



## Clinical Evaluation of Performances of Two Commonly Used Grafts Materials During Indirect Sinus Augmentation Technique (ISAT) in Artophic Maxillary Alveoli: An In- Vivo (Original Research Study)

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### KEYWORDS

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Maxillary Sinus,  
Osteotomy Eucare  
Sybograf Sterile  
Synthetic  
Hydroxyapatite  
Bone Graft

### ABSTRACT:

**Background and Aim:** Grafts are frequently utilized in defective bony sites and other indicated situations. Quality and quantity of grafts usually depends upon the circumstantial need of patients. Many clinical methods have been tried by numerous clinicians to rectify this problem however, none of the method is appears to be perfect. Hence this in vivo study was conducted to evaluate the performances of two commonly used grafts materials during indirect sinus augmentation technique (ISAT) in artophic maxillary alveoli.

**Materials and Methods:** This in vivo study involved 18 patients those were studied with preset objectives. Both male and female patients were included in the study. Single implant per patients with bone grafts was studied. Group 1 patients included 9 patients wherein B-Ostin HT Series 100% Synthetic Bonegraft Material was used during indirect sinus augmentation technique for unsatisfactory alveolar bone heights. Group 2 patients included 9 patients wherein Eucare Sybograf Sterile Synthetic Hydroxyapatite Bone Graft was used during indirect sinus augmentation technique for inadequate alveolar bone heights. The responses were studied as successful and unsuccessful in 5 months post-operative periods.

**Statistical Analysis and Results:** In Group 1, (for B-Ostin HT Series, n=9) total 7 patients showed successful outcomes with highly significant p value (0.01). 2 patients showed Unsuccessful responses with non-significant p value. In Group 2 for Eucare Sybograf Sterile Synthetic Hydroxyapatite Bone Graft, total 6 patients showed successful outcomes with highly significant p value (0.02). ANOVA showed highly important level of significance which was calculated for between the groups (0.001).

**Conclusion:** Authors concluded that both of the experimented graft materials were clinically satisfactory however number of successful cases were higher with B-Ostin HT grafts as compared with Eucare Sybograf Sterile Synthetic Hydroxyapatite Bone Graft. Authors also presume some other long term future studies so as to set up other significant guidelines in these perspectives.



## Introduction

Literature has well evidenced about the problems associated with maxillary sinus rehabilitation.<sup>1,2</sup> Dental surgeons and clinicians are always confronted with resorbed maxillary bone and associated issues. Insertion of implant in the deficient bony maxilla is always challenging and difficult.<sup>3</sup> Artificial bone grafts are one of the viable options which seem to solve this clinical dilemma.<sup>4,5</sup> Now days, several bone grafting materials available with their own indications and contraindications. Many of them have been extensively experimented in the recent past by various researchers.<sup>6,7</sup> B-Ostin HT Series 100% Synthetic Bonegraft Material is synthetic biocompatible material made by components that present naturally in the bone. These are primarily hydroxapatite. B-OstIN is made by wet chemical technique and afterward transformed into porous form by ceramic dispensation methods. Resemblance to the bone makes B-OstIn biocompatible and most osteoconductive material. B-OstIN is most osteoconductive substance which promotes bone bonding within 2.5 month. So it is having fastest action of all ceramic components. B-Ostin HT Series 100% Synthetic Bonegraft Material is predominantly used for restoration or rebuilding of a traumatic or deteriorating several walled bony deficiencies. It is also used for augmentation of the maxillary sinus floor with atrophied alveolar ridge and for the conservation of maxillary alveolus for an implant osteotomy procedure. Eucare Sybograf Sterile Synthetic Hydroxyapatite Bone Graft is a synthetic Nanocrystalline Hydroxyapatite Bone Graft material. Synthetic nanocrystalline Hydroxyapatite is a highly useful bone graft material in dentistry globally. In view of all these noteworthy facts and evidences, this in vivo study was conducted to evaluate the performances of two commonly used grafts materials during indirect sinus augmentation technique (ISAT) in atrophic maxillary alveoli.

## Materials and Methods

This study was intended and executed for two commonly used grafts materials during indirect sinus augmentation. This was purely in vivo study wherein the grafts were tried and assessed on particular clinical situations. Total 18 patients were studied with predetermined objectives. All patients were selected by

