like to adopt it for their practice and believed that it has the potential to enhance efficiency. The results highlighted the importance of usability, user-friendliness, technological knowledge and attitudes, and behavioral aspects for the effective use of ChatGPT in dentistry.

Most respondents were aware that it has a role in education with moderate potential in dentistry. Students can access instant answers for any of the questions put up in ChatGPT, also it can explain complex dental concepts, by simplifying the steps. However, the evidence-based conclusions of more research should take the lead in addressing any potential advantages of utilizing a Large Language Model (LLM) like ChatGPT in the process of healthcare education [7]. Its extensive use in dental curriculum has the potential to revive academic research. More than half of the respondents in our study said that ChatGPT should be integrated into the curriculum. The reasons for integrating into the curriculum could be to enhance the learning experience and provide students with valuable opportunities for practice and engagement. Also, to develop the content including scenarios, case studies, or patient interactions that students can engage with using ChatGPT. Provide training for faculty members who will be involved in using and overseeing the integration of ChatGPT.

Writing is required for research and while ChatGPT shouldn't be the primary information source, it can be quite helpful for error identification and language improvement. It can help in finding academic articles, summarising their findings, and pinpointing areas of uncertainty. In some of the studies, the most common setting in which the advantages of ChatGPT in research, were mentioned was

academic/scientific writing. These included speeding up the literature review, enhancing research equality through enhanced language, readability, and translation, and being efficient and versatile while generating high-quality text [8]. It helps scientists and researchers with writing, conducting literature reviews, summarising data, organizing their work, suggesting citations, titles, and preparing a first draft of their papers. In our study, more than 89% felt that ChatGPT would help in writing and conducting research, specifically data collection and analysis, review of literature, and writing manuscripts. The main advantage of ChatGPT is that it is faster than humans at understanding information and making connections between seemingly unrelated pieces of data, thus it can make conclusions more quickly than humans. It is crucial to consider any potential drawbacks and difficulties with utilizing ChatGPT. Furthermore, an over-reliance on ChatGPT could hinder the development of critical and independent thinking abilities, which are crucial for dental field research [9]. Dental educators & researchers must stay informed of the rapid advancements in technology in order to develop efficacious teaching methodologies, curriculums, and assessment protocols [10].

One potential use for dental care is the development of clinical decision support systems through ChatGPT. These programs could go over patient data and offer recommendations for managing pain and other oral diseases. In our study, many respondents thought that ChatGPT can help in quick responses to patient queries, language translation, detailed procedure explanation, and also instructions such as do's and don'ts after specific dental treatment. Since ChatGPT uses real Language Processing, which is trained to recognize and comprehend real language, it's a useful tool for communicating with people who might not speak the same language. ChatGPT has certain clear benefits in dental practice such as the ability to provide real-time assistance around-the-clock, allowing users to get assistance more quickly. However, there may be limitations in dental practice, as it might not be particularly knowledgeable about dental diseases, procedures, or the most recent developments in the field [11]. It is dependent upon the data found in its training set as of the most recent update. ChatGPT might have trouble comprehending complex dental situations and it might misinterpret the context of a conversation. To overcome these situations, it

should be used as an adjunct and cannot be a primary interactive tool [4].

In our study majority believed it has potential for advanced dentistry, especially in dental education and research. This could be because faculty members were in a smaller percentage compared to students and they presented their perspective on the use of ChatGPT in their current field of interest i.e. dental education and dental research. More than 90% of the study were willing to use ChatGPT in different dental tasks.

### Conclusion

A new era of patient-centered treatment, operational efficiency, and educational improvements is brought in by ChatGPT integration, which breaks through traditional barriers in dentistry. It can be a flexible and helpful resource for dental students to help them write better, communicate more effectively, and understand dental subjects. Additionally, it can offer major advantages to faculty members and dental practitioners, in the form of enhanced collaboration, time savings, better teaching, and more effective communication along with good patient care,

Accepting these technical developments promotes dentistry towards a time of accuracy, efficacy, and caring for patients, at the forefront of medical innovation. It is an important tool that needs to be integrated into all aspects of dentistry. However, its optimal and ethical use needs to be taught using specific training programs to enhance its applicability. ChatGPT may become widely used, but in its current form, reckless, unrestrained use could be adverse to education, research as well as society.

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