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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/19572
DOI URL: http://dx.doi.org/10.21474/IJAR01/19572

RESEARCH ARTICLE

COMPARATIVE EVALUATION OF AUTOGENOUS BONE GRAFT VS OTHER BONE GRAFT FOR PERIODONTAL REGENERATION OF INTRABONY DEFECTS IN HUMAN : A SYSTEMATIC REVIEW AND META-ANALYSIS

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Manuscript Info

Manuscript History
Received: 30 July 2024
Final Accepted: 31 August 2024
Published: September 2024

Abstract

The current systematic review was conducted with a goal of evaluation and comparison of treatment of intrabony defects using autogeneous bone graft with guided tissue regeneration vs the other bone grafts. Chronic periodontitis is an inflammatory disease in which a progressive interaction between pathogenic micro-organisms and host immune system leads to destruction of tooth supporting tissues.

Introduction:-

Periodontitis is a multifactorial, chronic, infective disease of the periodontal tissues that affect human populations worldwide, characterized by an inflammatory response of the periodontal tissues to periodontal pathogenic bacteria1. Risk factors are poor oral hygiene, diabetes, smoking, genetic predisposition, and lack of dental visits. Periodontitis is characterized by periodontal breakdown with apical migration of the junctional epithelium, clinical attachment loss and bone loss that can induce horizontal and/or vertical bone defect formation. Vertical intrabony defects, can be treated by regenerative surgical procedures able to regenerate the lost tissues.

Other names for intrabony defects are infrabony, angular, vertical, intra alveolar, intraosseous defects. Intrabony defects are defined as, “The defects that occur in an oblique direction, leaving a hollowed-out trough in the bone alongside the root; the base of the defect is located apical to the surrounding bone.”16

Fig 1: Intrabony defect on distal aspect of first molar

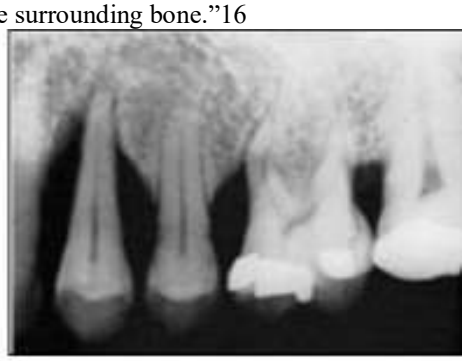

Fig 2: Intrabony defects at different levels

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Goldman and Cohen 17 gave the classification of intrabony defects based on presence of residual osseous walls as follows:

1. wall defect: Presence of one bony wall
2. wall defect: Presence of two bony walls
3. wall defect: Presence of three bony walls

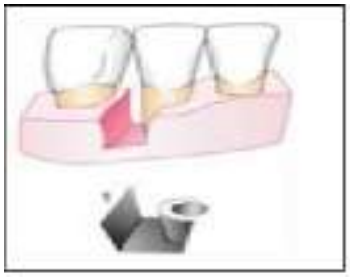


Fig 3: 1 wall defect

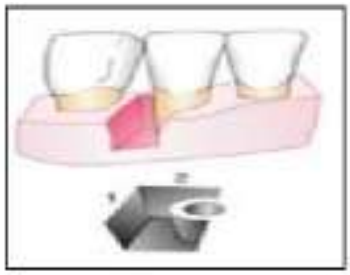


Fig 4: 2 wall defect

Fig 5: 3 wall defect

Combined osseous defect:

This term is used when the number of osseous walls are greater in apical portion than in occlusal portion of the defect.

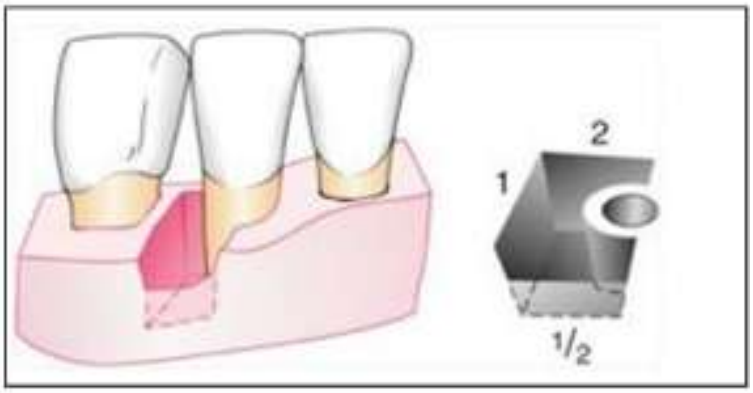


Fig 6: Combined osseous defect

Circumferential osseus defect:

A vertical defect that includes more than one surface of a tooth, is called circumferential osseous defect.

Fig 7: Circumferential osseous defect

Intra-bony defects are a result of apical spread of plaque during the course of attachment loss 18. So treatment of intra-bony defects is an important part of periodontal therapy that will convert these kind of defects into easily maintainable shallow pockets.19

After the motivation for maintenance of oral hygiene and non-surgical therapy, which represent the initial therapy in the treatment of periodontitis , a re-evaluation of the patient's condition to verify the reduction of periodontal inflammation and to plan, if necessary, a surgical approach is mandatory. The aim of the regenerative treatment of the periodontal intrabony defects is to obtain a new periodontal attachment with new cementum, periodontal ligament, and alveolar bone.2

The ideal outcome of periodontal therapy is regeneration of lost periodontal tissues following periodontal disease. It is concerned intimately with regeneration of alveolar process.14 The aim of periodontal regeneration is to obtain: (1) An increase in the periodontal attachment and bone of a severely compromised tooth.(2) Decrease in pocket depth and (3) No or minimal increase in gingival recession. For the past few decades, periodontist have taken interest in bone replacement grafts. The evolution of bone graft from basic science concept, to clinical applications has opened up a window to the regeneration therapy.14

Periodontal regeneration has been shown to be effective in the treatment of one,two, and three wall intrabony defects, or combinations ,from very deep to very shallow, and from very wide to very narrow defects.15

Intrabony defects represent a major challenge for the clinician. These defects often require access flap surgery alone or in association with bone resective techniques.3 Periodontal regeneration is defined as the reconstruction of the damaged periodontium as evidenced histologically by the formation of new cementum, periodontal ligament, and alveolar bone to a previously diseased root surface4 Several clinical procedures have been used to treat the intrabony defect so far, this includes bone grafts5,6 ,guided tissue regeneration (GTR)7,8, application of growth factors9, application of enamel matrix derivatives10, or combinations of these procedures.

