



# AWARENESS OF ZYGOMATIC IMPLANTS AMONG UNDERGRADUATE AND POSTGRADUATE DENTAL STUDENTS: A STUDY

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## ABSTRACT

**Background:** Zygomatic implants have emerged as a valuable treatment option in modern dentistry, offering solutions for complex maxillary cases. However, the awareness and knowledge levels among dental students, both at the undergraduate (UG) and postgraduate (PG) levels, regarding zygomatic implants play a pivotal role in their future clinical practice.

**Methods:** A cross-sectional survey of dental students at a private dental institution was done. A structured questionnaire was designed to evaluate the awareness of participants regarding zygomatic implants

**Results:** The study revealed that 92.5% of participants were aware of zygomatic implants, indicating a substantial level of recognition within the dental community. However, only 37.3% correctly identified all four indications, while 37.9% accurately recognized contraindications. Notably, knowledge gaps were observed in the technical aspects, with only 34.2% correctly identifying the average implant length and 54.3% recognizing the recommended angulation. Furthermore, 22.4% were aware of sinus lift as an alternative procedure for maxillary defects.

**Conclusion:** This study highlights the need for comprehensive and up-to-date training on zygomatic implants within dental education programs.

**Keywords:** Zygomatic implants, dental education, awareness, knowledge, indications, contraindications, complications, radiographic methods, treatment planning, sinus lift, dental students.

## INTRODUCTION

The field of dentistry has witnessed remarkable advancements in recent years, with innovative treatment modalities continually evolving to address the diverse needs of patients. Zygomatic implants, a cutting-edge dental innovation, have emerged as a promising solution for individuals with severe maxillary bone atrophy.<sup>1,2</sup> Zygomatic implants distinguish themselves from traditional dental implants by securely fastening to the zygomatic bone. The zygoma bone exhibits a pyramid-like shape in its anatomy, presenting a unique structure for implant placement. These specialized implants find utility in situations involving severe atrophy of the posterior maxilla and instances where the maxillary sinus has pneumatized, eliminating the necessity for bone grafts in the posterior region.<sup>3</sup> These implants provide a stable and effective means of supporting dental prostheses, offering newfound hope to patients who were previously deemed ineligible for traditional implant procedures.<sup>4</sup> However, the successful implementation of zygomatic implants in clinical practice requires more than just technical proficiency; it necessitates a thorough understanding of the procedure's indications, contraindications, surgical techniques, and potential complications.<sup>5,6</sup> This knowledge is especially crucial for dental students, as they represent the future of oral healthcare and will be responsible for offering a comprehensive range of treatment options to their patients.<sup>7</sup> Furthermore the advancement in the placements of zygomatic implants are evolved from static guides to digitally guided surgery to real time navigation system, the navigation system helps in the accurate placement of the implants and adjustments can be made real time even though the complexity of placement of the implants.<sup>8</sup> The learning of placement of zygomatic through navigation surgery requires immense learning pattern and practice and also it requires more time than the conventional placement of implants. <sup>9</sup>The present study aims to investigate the level of awareness and knowledge among dental students, both at the undergraduate (UG) and postgraduate (PG) levels, with regard to zygomatic implants. By evaluating their familiarity with this specialized dental procedure, we can gain insights into the preparedness of the next generation of dental practitioners to meet the evolving demands of modern dentistry.

## MATERIALS AND METHODS

The questionnaire survey was conducted among under-graduate and post-graduate dental students in a private dental college in Chennai. The study included about 161 participants, informed consent was obtained. A structured questionnaire [TABLE 1] consisting of 15 questions pertaining to awareness of zygomatic implants were distributed via Google forms and circulated through social media platforms. The data obtained was transferred to excel sheet, to analyse the data PSPP 3.0 software was used.

## RESULTS

Out of the 161 dental students who participated in this study, 28.6% were Compulsory Rotatory Resident Interns (CRRRI), followed by 22.5% undergraduate (UG) final-year students. An encouraging 92.5% of the participants were aware of what a zygomatic implant is. 59% of the respondents correctly identified Dr. Per Ingvar Branemark as the pioneering figure who introduced zygomatic implants to the field of dentistry. 37.3% of the participants correctly identified all four indications for zygomatic implants, which include severely atrophic maxilla, Ectodermal Dysplasia Syndrome, posterior maxillary defects, and maxillectomy defects. 37.9% of the participants correctly identified sinusitis, zygomatic bone pathologies, and uncontrolled systemic disorders as contraindications for zygomatic implants. 42.9% of the respondents were aware that post-operative sinusitis and orbital cavity penetration are potential complications associated with zygomatic implants. 46.6% of the participants correctly acknowledged that zygomatic implants can be used in both partially edentulous and completely edentulous conditions. A majority of 57.8% of the participants recognized Cone Beam Computed Tomography (CBCT) as the ideal radiographic method for assessing zygomatic implants. 54.7% of the participants correctly stated that zygomatic implants are a non-bone grafting rehabilitation procedure. Only 34.2% of the respondents correctly identified the average length of zygomatic implants as being between 30mm and 52.5mm. 54.3% of the participants accurately stated that the angulation of zygomatic implants is typically 45° along the long axis of the implant. 33.5% of the respondents were aware that zygomatic implants can be placed using Freehand Zygomatic Implant surgery. 39.1% of the participants correctly estimated the survival rate of zygomatic implants to be between 70% and 80%. 45.3% of the participants recognized that angulation in zygomatic implants compensates for the angle between the zygoma and maxilla. Only 22.4% of the respondents correctly identified sinus lift as an alternative procedure for addressing maxillary defects instead of zygomatic implants. 59% of the participants indicated that the

treatment plan for zygomatic implants, when there is adequate bone in the anterior maxilla and a posterior maxillary defect, includes a single zygomatic implant along with conventional implants.