simple random sampling procedure. Signed and informed consents were obtained from all contributing patients. Inclusion criteria were; 1) atrophic maxillary alveoli 2) patient seeking rehabilitation of maxillary molar of either side 3) patient agreed for implant therapy in the region of atrophic maxillary alveoli. Exclusion criteria included; 1) patient with systemic disease 2) patients taking heavy medication 3) patients with known hematological disorder 4) patient with sufficiently available bone for implant placement in maxillary arch. Both male and female patients were included in the study. Status and extent of atrophic maxillary alveoli was confirmed on radiographs using IOPA and OPG. Only single implant per patients and their corresponding bone grafts were studied in detail. For all patients; osteotomy procedure was attempted and completed by dedicated operatory team utilizing similar implant kit system and surgical armamentarium. Surgeries were attempted for all patients including indirect sinus augmentation technique. Indirect sinus augmentation technique is a minimally invasive procedure and it involves minimum bony osteotomy only up-to 3 mm deep and wide. Indirect sinus augmentation technique utilizes minimum instruments so it's a comparatively simple technique which can be done in less time and expertise. All 18 patients were categorized under two sets. Group 1 patients included 9 patients wherein B-Ostin HT Series 100% Synthetic Bonegraft Material was used during indirect sinus augmentation technique for unsatisfactory alveolar bone heights. Group 2 patients included 9 patients wherein Eucare Sybograf Sterile Synthetic Hydroxyapatite Bone Graft was used during indirect sinus augmentation technique for inadequate alveolar bone heights. Quantifiable performances and conducts were identified in post-operative stages for both the groups and results framed consequently. The responses were studied as successful and unsuccessful in 5 months post operative periods. Statistical analysis was accompanied to formulate the interpretations and results. P value less than 0.05 was considered as significant.

## Statistical Analysis and Results

All the noticeable data and responses were tabulated in master chart as preliminary data. Therefore it was assessed for any incorporated error. Afterwards data was subjected to basic statistical analysis with SPSS statistical package for the Social Sciences version 22 for



Windows. Nonparametric test, namely, chi-square test, was used for further data analysis; p-value. Out of 18 studied patients, 12 were males and 6 were females [Table 1, Graph 1]. P-value was highly significant for age group 26-30 years. It was 0.01. Maximum 6 patients were present in age group of 31-35 years. Table 2 demonstrates about the Elementary statistical explanation with level of significance evaluation using “Pearson Chi-Square” test (Group 1 for B-Ostin HT Series, n=9), Noted as successful and unsuccessful in 5 months post-operative timings. Total 7 patients showed successful outcomes with highly significant p value (0.01). 2 patients showed Unsuccessful responses with non-significant p value. Table 3 demonstrates about the

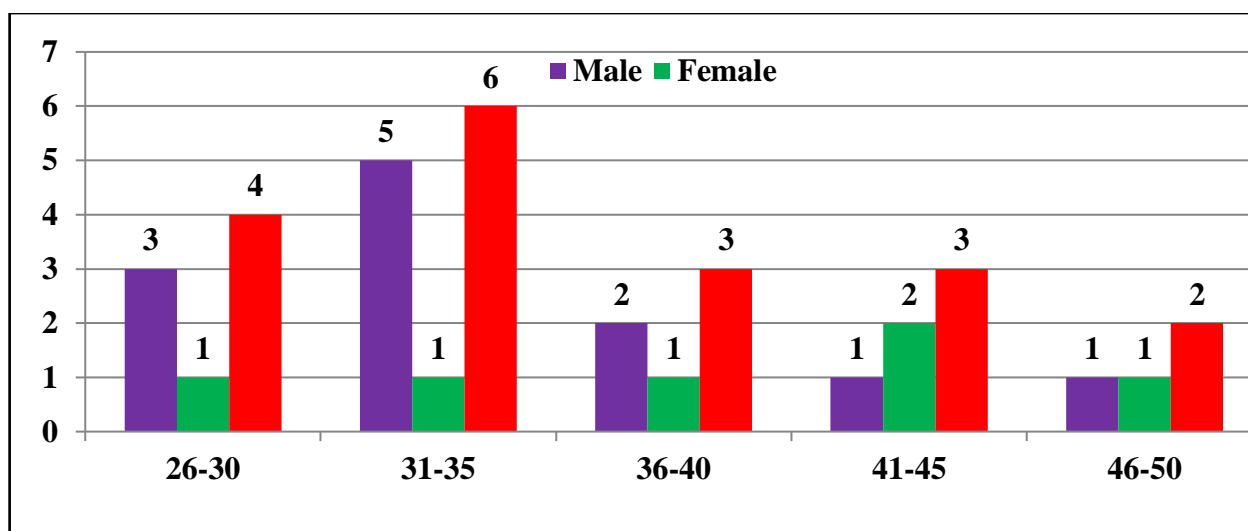
Elementary statistical explanation with level of significance evaluation using “Pearson Chi-Square” test (Group 2 for Eucare Sybograp Sterile Synthetic Hydroxyapatite Bone Graft, n=9), Noted as successful and unsuccessful in 5 months post-operative timings. Total 6 patients showed successful outcomes with highly significant p value (0.02). 3 patients showed Unsuccessful responses with non-significant p value. Table 4 shows about the assessment amongst all studied patients/groups using one-way ANOVA [Group 1= B-Ostin HT Series Bone Graft, Group 2= Eucare Sybograp Sterile Synthetic Hydroxyapatite Bone Graft]. The level of significance calculated for between the groups was highly significant (0.001).