It is proposed that new bone formation (up to 30% bone fill) regularly occurs in surgically treated intrabony defects. Studies indicate that additional use of bone grafts results in greater levels of bony fill to a maximum of 60–70%. The extent of gain in new attachment is very variable with bone grafts, but autogenous bone graft (ABG) has been used with success for some years11.Autogenous bone is the most biocompatible graft biomaterial, and avoids the risk of immunologic reaction or disease transmission. It has an osteoconductive effect, providing a scaffold for osteoblasts to produce new bone and may also have an osteogenic effect promoting the proliferation and differentiation of osteoprogenitor cells.12,13

So, the purpose of this study is to compare and evaluate autogenous bone graft with other bone graft for periodontal regeneration of intrabony defects in humans.

Rationale

In the treatment of intrabony defects of teeth after removal of infection and granulation tissue regeneration of bone is the most important thing. Different authors suggested different bone grafting materials. Autogeneous bone is the commonly used bone graft material and plays an important role in the domain of regenerative surgeries. In literature a lot of research has been done on autogeneous bone graft in regenerative surgeries but there are less research specifically on intrabony defect alone by using various regenerative bone grafts and comparing them with autogeneous bone alone. In the field of evidence-based dentistry, systematic reviews are very important as it can search and assess best available evidences. This systematic review focuses on RCTs carried out between autogeneous bone and other bone grafts for treatment of intrabony defects. Meta-analysis reinforces and strengthens the evidences gathered by systematic review. The present study was done to evaluate and compare the efficiency of treatment of intrabony defects using autogeneous bone compared with other bone grafts.

Aim and Objectives:-

Aim:-

The aim of this study was to evaluate and compare autogenous bone graft with other bone graft for periodontal regeneration of intrabony defects in humans by systematic review and meta-analysis.

Objectives:-

1. To evaluate the effectiveness of autogenous bone graft for the treatment of intrabony periodontal defects by systematic review and meta-analysis. 2. To compare the effectiveness of autogeneous bone graft with other bone graft for the treatment of intrabony periodontal defects by systematic review and meta-analysis.

Materials and Methods Protocol and Registration:-

The present systematic review was registered at the National Institute for Health Research PROSPERO International Prospective Register of Systematic Reviews (CRD42023417870). This research protocol is designed according to the PRISMA (Preferred Reporting Items for Systematic Review and Meta Analyses) guidelines 2009.

Eligibility Criteria

Inclusion Criteria

1) Articles including treatment of intrabony defects using autogeneous bone graft
2) Randomized controlled trials
3) Studies published in English
4) Studies published up to march 2023

Exclusion Criteria

1) Prospective or retrospective cohort studies, case-control studies, cross sectional studies, Case reports, review articles, letters to the editor, commentaries
2) Animal studies
3) Articles published in a language other than English

Search Stratergy:

1. The results of this review have been searched into databases Medline through Pubmed, Cochrane, and Google scholar upto march 2023 The advanced search strategy for the different databases, along with its findings, are summarized in the table 1

Table 1:- Electronic databases and search strategies.

Study Selection

Title and abstracts of all identified studies were screened independently by two reviewers for eligibility. All studies that met the eligibility criteria were selected for full-text reading. Full- text articles that fulfilled the eligibility criteria were included in the study and processed for data extraction, while reasons for exclusion were recorded. In all steps, lists were compared between reviewers; in case of disagreement, final decisions on inclusion or exclusion were made following discussion with third reviewer.

Data Collection Process

Data collection was performed using a customized data extraction form Data Extraction form contents: 1. 2. 3. 4. 5. 6. 7. 8. 9. Author's Name Duration of the study Year of publication Country of study Study design Type of RCT Study population Method of randomization used (if any) Characteristics of participants (Age, Sex, Smoking history) 10. Treatment groups 11. Clinical attachment level gain 12. Pocket probing depth reduction 13. Intrabony defect depth reduction

Risk of Bias In Individual Studies

Table 2:- A Revised Cochrane Risk of Bias Tool for Randomized Controlled Trials15.

DATABASE	SEARCH STRATEGY	FINDINGS
PUBMED	#1 (intrabony defect[Title/Abstract]) OR (infrabony defect[Title/Abstract])) OR (intra bony defect[Title/Abstract])) OR (infra bony defect[Title/Abstract])) OR (regenerative periodontal therapy[Title/Abstract])) OR (periodontal regeneration[Title/Abstract])) OR (periodontal pocket surgery[Title/Abstract])) OR (surgical flap[Title/Abstract])	2669 800064

	#2 (autogenous bone[Title/Abstract]) OR (autologous bone[Title/Abstract])) OR (bone graft[Title/Abstract])) OR (bone[Title/Abstract]) #3 (xenograft[Title/Abstract]) OR (bovine xenograft[Title/Abstract])) OR (enamel matrix derivative[Title/Abstract])) OR (demineralised freeze dried bone allograft[Title/Abstract])) OR (Bio Oss[Title/Abstract])) OR (hydroxyapatite[Title/Abstract])) OR (alloplast[Title/Abstract])) OR (freeze dried bone allograft[Title/Abstract]) **(#1) AND (#2) AND (#3)**	8889 319
Cochrane	#1 Intrabony or Infrabony or intrabony defect or infrabony defect or regenerative periodontal therapy or periodontal regeneration or periodontal pocket surgery or surgical flap #2 Autogeneous bone or autologous bone or bone graft or bone #3 Xenograft or enamel matrix derivative or demineralized freeze dried bone allograft or bio-oss 0r freze dried bone allograft #4 #1 AND #2 AND #3	975 6478 1816 240
Google scholar	Intrabony defect, infrabony defect, regenerative periodontal treatment, autogenous bone graft, autologous bone graft, autogeneous bones	34

Table 3:- Reaching risk-of-bias judgements for bias due to deviations from intended intervention (effect of assignment to intervention).