## DISCUSSION

The findings of this study provide valuable insights into the awareness and knowledge levels concerning zygomatic implants among dental students, encompassing both undergraduates (UG) and postgraduates (PG). Notably, a significant 92.5% of the surveyed students exhibited awareness of zygomatic implants. This heightened awareness suggests that zygomatic implants have gained substantial recognition within the dental community as a noteworthy treatment modality, mirroring the findings of a similar study by Baala Vignesh et al., where 90% of participants demonstrated awareness of zygomatic implants. In contrast, the study conducted by Shunmugam Kumar Mangal et al. reported a lower awareness rate of 56.3%, and the study by Dhinesh Kumar Sanggaya found an awareness rate of 72%.<sup>10,11,12,13</sup> The results indicate that there is room for improvement in educating students regarding the precise clinical scenarios where zygomatic implants are most appropriate, as only 37.3% correctly identified all four indications for zygomatic implants, and 37.9% accurately identified the contraindications. This underscores the importance of enhancing students' understanding of when to recommend or avoid zygomatic implants in patient treatment plans. Furthermore, the study underscores the alignment of 57.8% of participants with current best practices in implant dentistry, as they recognized Cone Beam Computed Tomography (CBCT) as the preferred radiographic method for assessing zygomatic implants. CBCT provides detailed three-dimensional images that are invaluable for treatment planning and ensuring the accurate placement of zygomatic implants.<sup>14,15</sup> As technology continues to advance, dental education must keep pace to equip students with the skills necessary to leverage these tools effectively. Additionally, the awareness that zygomatic implants entail non-bone grafting rehabilitation (54.7%) highlights the procedural advantages, notably in mitigating the complexities and risks associated with bone grafting. The study's revelation that only a minority of participants accurately identified the average length and angulation of zygomatic implants, similar to findings in Dhinesh Kumar Sanggaya's study, underscores potential knowledge gaps regarding the technical aspects of zygomatic implant placement.<sup>10,18,19</sup> This emphasizes the need for more comprehensive training in this area during dental education. Regarding treatment planning, the practical approach of 59% of participants, involving the use of a single zygomatic implant alongside conventional implants when there is adequate bone in the anterior maxilla with a posterior maxillary defect, reflects sound clinical judgment.<sup>16,20</sup> This approach not only simplifies treatment but also optimizes outcomes. However, the low recognition (22.4%) of sinus lift as an alternative for maxillary defects indicates that there is room for improvement in educating students about alternative procedures in specific clinical contexts. The study emphasizes the importance of enhancing dental education programs to provide comprehensive and up-to-date training on zygomatic implants.<sup>21,22,23,24</sup> While awareness is high, knowledge gaps exist, particularly in understanding the clinical indications, contraindications, and technical nuances. Bridging these gaps through continued education and training is vital to ensure that dental practitioners are well-prepared to offer the best treatment options for patients with complex maxillary conditions. Ultimately, this will contribute to improving patient care and outcomes in the field of implant dentistry. The utilization of zygomatic implants serves as a viable substitute for bone augmentation, maxillary sinus lifts, and traditional bone grafting procedures in individuals dealing with posteriorly atrophic maxillae. It is essential to recognize that the zygomatic implant technique constitutes a substantial surgical undertaking, necessitating thorough training. Therefore, there is a critical need to enhance the awareness and knowledge of zygomatic implants among dental practitioners.<sup>25</sup>

## CONCLUSION

In conclusion, this study underscores the importance of enhancing dental education programs to include comprehensive and up-to-date training on zygomatic implants. Beyond raising awareness, it is crucial to equip future dental professionals with a deeper understanding of when and how to apply zygomatic implants effectively. Continued education and training opportunities are essential for bridging knowledge gaps and ensuring that dental practitioners are well-prepared to offer the best treatment options for patients with complex maxillary conditions. Ultimately, this will contribute to improving patient care and outcomes in the field of implant dentistry.

