Keywords
Alveolar Ridge Atrophy, Bone Resorption, Dental Implants, Immediate Dental Implant Loading, Intraoral Welding, Marginal Bone Loss, Maxillary Atrophy, Corticobasal Implants.

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Evaluation Of Corticobasal Implants In Atrophic Jaws: A Systematic Review

Abstract

Background: The rehabilitation of severely atrophic maxillary and mandibular ridges remains a significant challenge in implant dentistry because conventional implant placement may require bone grafting, sinus augmentation, or other invasive procedures. Corticobasal implants are designed to engage dense basal cortical bone, potentially providing high primary stability and permitting immediate functional loading. They have therefore been proposed as a graft-free and less invasive alternative for selected patients with advanced ridge resorption. However, the strength and independence of the evidence supporting these benefits have not been systematically established.

Aim: To evaluate the clinical efficacy, implant survival rates, prosthetic outcomes, patient-reported outcomes, and biological and technical complications associated with CBIs used to rehabilitate atrophic jaws.

Methodology: A systematic review was conducted in accordance with the PRISMA 2020 guidelines. PubMed, Scopus, Web of Science, the Cochrane Library, Google Scholar, ClinicalTrials.gov, and EMBASE were searched from inception to January 2024, without language restrictions at the search stage. Boolean operators and MeSH terms were combined across four concept clusters: implant design, anatomical indication, loading protocol, and clinical outcome. The research question was structured according to the PICOS framework. Of 624 records screened, six studies fulfilled the eligibility criteria. Included investigations comprised prospective clinical trials, retrospective cohort studies, and observational in vivo studies, with follow-up periods ranging from 6 to 60 months. Case reports and case series were excluded a priori to reduce the influence of brand-specific publication patterns identified during preliminary scoping. Data extraction and methodological appraisal were performed independently by three reviewers. Risk of bias was assessed using the Newcastle–Ottawa Scale and ROBINS-I, and each study was assigned an Oxford Centre for Evidence-Based Medicine level.

Results: Across the included studies, 567 patients received 8,742 CBIs, corresponding to an aggregate of 15.4 implants per patient. Immediate functional loading was used in all studies. Implant survival ranged from 90.67% to 100%, while reported marginal bone loss averaged 1.48 mm. Prosthetic complications, including veneer fractures and ceramic chipping, were uncommon. Biological complications were inadequately characterized; cortical necrosis and retrograde osteolysis were not systematically screened for or consistently reported. Patient-reported outcomes indicated high satisfaction, with oral health-related quality-of-life scores reaching 4.92/5.

Conclusion: Short- to mid-term CBI survival was high in the included studies. Nevertheless, the evidence base consisted entirely of observational research, with substantial heterogeneity and concentrated authorship among proponents of specific implant systems. Under-reporting of important biological complications further limits interpretation. CBIs should therefore be considered a selectively applicable, hypothesis-generating treatment option rather than a definitive graft-free alternative for all forms of jaw atrophy. Independent prospective comparative studies with standardized outcome reporting and longer follow-up are required.

INTRODUCTION

Dental implantology has provided innovative solutions for rehabilitation of edentulous and atrophic jaws by its significant advancements. Corticobasal implants are one amongst them that has appeared as one of several proposed alternatives to conventional implants, especially in cases of severe alveolar bone resorption where placement of traditional implants has become challenging or is contraindicated . CBIs engage the highly mineralized cortical bone, which is less susceptible to resorption and provides superior primary stability unlike conventional root-form implants that depend on trabecular bone 1. This approach may avoid extensive bone grafting or sinus augmentation in selected patients, making CBIs a potentially less invasive and more time-efficient option for rehabilitating atrophic jaws 1. However, the evidence supporting these benefits is derived predominantly from small observational cohorts, case reports, and other lower-level studies; therefore, the findings should not be interpreted as definitive evidence of superior efficacy.

CBIs should also not be regarded as the sole graft-free treatment modality. Other alternatives, including zygomatic implants for severe maxillary atrophy, may enable graft-free rehabilitation 2. Zygomatic implants are treated here as part of the broader basal-anchored implant family rather than as a competing modality, and the choice among these approaches should be individualized according to the patient's anatomy, functional requirements, surgical risks, and the strength and applicability of the available clinical evidence.

CBIs owing to their smooth surface and single-piece design may reduce the risk of peri-implantitis compared with two-piece systems 3. However, this potential advantage should not be overstated, as plaque accumulation on prosthetic components and technique-specific biological complications — among them cortical (compression) necrosis and retrograde osteolysis, described in independent reviews of basal-anchored implants 4 — can still occur. These specific biological complications have rarely been systematically captured in the primary CBI studies evaluated in this review, which represents an important reporting gap.