	Part 1: criteria for questions 2.1 to 2.5	**Part 2: criteria for questions 2.6 and 2.7**	**Criteria for the domain**
Low risk of bias	(i) Participants and people delivering the interventions were unaware of intervention groups during the trial OR (ii.1) Participants, carers or people delivering the interventions were aware of intervention groups during the trial AND (ii.2) No deviations frosm intended intervention arose because of the trial context.	An appropriate analysis was used to estimate the effect of assignment to intervention	'Low' risk of bias for Part 1 AND 'Low' risk of bias for Part 2
Some concerns	(i) Participants or people delivering the interventions were aware of intervention groups during the trial AND (ii.1) There is no information on whether there were deviations fromintended intervention because of the trial context OR (ii.1.1)	(i) An appropriate analysis was not used to estimate the effect of assignment to intervention AND (ii) The potential impact (on the estimated effect of intervention) of the failure to analyse participants in the group to which they were	''Some concerns' for Part 1 OR ''Some concerns' for Part 2 AND Part 1 not 'High' risk of bias ANDPart 2 not 'High' risk of bias

	There were deviations from intended interventions that arose because of the trial context AND (ii.1.1.1) These deviations were not likely to have affected the outcome OR (ii.1.1.2) These deviations were balanced between the intervention groups	randomized was not substantial	
High risk of bias	(i) Participants or people delivering the interventions were aware of intervention groups during the trial AND (ii) There were deviations from intended interventions that arose because of the trial context AND (iii) These deviations were likely to have affected the outcome AND (iv) These deviations were unbalanced between the intervention groups	(i) An appropriate analysis was not used to estimate the effect of assignment to intervention AND (ii) The potential impact (on the estimated effect of intervention) of the failure to analyse participants in the group to which they were randomized was substantial	High' risk of bias for Part 1 OR 'High' risk of bias for Part 2

Table 4:- Reaching risk-of-bias judgements for bias due to deviations from intended interventions (effect of adhering to intervention).

Low risk of bias	**(i.1) Participants and people delivering the interventions were unaware of intervention groups during the trial OR (i.2.1) Participants, carers or people delivering the interventions were aware of intervention groups AND (i.2.2) [If applicable] The important non-protocol interventions were balanced across intervention groups AND (ii) [If applicable] Failures in implementing the intervention could not have affected the outcome AND (iii) [If applicable] Study participants adhered to the assigned intervention regimen**
Some concerns	**(i.1.1) Participants and people delivering the interventions were unaware of intervention groups during the trial AND (i.1.2.1) [If applicable] Failures in implementing the intervention could have affected the outcome OR (i.1.2.2) [If applicable] Study participants did not adhere to the assigned intervention regimen OR (i.2.1) Participants, carers or people delivering the interventions were aware of intervention groups AND (i.2.2) [If applicable] The important non-protocol**

	interventions were balanced across intervention groups AND (i.2.3.1) [If applicable] Failures in implementing the intervention could have affected the outcome OR (i.2.3.2) [If applicable] Study participants did not adhere to the assigned intervention regimen OR (i.3.1) Participants or people delivering the interventions were aware of intervention groups AND (i.3.2) [If applicable] The important non-protocol interventions were not balanced across intervention groups AND (ii) An appropriate analysis was used to estimate the effect of adhering to intervention
High risk of bias	**(i.1.1) Participants and people delivering the interventions were unaware of intervention groups during the trial AND (i.1.2.1) [If applicable] Failures in implementing the intervention could have affected the outcome OR (i.1.2.2) [If applicable] Study participants did not adhere to the assigned intervention regimen OR (i.2.1) Participants or people delivering the interventions were aware of intervention groups AND (i.2.2) [If applicable] The important non-protocol interventions were balanced across intervention groups AND (i.2.3.1) [If applicable] Failures in implementing the intervention could have affected the outcome OR (i.2.3.2) [If applicable] Study participants did not adhere to the assigned intervention regimen OR (i.3.1) Participants or people delivering the interventions were aware of intervention groups AND (i.3.2) [If applicable] The important non-protocol interventions were not balanced across intervention groups AND (ii) An appropriate analysis was not used to estimate the effect of adhering to intervention**

Table 5:- Reaching risk-of-bias judgements for bias due to missing outcome data.

Low risk of bias	**(i) Outcome data were available for all, or nearly all, randomized participants OR (ii) There is evidence that the result was not biased by missing outcome data**

	OR **(iii) Missingness in the outcome could not depend on its true value**
Some concerns	**(i) Outcome data were not available for all, or nearly all, randomized participants** **AND** **(ii) There is not evidence that the result was not biased by missing outcome data** **AND** **(iii) Missingness in the outcome could depend on its true value** **AND** **(iv) It is not likely that missingness in the outcome depended on its true value**
High risk of bias	**(i) Outcome data were not available for all, or nearly all, randomized participants** **AND** **(ii) There is not evidence that the result was not biased by missing outcome data** **AND** **(iii) Missingness in the outcome could depend on its true value** **AND** **(iv) It is likely that missingness in the outcome depended on its true value.**

Table 6:- Reaching risk-of-bias judgements for bias in measurement of the outcome.

