A Survey On Awareness Of Bone Graft Used By Implantologists To Restore The Bone Defects Around The Dental Implant In India. A Prospective Study

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Abstract:
Introduction: The success of dental implants depends largely on the quality and quantity of bone at the implant site. When bone is insufficient, bone grafting becomes necessary to ensure implant stability and longevity.
Aim: This prospective study aimed to assess the awareness, knowledge, and clinical practices related to bone graft placement among implantologists in India.
Materials and Method: A structured online questionnaire consisting of 25 close-ended questions was completed by 200 implantologists.
Result: Results indicated that autografts were the most preferred and considered the most biocompatible graft material. Most practitioners (89.9%) selected graft materials based on personal knowledge, and 75.4% reported improved success with bone grafts over time, citing better techniques and material availability. Common donor sites included the iliac crest and mandibular ramus. Key barriers included patient-related factors and limited familiarity with certain materials.
Conclusion: The study concludes that there is substantial awareness and clinical application of bone grafting among Indian implantologists, with autografts being the most favored option.
Keywords: Bone graft, Dental implant, Implantology, Autograft, Allograft, Xenograft, Alloplast, Bone augmentation, Awareness survey, India

INTRODUCTION:

Dental implant therapy is now a widely accepted and predictable treatment modality for replacing missing teeth. A critical determinant of implant success is the quality and quantity of alveolar bone available at the recipient site. In cases of inadequate bone volume, ridge augmentation becomes essential to facilitate proper implant placement and ensure long-term prosthetic support.[1]

Several augmentation techniques are available to address alveolar ridge deficiencies. These include guided bone regeneration (GBR), block bone grafting, sinus and nasal floor grafting, interpositional grafting, ridge expansion, protected bone regeneration using titanium mesh, and distraction osteogenesis.[2,3] The selection of technique and graft material depends on factors such as the degree of ridge atrophy, defect morphology, type of prosthesis, and both clinician and patient preferences.[4]

Among the various grafting materials, autogenous bone grafts remain the gold standard due to their osteogenic, osteoconductive, and osteoinductive properties. [5] Cortical autografts provide high mechanical strength and serve as a stable scaffold, although they possess limited biological activity. Cancellous autografts, on the other hand, are rich in osteogenic cells and growth factors, facilitating faster integration. Corticocancellous grafts combine the advantages of both.[6] The iliac crest is the most commonly used donor site for harvesting autogenous grafts, as it provides substantial quantities of both cortical and cancellous bone. However, donor-site morbidity and postoperative discomfort have led to exploration of alternative donor sites such as the proximal tibia, distal radius, distal tibia, and greater trochanter.[7,8]

In cases of severe mandibular atrophy, onlay autogenous bone grafting is often considered the most suitable approach to restore lost bone volume and support future implant placement 9 . Osseous augmentation using autografts, allografts, and xenografts—especially bovine bone mineral—alone or in combination with other regenerative

materials, has demonstrated successful outcomes in ridge augmentation procedures.[10,11]

This study aims to assess the awareness and clinical practices related to the use of bone grafts among implantologists in India. Despite its importance, there is limited literature specifically addressing grafting trends and awareness among Indian clinicians, making this investigation timely and relevant.

Primary Research Question: Is there awareness and practice of bone graft placement among the implantologists?

Null Hypothesis: There is no significant awareness or practice of bone graft placement among implantologists in India.

Alternative Hypothesis: There is significant awareness and practice of bone graft placement among implantologists in India.

AIM

To evaluate and analyze awareness and practice of bone graft placement among the implantologists.

OBJECTIVES

• To evaluate and analyze the knowledge and awareness of bone graft placement among the implantologists.

• To evaluate and analyze the practice of bone graft placement among the implantologists.

• To evaluate success of bone graft placement among the implantologists.

Methodology Study Design:

Awareness-based, cross-sectional questionnaire survey conducted among practicing implantologists

Inclusion Criteria:

• Licensed dental practitioners including post graduate student currently practicing implantology in India

• Willingness to provide informed consent and complete the questionnaire

Exclusion Criteria:

• Undergraduate students or dentists not performing implant procedures

• Incomplete responses Ethical Approval: The study received ethical clearance from the Institutional Review Board. Informed consent was obtained from all participants at the start of the questionnaire.