The efficacy of CBIs in various complicated cases is supported by clinical evidence that have demonstrated its success in maxillofacial trauma rehabilitation without bone augmentation 5. A prospective study has reported high survival rates and stable peri-implant tissues, with enhanced patient-reported outcomes in compromised ridges 3. Hence, the corticobasal implants have reported durable clinical performance in severely atrophic jaws over the short to mid term 1.

Corticobasal implants are advantageous due to their compatibility with immediate loading protocols. This helps to reduce the overall treatment time significantly and improve patient satisfaction 6. CBIs facilitate immediate functional loading, frequently with provisional prostheses delivered within 24 to 72 hours post-implantation unlike conventional implants that require extended healing periods prior to prosthetic placement 7. Intraoral welding helps to stabilize implants by joining implant abutments with a titanium bar, thus efficiently avoiding micromovements and optimizing load distribution 8. Syncrystallization further strengthens acrylic provisional restorations by including metal frameworks, thus enhancing mechanical stability during the critical healing phase 9. The immediate functional loading aims to restore masticatory function and aesthetics without compromising osseointegration 3.

Moreover, CBIs have established a positive impression on oral health-related quality of life, with some studies demonstrating significant improvements in masticatory efficiency, speech, and overall patient satisfaction 4. It has been shown that immediate restoration facilitates improved patient satisfaction, predominantly among those with severe alveolar ridge resorption 3.However, effective outcomes with CBIs depend on meticulous surgical planning and exact prosthetic design 10. Knowledge on the position of the implant and the transmission of the occlusal forces is vital for minimizing the risk of peri-implant bone loss and prosthetic complications 3. Although the available evidence on CBIs is growing, heterogeneity in study designs, implant systems, loading protocols, and outcome assessment limits the comparability and generalizability of current findings 1.Specifically, the published evidence on biological complications of CBIs is incomplete and warrants careful interpretation 11. Cortical necrosis and retrograde osteolysis from pre-existing infection at extraction sites, described in independent reviews of basal-anchored implants 4, have not been systematically documented in the primary CBI cohorts included in this review. This absence raises concerns regarding potential reporting biases, which warrant cautious interpretation 12.

The aim of this systematic review is therefore to evaluate the clinical performance, predictability, and drawbacks of corticobasal implants in the rehabilitation of atrophic jaws, with attention to the evidence hierarchy, conflict-of-interest considerations in authorship, and the under-reporting of key biological outcomes.

Methodology

Research Question

The primary research question was: "What is the clinical efficacy, implant survival rates, and complications associated with corticobasal implants in the rehabilitation of atrophic jaws?"

PICO(S) Framework

- Population (P): Patients with atrophic maxillary or mandibular ridges rehabilitated using corticobasal dental implants, including those with traumatically deficient ridges and compromised bone conditions.
- Intervention (I): Placement of corticobasal implants with immediate functional loading protocols.
- Comparison (C): Conventional dental implants, delayed loading protocols, or alternative graft-less techniques not utilizing corticobasal implant designs (zygomatic implants being treated here as part of the basal-implant family rather than a separate comparator).
- Outcomes (O): Implant survival rates, marginal bone loss, prosthetic and biological complications (including cortical necrosis and retrograde osteolysis), oral health-related quality of life, and patient satisfaction outcomes.
- Study Design (S): Prospective clinical studies, retrospective cohort studies, and observational in vivo

studies with follow-up periods ranging from 6 months to 60 months.

Search Strategy

A systematic search was conducted in accordance with PRISMA 2020 guidelines 13 across multiple electronic databases: PubMed, Scopus, Web of Science, Cochrane Library, Google Scholar, ClinicalTrials.gov, and EMBASE, up to January 2024. No language restriction was applied at the search stage; translations were obtained for non-English titles where required. The protocol was registered prospectively. Boolean operators and MeSH terms were combined across four term clusters: implant design ("corticobasal," "basal," "BCS," "BECES," "BOI," "KOS," "Strategic Implant," "disk implant," "lateral basal," "bicortical"); anatomy ("atrophic," "resorbed ridge," "atrophic maxilla," "atrophic mandible"); loading ("immediate loading," "IPIL," "early loading"); and outcome ("survival," "marginal bone loss," "complications," "biological complication," "cortical necrosis," "osteolysis," "OHRQoL"). An example PubMed strategy is provided in Appendix Table A1.