Low risk of bias	**(i) The method of measuring the outcome was not inappropriate** **AND** **(ii) The measurement or ascertainment of the outcome did not differ between intervention groups** **AND** **(iii.1) The outcome assessors were unaware of the intervention received by study participants** **OR** **(iii.2) The assessment of the outcome could not have been influenced by knowledge of the intervention received**
Some concerns	**(i.1) The method of measuring the outcome was not inappropriate** **AND** **(i.2) The measurement or ascertainment of the outcome did not differ between intervention groups** **AND** **(i.3) The assessment of the outcome could have been influenced by knowledge of the intervention received** **AND** **(i.4) It is unlikely that assessment of the outcome was influenced by knowledge of intervention received** **OR(ii.1) The method of measuring the outcome was not inappropriate** **AND** **(ii.2) There is no information on whether the measurement or ascertainment of the outcome could have differed between intervention groups** **AND** **(ii.3.1) The outcome assessors were unaware of the intervention received by study participants** **OR**

	(ii.3.2) The assessment of the outcome could not have been influenced by knowledge of the intervention received
High risk of bias	**(i) The method of measuring the outcome was inappropriate OR (ii) The measurement or ascertainment of the outcome could have differed between intervention groups OR (iii) It is likely that assessment of the outcome was influenced by knowledge of the intervention received**

Table 7:- Reaching risk-of-bias judgements for bias in selection of the reported result.

Low risk of bias	**(i) The data were analysed in accordance with a pre specified plan that was finalised before unblinded outcome data were available for analysis AND (ii) The result being assessed is unlikely to have been selected, on the basis of the results, from multiple eligible outcome measurements (e.g. scales, definitions, time points) within the outcome domain AND (iii) Reported outcome data are unlikely to have been selected, on the basis of the results from multiple eligible analyses of the data**
Some concerns	**(i.1) The data were not analysed in accordance with a pre-specified plan that was finalised before unblinded outcome data were available for analysis AND (i.2) The result being assessed is unlikely to have been selected, on the basis of the results, from multiple eligible outcome measurements (e.g. scales, definitions, time points) within the outcome domain AND (i.3) The result being assessed is unlikely to have been selected, on the basis of the results, from multiple eligible analyses of the data OR (ii) There is no information on whether the result being assessed is likely to have been selected, on the basis of the results, from multiple eligible outcome measurements (e.g. scales, definitions, time points) within the outcome domain AND from multiple eligible analyses of the data**
High risk of bias	**i) The result being assessed is likely to have been selected, on the basis of the results, from multiple eligible outcome measurements (e.g. scales, definitions, time points) within the outcome domain OR (ii) The result being assessed is likely to have been selected, on the basis of the results from multiple eligible analyses of the data**

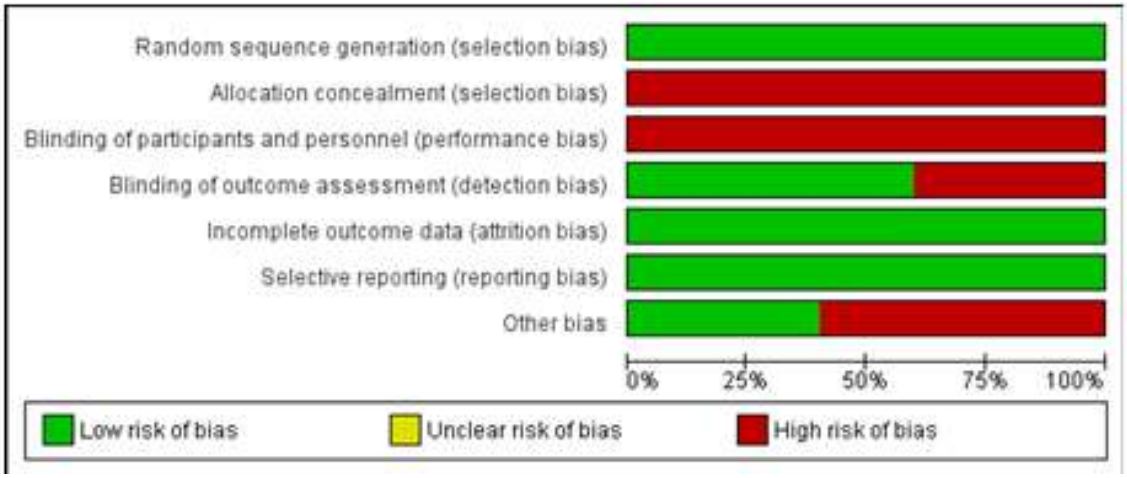
Table 8:- Overall risk of bias-judgement.

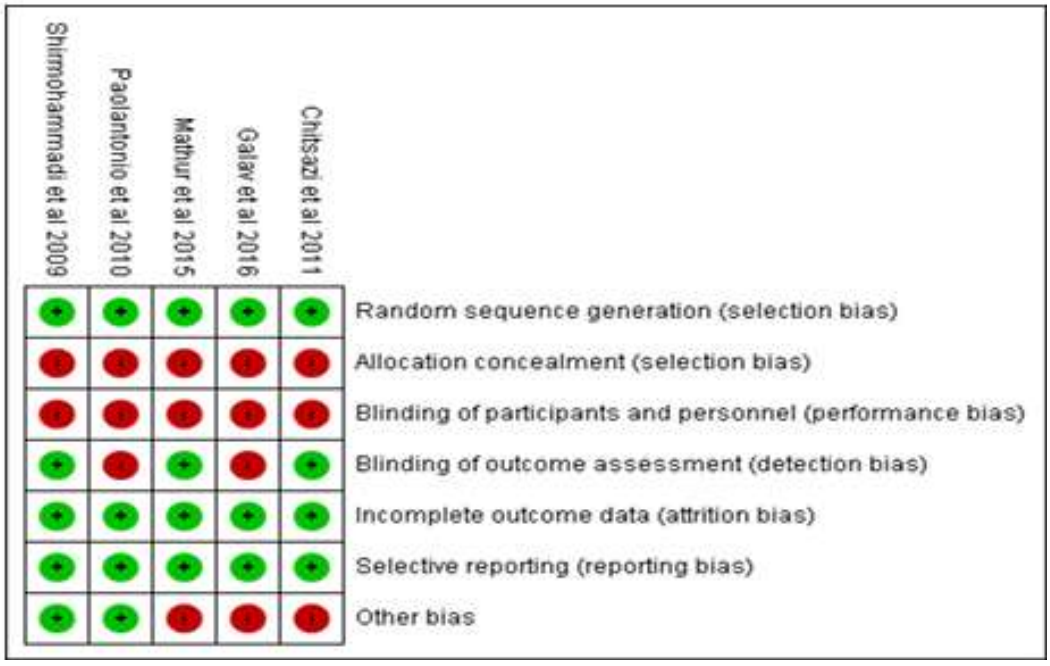
Overall judgement risk of bias	**Criteria**
Low risk of bias	**The study is judged to be at low risk of bias for all**