Demographic Details Collected: Years of clinical experience in implantology

Type of clinical practice (private/academic) Region of practice (North, South, East, West, Central India) Number of implants placed annually

MATERIALS AND METHOD:

The survey instrument was a pretested, self-administered, closed-ended questionnaire comprising 25 questions divided into three sections:

- Knowledge
- Attitude
- Clinical Practice

The questionnaire was developed after reviewing relevant literature and validated by a panel of three prosthodontists and one statistician for face and content validity. A pilot test was conducted with 20 implantologists to assess clarity and reliability. Cronbach's alpha coefficient was calculated to measure internal consistency, with a value of 0.81 indicating good reliability. The pilot responses were excluded from the main study data.

Sample Size Justification:

Based on an expected awareness rate of 70% and with a 95% confidence level and 7% margin of error, the minimum sample size was calculated to be 180. To account for nonresponses, a total of 200 implantologists participated in the final study.

STATISTICAL ANALYSIS

Data were entered and analyzed using SPSS version

26.0 (SPSS Inc., Chicago, Illinois).

Descriptive statistics (frequencies and percentages) were used for categorical variables.

Inferential statistics such as the Chi-square test were applied where relevant. A p-value ≤ 0.05 was considered statistically significant.

Results were presented using tables and bar graphs for clarity.

RESULT

A total of 200 dental practitioners and implantologists across India participated in this study.

• Preferred Bone Graft Material:

According to the responses, 68.1% preferred autograft as the graft material of choice, followed by 20.3% who chose allograft. (Fig. 1)

• Source of Decision-Making:

The majority of respondents (89.9%) relied on their own knowledge and understanding to select the bone graft material, while 8.7% relied on information from company representatives or peers. (Fig. 2)

• Instruction Review:

When asked whether they read manufacturer instructions before use, 81.2% stated they always do, and 14.5% reported reading them occasionally.

• Biocompatibility Perception:

84.1% considered autograft to be the most biocompatible material, while allograft and xenograft were preferred by 8.7% and 5.8%, respectively.

• Biological Properties Awareness:

89.9% of participants reported that autografts exhibited all three critical properties— osteoconduction, osteoinduction, and osteogenesis.

• Waiting Period Before Implant Placement:

44.9% reported no waiting period post-grafting, while 46.4% waited for 3–4 months, and the remainder reported longer durations.

- **Evaluation of Graft Success:** Respondents used various methods for evaluation:
  - CBCT: 30.4%
  - Clinical Evaluation: 29%
  - IOPA: 21.7%
  - OPG: 18.8%

• Barriers to Bone Grafting:

The top limiting factors were:

- o Patient-related concerns (42%)
- o Lack of experience with techniques/materials (33.3%)
- o Limited material availability (24.6%)

- Defect Healing Capacity:
  - o 56.5% believed grafts healed 2–3 mm defects
  - o 20.3%: 1–2 mm o 13%: 4–5 mm
  - o Remaining: 3–4 mm
- Frequency of Graft Placement:
  - o When needed: 76.8%
  - o Always: 13%
  - o Rarely: 8.7%
  - o Never: 1.5%
- Purpose of Bone Grafting Post-Implant:
  - o For implant success: 58%
  - o For structural support: 36.2%
  - o Other reasons: 4.3%
- Form of Graft Material Preferred:
  - o Particulate: 58%
  - o Putty: 24.6%
  - o Injectable paste: 15.9%
  - o Tablet: 1.4%
- Perceived Success Over Time:
  - o Improved: 75.4%
  - o Constant: 13%
  - o No success: 7.2%
- Reasons for Success:
  - o Better understanding and technique: 69.6%
  - o Improved materials: 18.8%
  - o Better follow-up: 11.6%
- Follow-up Frequency:
  - o Often: 49.3%
  - o Very often: 39.1%

o Rarely: 10.1%

o Never: 1.4%

• Awareness of Standard Evaluation Criteria:

o Aware: 46.4%

o Not aware: 40.6%

o Uncertain: 13%

• Autograft Harvest Sites:

o Iliac crest: 43.5%

o Mandibular ramus: 18.8%

o Symphysis: 31.9%

• Reported Complications:

o Soft tissue dehiscence: 21.7%

o Wound infection/inflammation: 34.8%

o Hemorrhage: 10.1%

o Schneiderian membrane perforation: 33.3%

• Perceived Success vs Failure:

o Success > Failure: 76.8%

o Equal: 13%

o Failure > Success: 7.2%

• Storage Medium for Autograft:

o Saline: 49.3%

o Patient's blood: 37.7%

o Glucose: 13% (Fig. 20)