**Table 1:** Age & gender based statistical description of contributing patients

Age Group (Yrs)	Male	Female	Total	P value
26-30	3	1	4	0.01*
31-35	5	1	6	0.20
36-40	2	1	3	0.50
41-45	1	2	3	0.10
46-50	1	1	2	0.80
Total	12	6	18	*Significant

**\*p<0.05 Significant**

**Graph 1:** Patients demographic allocations and associated details





**Table 2:** Elementary statistical explanation with level of significance evaluation using “Pearson Chi-Square” test (Group 1 for B-Ostin HT Series, n=9), Noted as successful and unsuccessful in 5 months post-operative timings

Status	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Chi-Square Value	df	p value
Successful	7	1.83	0.019	0.055	1.96	1.281	1.0	0.01*
Unsuccessful	2	1.22	0.541	0.128	1.12	1.942	2.0	0.08
<b>*p&lt;0.05 significant</b>								

**Table 3:** Elementary statistical explanation with level of significance evaluation using “Pearson Chi-Square” test (Group 2 for Eucare Sybograp Sterile Synthetic Hydroxyapatite Bone Graft, n=9), Noted as successful and unsuccessful in 5 months post-operative timings

Status	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Chi-Square Value	df	p value
Successful	6	1.63	0.094	0.055	1.23	1.049	1.0	0.02*
Unsuccessful	3	1.31	0.364	0.128	1.94	1.237	2.0	0.92
<b>*p&lt;0.05 significant</b>								

**Table 4:** Assessment amongst all studied questions using one-way ANOVA [Group 1= B-Ostin HT Series Bone Graft, Group 2= Eucare Sybograp Sterile Synthetic Hydroxyapatite Bone Graft]

Variables	Degree of Freedom	Sum of Squares $\Sigma$	Mean Sum of Squares $m\Sigma$	F	Level of Sig. (p)
Between Groups	2	1.498	1.382	1.2	0.001*
Within Groups	13	2.033	0.202		-
Cumulative	112.13	7.744			<b>*p&lt;0.05 significant</b>

## Discussion

Implant surgery is not similar in both of the jaws and it solely depends upon the availability of alveolar bone. Not only availability/quantity but quality of the underlying bone also plays a key role.<sup>8,9</sup> Compact bone is always thought of good option as compared to porous bone. Defects in mandible can only be managed by inserting bone grafts however in maxilla; sinus lift is also important.<sup>10,11,12</sup> Maxillary sinus lift can be done in direct and indirect ways. Bone grafts have been

comprehensively studied since years by several investigators.<sup>13,14,15</sup> Literature has well evidenced that bone graft materials are highly popular amongst surgeons for clinical management of most of the alveolar deficiencies.<sup>16,17,18</sup> All the bony insufficiencies of upper and lower jaws are also indicated for bony restorations by means of bone graft materials.<sup>19,20</sup> Lee and other stated about the osteogenesis and osseointegration processes after the implant placement with maxillary sinus augmentation using collagenase block types of deproteinized porcine bone. They also



highlighted the imperative role of bone grafts in managing deficient maxilla.<sup>21</sup> Valentini and other researchers have discussed about the sinus grafting with anorganic bovine bone. Their results were highly predictable and clinically applicable too.<sup>22</sup> Tawil and colleagues experimented about the sinus floor elevation using a bovine bone mineral (Bio-Oss) with or without the concomitant use of a bilayered collagen barrier (Bio-Gide). They showed that Bio-Oss was a superior option for closing the bony defects.<sup>23</sup> Hatano and other coworkers have checked the changes in graft height after maxillary sinus floor augmentation with autogenous bone/xenograft mixture. They also confirmed the significant role of bone grafts similar to our study's results.<sup>24</sup> Kim and McCarthy also studied sinus augmentation bone grafts for the provision of dental implants and presented similar outcomes.<sup>25,26</sup>

### Conclusion

Within the limitations of the study, authors concluded highly imperative clinical outcomes about the studied bone grafts. Both of the experimented graft materials were clinically acceptable however number of successful cases were higher with B-Ostin HT grafts as compared with Eucare Sybograf Sterile Synthetic Hydroxyapatite Bone Graft. Additionally, B-Ostin HT grafts were found to be more biocompatible and less allergic. However, this cannot be utilized in all indicated scenarios. Infection of the maxillary sinus can be unavoidably seen in both grafts if mishandled for sterilization procedure. Results and recommendations of this study should be clinically correlated before applying. Authors also expect some other long term future studies so as to set up other noteworthy norms in these perspectives.

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