	domains for this result.
Some concerns	**The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.**
High risk of bias	**The study is judged to be at high risk of bias in at least one domain for this result. Or The study is judged to have some concerns for multiple domains in a way that substantially lowers confidence in the result.**

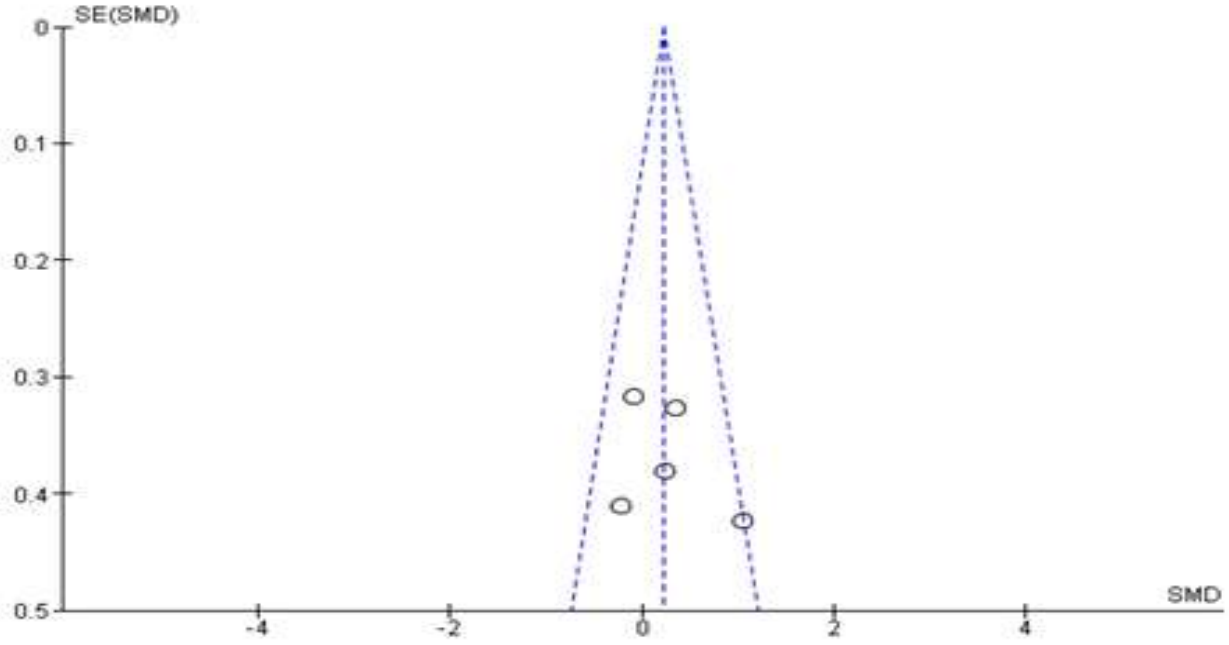
Risk of Bias Assessment in randomized controlled trial:

To determine the validity of the included RCTs, a tool developed by the Cochrane Collaboration was used to assess the risk of bias in clinical trials. Using this tool, the reviewer evaluated the risk of bias of the selected studies using the following parameters: random sequence generation, allocation concealment, blinding of participants and personnel, analysis intention (blinding of outcome assessment), incomplete outcome data, selective reporting (selection of the reported results), and other types of bias not considered previously (e.g., design bias, contamination bias). The methodological quality of each study was classified as low, high, or unclear risk.





Random sequence generation was reported adequately in all the studies assessed and was categorized as low risk; however, none of the studies had reported allocation concealment and hence was categorized as high risk. Blinding of the examiner (surgeon) and patients was not reported as it was not possible to blind them due to the nature of the intervention. Blinding of outcome assessment was reported in three out of five studies; hence, it was categorized as a moderate risk. All the studies were complete in terms of follow-up and no drop outs occurred. All the results were reported adequately. Other unspecified types of bias were also considered as associated with the lack of information on sample size estimation and examiner calibration. Three studies did not mention the sample size estimation and two studies did not mention the examiner calibration. Publication bias was assessed using funnel plot that showed a symmetrical plot indicating less possibility of publication bias and heterogenicity



Funnel plot – Publication bias

Results:-

Synthesis Of Results

A narrative synthesis was provided for the findings from the included studies, focusing on intervention details , characteristics of participants (age, gender,), inclusion criteria, exclusion criteria, study designs, method of randomization, outcome and summaries of intervention effects for studies were provided by calculating risk ratio (for dichotomous outcomes) or standardized mean difference (for continuous outcomes). Heterogeneity of previously mentioned characteristics was assessed using chi square test (significance 0.1) and I2 statistics. If high level of heterogeneity exits (I^2=50% or $p \leq 0.1$ the characteristics of the included trials will be analysed and sources of heterogeneity might be explained by subgroup analysis or sensitivity analysis.

- Literature search and study selection: Database and hand searches of the reference list yielded 1896 articles. After duplicate removal , 593 articles were obtained. After screening title and abstract of articles, 581 studies were excluded .Out of remaining 12 studies, the study of 5 full-text articles were included.