• Grafting Combinations Used:

o Autograft + Alloplast: 34.4%

o All types (Autograft, Xenograft, Alloplast): 24.6%

o Grafts with PRF: 33.3%

• Use of Titanium Mesh:

o Rarely: 43.5%

o Never: 17.4%

o Always: 34.4%

• Use of Collagen Membrane:

o Always: 36.2%

o Sometimes: 36.2%

o Rarely: 23.2%

• Use of Fixation Screws:

o Always: 40.6%

o Sometimes: 34.8%

o Rarely: 14.5%

o Never: 10.1%

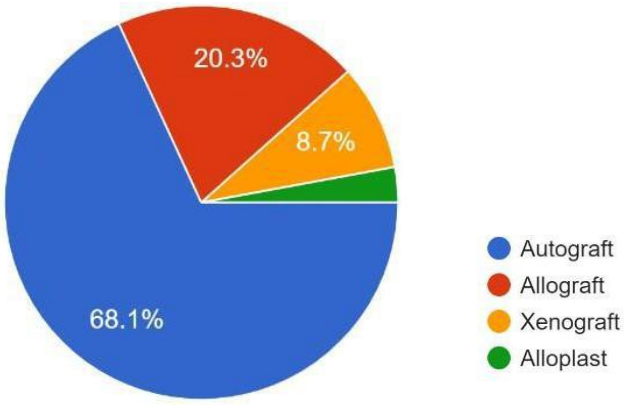

FIG 1. The pie diagram shows that mostly use bone graft material is autograft by 68.1% practitioners, which is highlighted in blue colour.

FIG 2. The pie diagram shows that 89.9% practitioners chooses their bone graft material by their knowledge and understanding represented by blue colour, red colour means 68.1% represents through company representative.

DISCUSSION

This study assessed the awareness and clinical practices regarding bone graft placement among implantologists in India. The findings demonstrated a high level of familiarity with bone grafting procedures, with autografts being the most preferred option.

The preference for **autogenous bone grafts (68.1%)**

observed in this study is consistent with earlier findings reported by **Artzi et al.**, who concluded that autogenous grafts remain the gold standard due to their osteoconductive, osteoinductive, and osteogenic properties despite their morbidity risks.[12] Similarly, **Jensen and Sindet-Pedersen** reported successful outcomes using mandibular bone grafts in severely atrophic maxilla.[13]

However, an increasing trend toward using bone substitutes such as allografts, xenografts, and alloplasts has been noted in global literature to avoid donor site morbidity and reduce surgical time.[14] In our study, although autografts were preferred, clinicians also utilized alloplasts and xenografts, often in combination with PRF, reflecting a growing inclination toward multimodal regenerative techniques.

Regarding knowledge sources, 89.9% of participants relied on personal knowledge rather than guidance from sales representatives or peer recommendations. This contrasts with the findings by Garg et al., where a significant proportion of clinicians reported depending on manufacturer inputs for graft selection.[15] This indicates greater autonomy and experience among Indian implantologists in clinical decision-making. Regarding knowledge sources, 89.9% of participants relied on personal knowledge rather than guidance from sales representatives or peer recommendations. This contrasts with the findings by Garg et al., where a significant proportion of clinicians reported depending on manufacturer inputs for graft selection15. This indicates greater autonomy and experience among Indian implantologists in clinical decision-making.

Interestingly, **81.2%** of our respondents always read manufacturer instructions. While encouraging, this still indicates room for improved compliance, especially when newer biomaterials are introduced. Lack of adherence to usage protocols can impact graft performance, as highlighted by **Stellingsma et al.**, who stressed the importance of standardized clinical protocols in improving implant success.[16]

Evaluation methods such as **CBCT** (30.4%) and **intraoperative clinical judgment** (29%) were the most common. Similar trends were reported by **Gao et al.**, where CBCT was preferred due to its 3D diagnostic accuracy, though cost and accessibility remain limitations in some regions.[17]

Barriers to ideal bone graft placement included patient-related issues, clinician inexperience, and material availability. These findings echo those of **Chiapasco et al.**, who emphasized the role of clinician expertise and material selection in the success of grafting procedures.[18]

The reported complications, particularly wound infection (34.8%) and Schneiderian membrane perforation (33.3%), are comparable to international data. For instance, **Artzi et al.** also identified similar complication profiles in augmentation procedures using xenografts and titanium mesh.[12]

Overall, while the awareness level in India appears high, our study reveals areas needing attention—such as standardization of evaluation criteria and improved follow-up protocols. Nearly half of the respondents were unaware of formal evaluation guidelines, suggesting a **need for continued education programs** and integration of evidence-based practice models.