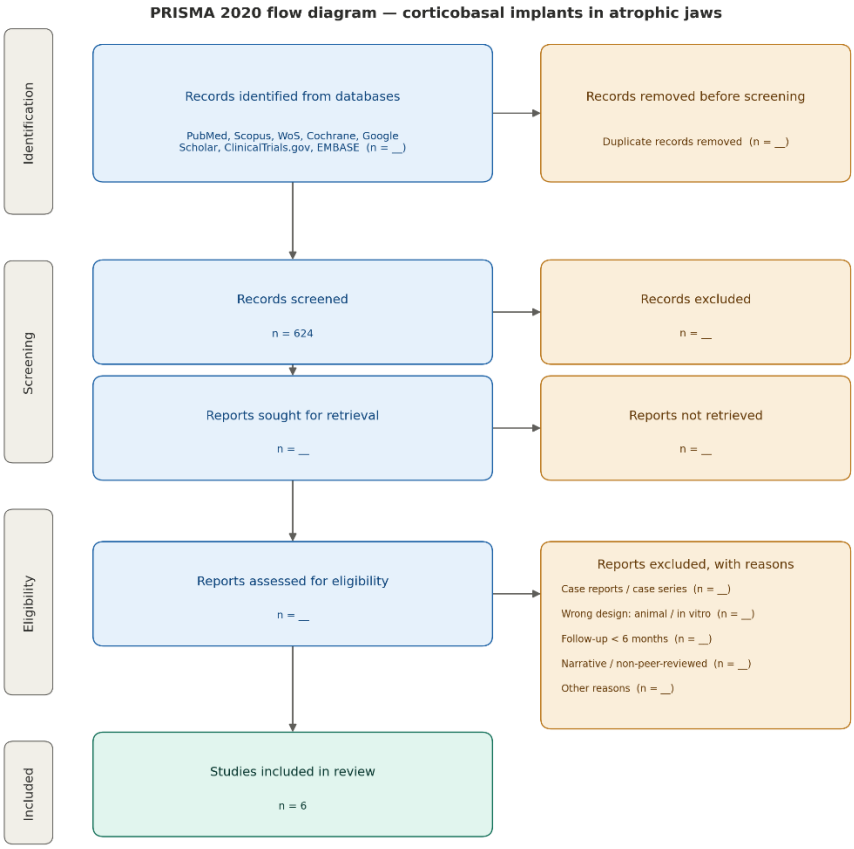

Figure1: Prisma flow chart

To mitigate brand-specific literature concentration, the database search was supplemented with: (i) reference-list screening of all included studies and key reviews; (ii) forward citation tracking via Google Scholar; (iii) hand-searching of Journal of Oral Implantology, Annals of Maxillofacial Surgery and Journal of Contemporary Dental Practice; and (iv) targeted searches for independent (non-industry-affiliated) comparative work, including the strings "zygomatic vs corticobasal," "graft-less rehabilitation comparison," and "cortical bone anchorage systematic review."

Eligibility Criteria

Inclusion: Human in vivo studies in peer-reviewed journals; cohort, trial, or observational design; follow-up ≥ 6 months; quantitative outcomes.

Exclusion: Animal, in vitro, cadaveric, narrative-review, and non-peer-reviewed work; case reports and case series (excluded a priori to mitigate the brand-specific publication pattern observed in scoping searches).

Data Extraction, Synthesis, and Quality Assessment

Six studies satisfied the inclusion criteria after 624 publications were screened. Data extraction, synthesis, and quality evaluation were carried out by three independent reviewers. Following an initial examination of the title and abstract, whole texts were evaluated. The research design, sample size, patient demographics, implant type, loading procedures, prosthetic and biological outcomes, survival rates, complications, and OHRQoL were extracted. A fourth reviewer or consensus was used to settle disagreements.

Given the absence of randomised controlled trials and heterogeneity in design, a quantitative meta-analysis was not performed. Outcomes were synthesised qualitatively. Studies emphasize that the use of welded frameworks enhances the biomechanical stability of prostheses and distributes functional loads equally 8 The effective management of mandibular

non-union fractures and marginal mandibulectomy cases using single-piece corticobasal implants validates their efficiency in intricate maxillofacial rehabilitation and immediate prosthetic loading cases 14,15 However, discrepancies in the characterization of atrophic jaws, study procedures, and loading protocols test the generality of results 16 Nevertheless, available studies indicate that CBIs offer predictable high success rates, particularly in complex cases with compromised bone conditions, severely resorbed ridges, or deficient bone structures 17,18More randomized controlled trials are required to establish standardized protocols and long-term outcomes even though existing evidence highlights their clinical efficiency 19–21