Types Of Intervention For RCT

1- A clinical study for Comparison of Autogeneous bone graft with and without Periodontal ligament grafts in periodontal intrabony defects ;Adileh Shirmohammadi et al (2008); Autogeneous bone graft and Periodontal ligament grafts were compared.
2- A Comparison of Autogeneous bone graft with Autogeneous periosteal barrier membranes in periodontal intrabony defects; Michele Paolantonio et al (2010); Autogeneous bone graft and Periosteal barrier membranes were compared.

3- A clinical comparison of Autogenous bone graft and nano-crystalline hydroxyapatite (Ostim) Autogenous bone graft in periodontal intrabony defects ; Mohammad-Taghi Chitsazi et al (2011); Autogeneous bone graft and nano-crystalline hydroxyapatite (Ostim) were compared.
4- A clinical study for comparison of autogeneous bone graft and platlet rich fibrin in periodontal intrabony defects ;Ashish Mathur et al (2015); Autogeneous bone graft and platlet rich fibrin were compared.
5- A clinical study for comparison of autogeneous bone graft and platlet rich fibrin in periodontal intrabony defects; Sneha Galav et al (2016); Autogeneous bone graft and platlet rich fibrin were compared.

Prisma flow diagram

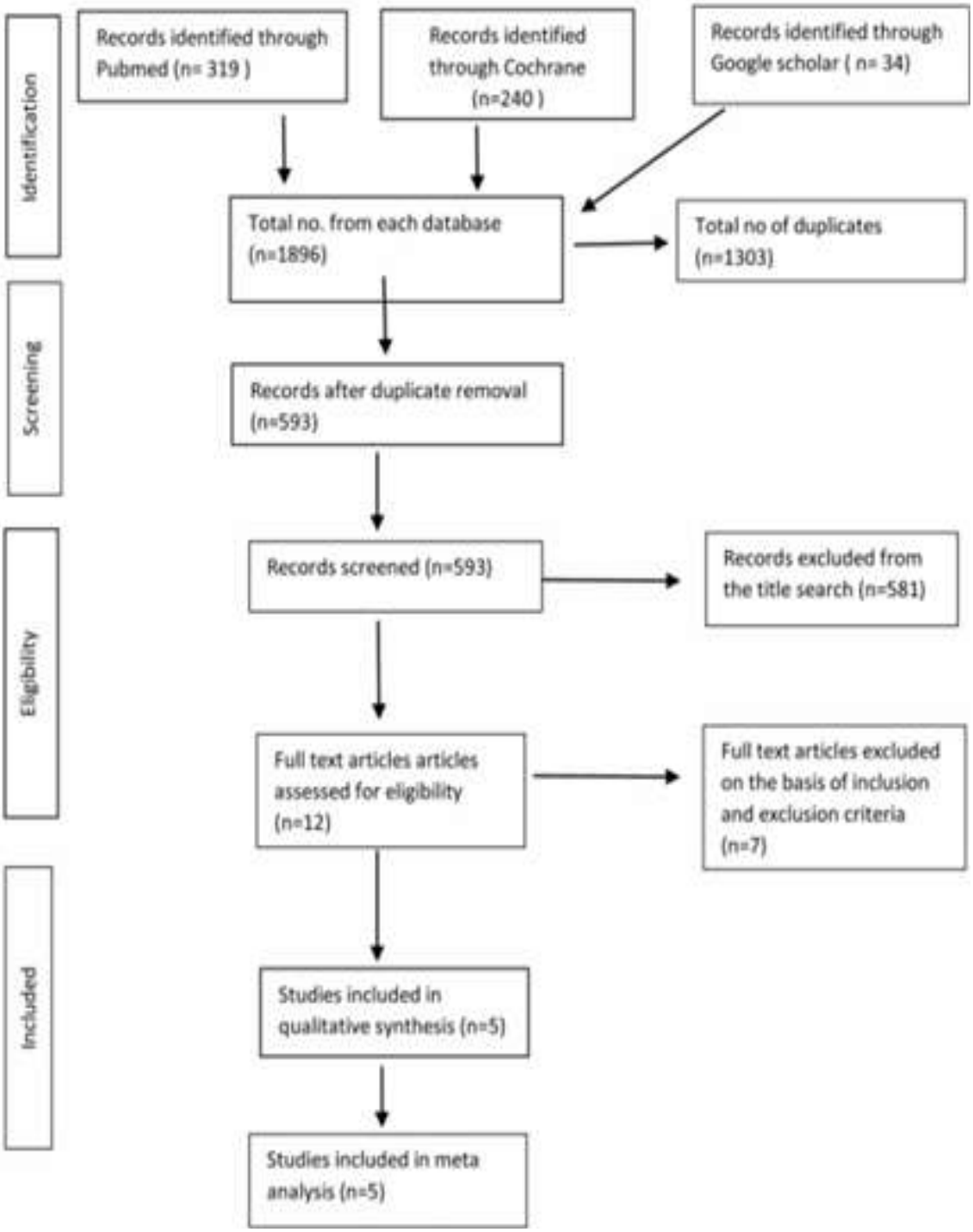


Table – 9 Characteristics of included studies

Sr no	Authors Name	Duration of study	Year of publication	Country	Study design	Type of RCT	Study Population
1	Adileh Shirmohammadi et al	6 Months	2008	Iran	RCT	Split mouth	Two-wall intrabony periodontal defects with ≥5 mm probing depths and ≥3 mm depths of intrabony component
2	Michele Paolantonio et al	1 year	2010	Italy	RCT	Not specified	One deep intrabony defect (≥ 6mm)
3	Mohammad-Taghi Chitsazi et al	6 Months	2011	Iran	RCT	Split mouth	Two and three wall intrabony periodontal defects with ≥5 mm probing depths and ≥3 mm depths of intrabony component
4	Ashish Mathur et al	6 Months	2015	India	RCT	Not specified	At least one IBD with probing pocket depth (PPD) ≥5 mm Radiographic defect on intraoral periapical radiographs (IOPA) of ≥3 mm and predominantly three wall interproximal IBD
5	Sneha Galav et al	9 Months	2016	India	RCT	Not Specified	3-wall IBD≥ 3 mm deep (the distance between alveolar crest and base of the defect on an intraoral periapical radiograph [IOPA]) along with interproximal probing depth (PD) ≥5 mm