CONCLUSION

The study found that Autograft was the most biocompatible bone graft material, with 68.1% of respondents believing it had all three biological properties of osteoinductivity, osteoconductivity, and osteogenesis. 44.9% reported no waiting period for

implant placement after bone grafting. Bone graft material placement is limited by patient-related factors, availability of sources, inexperience with material and techniques, poor laboratory support, and poor follow up. 75.4% have improved success with the material over time, while 18.8% say it is due to better materials and 11.6% improved follow up. Autogenous bone graft is most commonly harvested from the iliac crest and ramus of the mandible, and common complications include soft tissue dehiscence, wound infection/inflammation, and secondary hemorrhage. The pie diagram shows that autograft is the most biocompatible material, with IOPA, OPG, CBCT, and clinical evaluation during surgery being the guiding factors for evaluating the success of bone graft material.

REFERENCES

1. Albrektsson T, Zarb G, Worthington P, Eriksson AR. The long-term efficacy of currently used dental implants: a review and proposed criteria of success. *Int J Oral Maxillofac Implants*. 1986;1(1):11–25.

2. Aghaloo TL, Moy PK. Which hard tissue augmentation techniques are the most successful in furnishing bony support for implant placement? *Int J Oral Maxillofac Implants*. 2007;22 Suppl:49–70.

3. Buser D, Martin W, Belser UC. Optimizing esthetics for implant restorations in the anterior maxilla: anatomic and surgical considerations. *Int J Oral Maxillofac Implants*. 2004;19 Suppl:43–61.

4. Esposito M, Grusovin MG, Felice P, Karatzopoulos G, Worthington HV, Coulthard P. The efficacy of horizontal and vertical bone augmentation procedures for dental implants—A Cochrane systematic review. *Eur J Oral Implantol*. 2009;2(3):167–84.

5. Misch CM. Autogenous bone: is it still the gold standard? *Implant Dent*. 2010;19(5):361–2.

6. Urist MR. Bone: formation by autoinduction. *Science*. 1965;150(3698):893–9.

7. Schlee M, Esposito M. Outcomes of harvesting autogenous bone block grafts from the chin and iliac crest for alveolar ridge augmentation. *Eur J Oral Implantol*. 2009;2(3):229–36.

8. Chiapasco M, Casentini P, Zaniboni M. Bone augmentation procedures in implant dentistry. *Int J Oral Maxillofac Implants*. 2009;24 Suppl:237–59.

9. Jensen OT, Greer RO. Autogenous mandibular onlay bone grafts for reconstruction of alveolar ridges and maxillary sinuses. *J Oral Maxillofac Surg*. 1992;50(12):1412–6.

10. Buser D, Dula K, Belser U, Hirt HP, Berthold H. Localized ridge augmentation using guided bone regeneration. *Clin Oral Implants Res*. 1993;4(3):113–25.

11. Cordaro L, Amadé DS, Cordaro M. Clinical results of alveolar ridge augmentation with mandibular block bone grafts in partially edentulous patients prior to implant placement. *Clin Oral Implants Res*. 2002;13(1):103–11.

12. Artzi Z, Dayan D, Alpern Y, Nemcovsky CE. Vertical ridge augmentation using xenogenic material supported by a configured titanium mesh: Clinico-histopathologic and histochemical study. *Int J Oral Maxillofac Implants*. 2003;18:440–446.

13. Jensen J, Sindet-Pedersen S. Autogenous mandibular bone grafts and osseointegrated implants for reconstruction of the severely atrophied maxilla: A preliminary report. *J Oral Maxillofac Surg*. 1991;49:1277–1287.

14. Westrich GH, Geller DS, O'Malley MJ, et al. Anterior iliac crest bone graft harvesting using the corticocancellous reamer system. J Orthop Trauma. 2001;15:500–506.

15. Garg A, Zablotsky M. Bone grafting materials in dental implants: A comprehensive review. Implant Dent. 2018;27(5):521–529.

16. Stellingsma C, Vissink A, Meijer HJ, et al. Implantology and the severely resorbed edentulous mandible. Crit Rev Oral Biol Med. 2004;15:240–248.