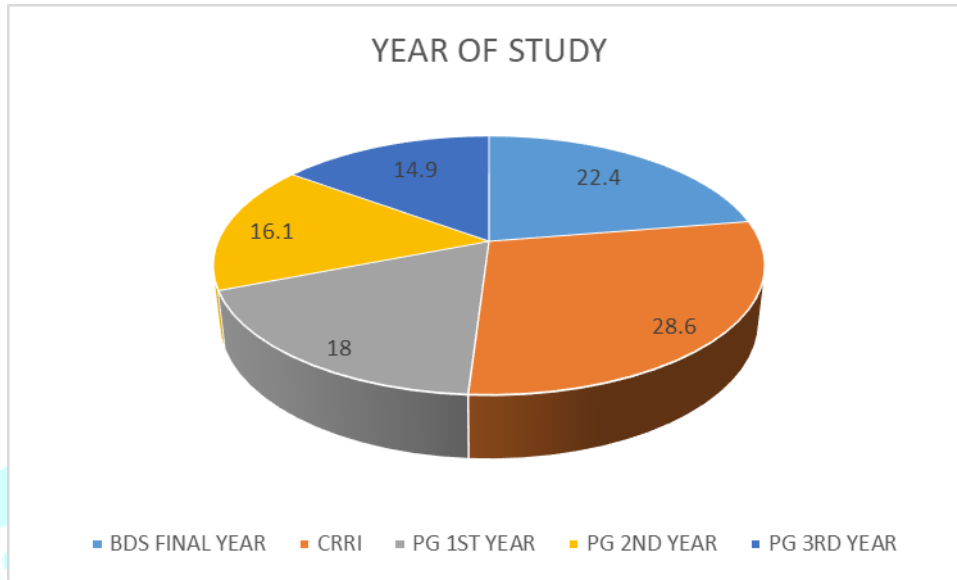
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<b>**Participant Demographics:**</b>
- Year of Study (Please circle one): BDS FINAL YEAR / CRRI / PG 1ST YEAR / PG 2ND YEAR / PG 3RD YEAR
<b>1. What is Zygomatic implant?</b>
- Placement of Implant in Pterygoid bone
- Placement of Implant in maxillary bone
- Placement of Implant in zygomatic bone
- Placement of Implant in mandibular bone
<b>2. Zygomatic implant was introduced by:</b>
- (i) Dr. Per Ingvar Branemark
- (ii) Dr. E.J. greenfield
- (iii) Dr. Raphael Chercheve
- (iv) Dr. Schroder
<b>3. What are the indications for Zygomatic Implants?</b>
- (a) Severely atrophic maxilla
- (b) Ectodermal Dysplasia Syndrome
- (c) Posterior maxillary defects
- (d) Maxillectomy defects
- (Select one or more)
<b>4. What are the contraindications for Zygomatic Implants?</b>
- (i) (a) Sinusitis
- (ii) (b) Zygomatic bone pathologies
- (iii) (c) Uncontrolled systemic disorders
- (iv) (d) All the above

<b>5. What are the complications of Zygomatic Implants?</b>
- (a) Post-operative Sinusitis
- (b) Orbital cavity penetration
- (c) Edema
- (d) Peri-Implantitis
- (Select one or more)
<b>6. In what cases can Zygomatic Implants be used?</b>
- (i) (a) Partially edentulous
- (ii) (b) Completely edentulous
- (iii) Both (a) and (b)
- (iv) Maxillary fractures
<b>7. What is the ideal radiographic method for Zygomatic Implant?</b>
- Cone Beam Computed Tomography (CBCT)
- Multislice computed Tomography (MSCT)
- OPG
- Lateral cephalogram
<b>8. Zygomatic Implant procedure is:</b>
- (a) Bone grafting Rehabilitation procedure
- (b) Non-Bone grafting Rehabilitation procedure
- (iii) Both (a) and (b)
- (iv) None of the above
<b>9. What is the average length of Zygomatic Implant?</b>
- 30mm - 52.5mm
- 35mm - 55mm
- 45mm - 53mm
- 50mm - 55mm
<b>10. What is the Angulation of Zygomatic Implant?</b>
- (i) 30° along the long axis of implant
- (ii) 45° along the long axis of implant
- (iii) 60° along the long axis of implant
- (iv) 90° along the long axis of implant
<b>11. Zygomatic Implants can be placed with:</b>
- (i) Surgical Templates
- (ii) Freehand Zygomatic Implant surgery
- (iii) Real-time Navigation surgery
- (iv) All the above
<b>12. What is the survival rate of Zygomatic Implants?</b>
- (i) 60%-70%
- (ii) 70%-80%
- (iii) 80%-90%
- (iv) 95%-100%
<b>13. Why is Angulation required for Zygomatic Implants?</b>
- (i) To compensate for the angulation between the Zygoma & Maxilla
- (ii) To prevent orbital cavity penetration
- (iii) To prevent injury to Infraorbital nerve
- (iv) To help in prosthetic replacement of tooth
<b>14. What are the alternatives for maxillary defects other than Zygomatic Implants?</b>
- (i) Sinus lift
- (ii) Sinus graft
- (iii) Onlay graft
- (iv) Opposition graft with (or) without LeFort Osteotomy

- (v) All the above
15. What is the treatment planning for Zygomatic Implant when there is adequate bone in anterior maxilla & posterior maxillary defect?
- Single ZI with Conventional implant
- Bilateral two ZI approach
- Triple ZI in bilateral Zygoma
- Triple ZI in unilateral Zygoma