Table 10- Results of intervention and conclusion

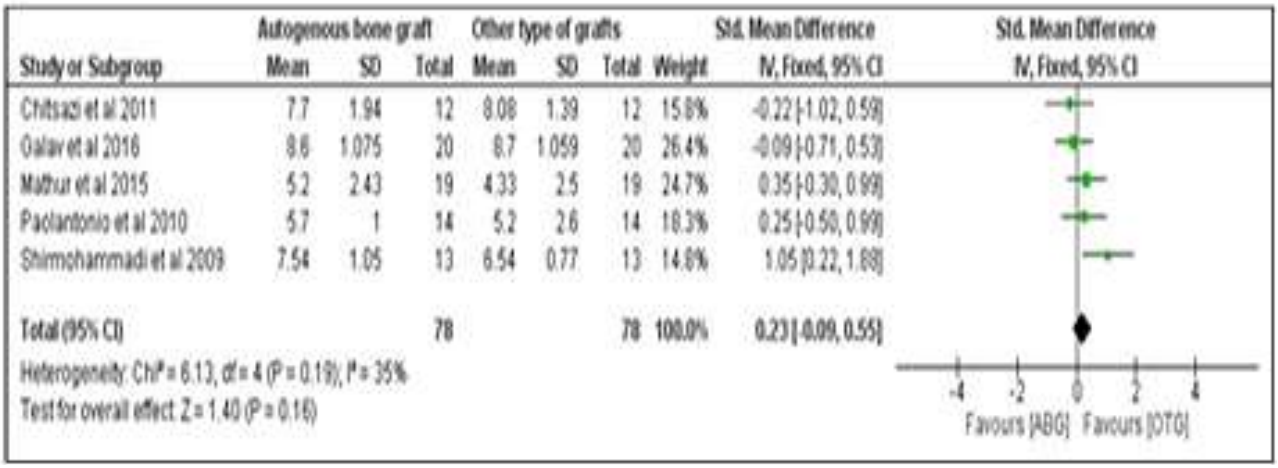
Sr no	Authors Name	Year of publication	Conclusion
1	Adileh Shirmohammadi et al	2008	Both Groups showed statistically significant improvements in soft and hard tissue parameters after 6 months. However, the between-group differences after 6 months were not statistically significant with regard to soft and hard tissue measurements except CAL gain. In the (ABG+PDL GRAFT) group, it was significantly higher than the ABG group (3.69 and 2 mm, respectively; P=0.03). Both treatments resulted in marked clinical improvement, but combined treatment seemed to enhance the results in the treatment of two-wall intrabony defects
2	Michele Paolantonio et al	2010	Both the GTR and aCPRT treatments produce additional clinical benefits overOFD alone. the aCPRT technique can minimize post-surgical GR and produce better defect bone-level improvement
3	Mohammad-Taghi Chitsazi et al	2011	In between-group differences after 6 months were not statistically significant with regard to soft and hard tissue measurementsBoth treatments resulted in marked clinical improvement, and Ostim treatment seemed to be effective in the treatment of two & three-wall intrabony defects as well as autogenous bone graft
4	Ashish Mathur et al	2015	Significant probing pocket depth (PPD) reduction, clinical attachment level (CAL) gain and defect resolution at both PRF and ABG treated sites with OFD was observed. However, inter-group comparison was non-significant (P > 0.05). The use of either PRF or ABG were effective in the treatment of three wall Intra bony defects with an uneventful healing of the sites.
5	Sneha Galav et al	2016	Both PRF and ABG sites produced a significant improvement from baseline to 9 months for all the parameters. There was no significant difference between the two treatment modalities in the reduction of PPD and RAL gain at 6 months. In addition, ABG showed significantly greater RBF (30.34%) as compared to PRF (20.22%). Both ABG and PRF can be used predictably to reconstruct lost periodontal structures as indicated by PPD reduction and RAL gain. In terms of osseous defect fill, ABG yields more definitive outcome than PRF.

Meta Analysis

The meta-analyses, using random effects model, were applied with RevMan 5.4 (RevMan 5.4, The Nordic Cochrane Centre, Copenhagen). Heterogeneity was assessed by Q test and quantified with I2 statistics. Data on clinical attachment level (CAL) was obtained from selected studies. Following comparison was performed: Comparison of CAL between autogenous bone graft (ABG) and other type of grafts (OTG). For analyses, if the test showed substantial heterogeneity (I2>50%), a random effects model was applied, or else (I2 ≤50%), a fixed effects model would be used.

Comparison of CAL between autogenous bone graft (ABG) and other type of grafts (OTG):

The meta-analysis was performed on five studies that have qualified with required data outcome that could be analyzed quantitatively. The results of the overall comparison have been depicted as forest plot. With the meta-analysis conducted for selected studies, heterogeneity was less than 50% (I2 = 35%); hence, a fixed effect model was applied. There was no difference (p=0.16) in clinical attachment level of subjects treated with either autogenous bone graft (ABG) or other type of grafts (OTG), with a standardized mean difference of 0.23 (95% CI = -0.09 to 0.55; Z value = 1.40).