17. Gao X, Qin S, Cai H, Wan Q. Comparison of general and aesthetic effects between flapless and flap techniques in dental implantation: a meta-analysis of randomized controlled trials. Int J Implant Dent. 2021;7(1):48.

18. Chiapasco M, Consolo U, Bianchi A, Ronchi P. Alveolar distraction osteogenesis for the correction of vertically deficient edentulous ridges: A multicenter prospective study on humans. Int J

Oral Maxillofac Implants. 2004;19:399–407.
19.

ANNEXURE

1. Name, Age, workplace and working experience

2. Which bone graft material do you mostly choose after implant placement to fill * the defect?
   - Autograft
   - Allograft
   - Xenograft
   - Alloplast

3. The choice of bone graft material you prefer is based on *
   - Your knowledge and understanding
   - Through company representative
   - Suggestion by other people
   - Through social media

4. Do you read manufacturer issued instructions sheet before using bone graft? *
   - Yes, Always
   - Sometimes
   - Never
   - None of the above

5. According to you which type of bone graft material is most biocompatible among these?
   - Autograft
   - Allograft
   - Xenograft
   - Alloplast

6. Which bone graft material shows all the biological properties (Osteoinductive,Osteoconductive and osteogenesis)?
   - Autograft
   - Allograft
   - Xenograft
   - Alloplast

7. How long do you usually wait for implant placement after placing bone graft material?
   - 3-4 months
   - 6-8 months
   - 10-12 months
   - No waiting period

8. What is the guiding factor for evaluation of bone graft material whether it would * be successful or not?
   - IOPA
   - OPG
   - CBCT
   - Clinical evaluation during surgery

9. What factor limits the placement of ideal bone graft material? *
   - Availability of sources
   - Patient related factors
   - Inexperience with the material and techniques
   - Poor laboratory support

10. The size of the defect healed by bone graft material should not be more than *
   - 1-2 mm
   - 2-3 mm
   - 3-4 mm
   - 4-5 mm

11. How often do you place bone graft in your practice? *
   - Everytime
   - When needed
   - Rarely
   - Never

12. What is the reason for placing bone graft after implant placement?
   - It strengthens the implant
   - For the success of implant
   - Any other reason....
   - Never placed

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13. Which form of the bone graft material do you generally prefer while doing implant surgery?

- Putty form
- Particulate form
- Injectable paste
- Tablet

14. Do you think that with time you have had improved success with same bone graft material?

- Yes
- No
- Success rate remains constant over period
- None of the above

15. What has been the main reason for improved success of implant after bone graft material placed by you overtime?

- Better understanding of material and techniques
- Availability of better materials
- Improved follow up of patients
- Success rate has been the same

16. How long do you follow up your bone graft placed patient? *

- Very often
- Often
- Rarely
- Never

17. Are you aware of certain standard criteria for bone graft restoration evaluation?

- No
- If Yes mention....
- Any other....
- None of the above

18. The most common site of your preference for autogenous bone graft harvested is?

- Symphysis of mandible
- Iliac crest
- Lateral zygomatic buttress
- Ramus of mandible

19. Complications you most commonly seen in your routine practice is

- Intraoperative perforation of Schneiderian membrane
- Soft tissue dehiscence
- Wound infection/ inflammation
- Secondary hemorrhage at donar or recipient site

20. According to your personal experience among success rate or failure rate which is more?

- Success rate > Failure rate
- Failure rate > Success rate
- Success rate = Failure rate
- None of the above

21. Storage media of your choice for autogenous bone graft is...

- Normal saline solution
- 5% glucose solution
- Patient's blood
- Not needed

22. Do you graft various bone grafts in layers?

- Autograft + Alloplast
- Autograft + Xenograft + Alloplast
- Only Alloplast
- Various grafts + PRF

23. Do you use Titanium mesh with grafting? *

- Yes always
- No
- Rarely
- Never

24. How often you place collagen membrane over grafts? *

- Yes always
- Sometimes
- Rarely
- Never

25. Do you use fixation screws during grafting? *

- Yes always
- Sometimes
- Rarely
- Never

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How to cite this Article:
Bayaskar S, Komuravelli A, Niras S, Pawar R, Ingale P. A survey on awareness of bone graft used by implantologists to restore the bone defects around the dental implant in India. A prospective Study. Journal of Interdisciplinary Dental Sciences. 2025 Jan- Jun;14(1):31-39