Sr no	Treatment Groups			Characteristic of Population		CAL		PPD	
	Control Group	Test group		Age (Mean)	sex	ABG Group	Other	ABG Group	Other
		1	2						
1	Autogenous bone graft	Periodontal ligament graft	None	33±8 years	Female-7 Male-6	B-9.54±1.33 mm 6M-7.54±1.05 mm	B-10.15±0.98 mm 6M-6.54±0.77 mm	B-6.31±1.49 mm 6M-3.46±0.66 mm	B-7.23±1.09 mm 6M-3.08±0.27 mm
2	Autogenous bone graft	Autogenous Periosteal membrane	Open flap debridement	48 ±12 years	Female-22 Male-20	B- 9.1 ± 2.7 mm 6M- 5.2 ± 2.6 mm	1- B-8.9 ± 1.3 mm 6M-5.7 ±1.0 mm 2-	B-7.3 ± 1.1 mm 6M-2.9 ± 1.2 mm	1- B-7.4 ± 0.9 mm 6M-4.4 ± 0.8 mm

							B- 8.6 ±1.0 mm 6M- 7.0 ± 1.0 mm		2- B-8.0 ± 0.9 mm 6M-2.7 ± 0.7 mm
3	Autogenous bone graft	Nano-crystalline hydroxyapatite (Ostim)	None	38 years	Not specified	B- 10.08 ±2.02 mm 6M-7.70± 1.94 mm	B-10.70 ±1.73 mm 6M-8.08± 1.39 mm	B- 7.37 ± 1.69 mm 6M- 4.00± 1.38 mm	B-6.79 ± 0.68 mm 6M-3.58± 0.63 mm
4	Autogenous bone graft	Platlet rich Fibrin	None	39.66 ± 5.72 years	Female-19 Male- 19	B- 7.87±3.38 mm 6M-5.20±2.43 mm	B- 6.87±2.75 mm 6M-4.33±2.50 mm	B-7.93±2.28 mm 6M-5.53±1.81 mm	B-7.67±2.26 mm 6M-5.00±1.25 mm
5	Autogenous bone graft	Platlet rich Fibrin	None	30-55 years	Not specified	B-13.10±1.595 mm 6M-8.60±1.075 mm	B-12.60±1.430 mm 6M-8.70±1.059 mm	B-7.40±1.578 mm 6M-2.60±0.843 mm	B-7.30±1.767 mm 6M-3.20±0.919 mm

Discussion:-

The current systematic review was conducted with a goal of evaluation and comparison of treatment of intrabony defects using autogeneous bone graft with guided tissue regeneration vs the other bone grafts. Chronic periodontitis is an inflammatory disease in which a progressive interaction between pathogenic micro-organisms and host immune system leads to destruction of tooth supporting tissues [22].

Vertical intrabony defects, also known as angular defects, can be treated by surgical procedures able to regenerate the lost tissues .After the motivation to oral hygiene and non-surgical therapy which represent the starting point in periodontitis treatment, a re-evaluation of the patient's condition to verify the reduction of periodontal inflammation and to plan, if necessary, a surgical approach is mandatory. The aim of the regenerative treatment of the periodontal intrabony defects is to obtain a new periodontal attachment with new cementum, periodontal ligament, and alveolar bone [23] Guided tissue regeneration (GTR) is based on the placement of non resorbable or bio-resorbable membranes in order to create a barrier effect protecting against epithelial and connective apical migration. Furthermore, these membranes provide a tent effect in order to maintain the space between the bone and the root surface and to enable repopulation of periodontal ligament, cementum, and alveolar bone [24]

The advantages of the autogenous bone graft is there ability to be used as block or particulate, as well as its osteoconductive, osteoinductive and osteogenic potential. Conversely, limitations of the autogenous bone graft is its unpredictable resorption and the increased morbidity due to the donor site[25, 26] Adileh Shirmohammadi et al (2009) – Conducted study to evaluate the efficacy of autogenous bone graft (ABG) with and without autogenous periodontal ligament graft (PDLG) in the management of human two-wall intrabony periodontal defects . They Studied the primary outcomes such as changes in clinical probing depth (CPD) and clinical attachment level (CAL). Groups showed statistically significant improvements in soft and hard tissue parameters after 6 months. However, the between-group differences after 6 months were not statistically significant with regard to soft and hard tissue measurements except CAL gain. In the combined group, it was significantly higher than the ABG group (3.69 and 2

mm, respectively; P=0.03). Within the limits of this study, both treatments resulted in marked clinical improvement, but combined treatment seemed to enhance the results in the treatment of two-wall intrabony defects. Michele Paolantonio et al (2010) - Studied treatment by autogenous periosteal membranes and bone graft versus guided tissue regeneration (GTR) with collagen membranes or open-flap debridement (OFD) only in the treatment of intraosseous defect .The study concluded After 1 year, all of the evaluated clinical parameters showed statistically significant changes from baseline within each group (PD)reductions (5.2 and 4.4 mm, respectively) and CAL gain (3.2 and 3.9 mm) and DBL gain (2.4 and 3.1 mm) compared to the OFD group (PD, 2.9 mm; CAL, 1.6 mm; DBL, 1.5 mm); moreover, the aCPRT group showed a significantly smaller GR increase (0.5 mm) and a greater DBL gain (3.1 mm) compared to the GTR group (2 and 2.4 mm, respectively; P 0.05). The bivariate correlation results revealed that any of thetwo radiographic techniques (IOPA and OPG) can be used for analysis of the regenerative therapy in IBDs. Sneha Galav et al (2016)- Studied intraoral autogenous bone grafting (ABG) and platelet-rich fibrin (PRF) offer a useful treatment modality for periodontal regeneration of intrabony defects (IBDs). Both PRF and ABG sites produced a significant improvement from baseline to 9 months for all the parameters. However, there was no significant difference between the two treatment modalities in the reduction of PPD and RAL gain at 9 months. In addition, ABG showed significantly greater RBF (30.34%) as compared to PRF (20.22%). Similar findings were supported by surgical reentry, where a surgical reentry of 65.31% at ABG sites and 43.64% at PRF sites was seen.

Conclusion:-

Based on the findings of systematic review following conclusions were drawn:

1) Autogeneous bone causes more CAL level gain than BIO OSS alone for the treatment of intrabony defects.

2) Autogeneous bone causes more pocket probing depth reduction than autogeneous bone with barrier membrane alone for the treatment of intrabony defect.

3) Autogenous bone and PRF causes clinical attachment level gain than autogeneous bone alone for the treatment of intrabony defect. Within the limitations of this systematic review autogeneous bone is more effective treatment intrabony defect in respect to clinical attachment loss.

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