RESULTS

Table 1 summarizes six studies evaluating corticobasal and strategic implants under immediate loading protocols. 567 patients received 8,742 implants in all the studies included in the review. Sample sizes ranged from 10 to 394 patients, with follow-up periods between 6 and 60 months. All studies utilized immediate functional loading, with some reporting intraoral welding techniques. Implant types included BECES®, BECES N®, BCS®, BOI®, KOS®, and Strategic Implant®. Implant survival rates were consistently high, ranging from 97% to 100%. Marginal bone loss, peri-implant tissue stability, and soft tissue health were commonly assessed. Across studies, patient satisfaction was reported as high, with minimal prosthetic or biological complications. Marchesi et al. 29 reported 100% prosthetic survival, and Awadalkreem et al. 5 observed stable peri-implant tissues over five years. Overall, immediate loading of corticobasal implants demonstrated predictable outcomes with excellent survival rates and favourable patient-centred results.

Table 1: Characteristics of Included Studies

Author (Year)	Study Design	Sample Size / Population	Implant Type	Loading Protocol	Follow-up Period	Outcomes Reported
Marchesi M et al. (2015) (40)	Prospective Case Series study	17 patients (13 women, 4 men, avg. age 62.5 years)	4 implants per patient (2 parallel, 2 tilted)	Immediate loading with intraoral welding	26.5 months (range 18-36 months)	97% implant survival rate, 100% prosthetic survival rate, no prosthetic complications
Oleg D et al. (2019) (41)	Retrospective Cohort Study 394	394 patients, 4570 implants	BECES®, BECES N®, BCS®, BOI®, KOS®, Strategic Implant®	Immediate Functional Loading (within 3 days)	12 to 57 months (Mean: 18.93 ± 8.41 months)	Implant survival rate, marginal bone loss, prosthetic and biological complications, patient satisfaction
Patel K et al. (2021) (42)	Prospective Study	10 patients (age 20–80 years)	Strategic Basal Implants (BECES, BECES N, BECES EX, KOC)	Immediate Functional Loading	1 year	Implant survival rate, marginal bone loss, prosthetic & biological complications, patient satisfaction
Awadalkreem F et al. (2022) (20)	Prospective Study	15 marginal mandibulectomy patients	BCS® Corticobasal Implants	Immediate Loading	60 months	100% implant survival, stable peri-implant tissue, increased bone-implant contact, high patient satisfaction
Sahoo et al. (2023) (22)	Prospective, Observational In Vivo Study	120 patients (70 males, 50 females)	Corticobasal dental implants	Immediate placement and immediate loading	3 years	Oral health-related quality of life (OHRQoL), patient satisfaction, pain, infections, chewing difficulties, articulation speech, and construction

Vajdi Mitra G et al. (2023) (5)	Clinical Study	11 patients (30 implants), aged 20-55 years, with traumatically deficient ridges in maxilla and mandible	Basal Implants (BCS by Simpladent)	Immediate Loading	6 months	Pain levels, soft tissue health, marginal and crestal bone levels, patient satisfaction

Footnote: Abbreviations: BECES® – Basal Cortical Screw External Spiral; BECES N® – Basal Cortical Screw External Spiral Narrow; BECES EX® – Basal Cortical Screw External Spiral Extra; BCS® – Basal Cortical Screw; BOI® – Basal Osseo-Integrated Implants; KOS® – Kondo Osseo Screw; OHRQoL – Oral Health-Related Quality of Life.

Table 2 highlights clinical outcomes and complications from six studies on corticobasal implants under immediate loading. Reported corticobasal implant survival rates were about 97.5% to 99.3% 3. In the prospective study by Awadalkreem et al., implant health was reported as optimum, with no implant loss, mobility, or fracture 3. There were studies that showed high patient satisfaction 3. For example, Sahoo et al. (2023) reported higher satisfaction among patients receiving corticobasal implants 22, while Awadalkreem et al. (2023) 3 reported 100% satisfaction. Thus, immediate loading CBI established outstanding functional, esthetic, and biological results amongst varied patient populations.

Table 2: Summary of Clinical Outcomes and Complications

Author (Year)	**Implant Survival Rate (%)**	**Marginal Bone Loss (mm)**	**Prosthetic Complications (%)**	**Biological Complications (%)**	**Patient Satisfaction (OHRQoL Score)**	**Other Reported Outcomes**
Marchesi M et al. (2015) (40)	97%	Not reported	No prosthetic fractures or issues	2 implant failures (distal implants)	High patient satisfaction (esthetic and functional success)	2 failed implants replaced, patients retained prostheses during healing, modified protocol simplified workflow
Oleg D et al. (2019) (41)	95.7 % overall	Minimal; only one implant (0.1%) showed crater-like bone loss	No major prosthetic fractures or loosening reported	Very low: Pain (0.2%), Infection (0.1%), Mobility (0.4%)	High satisfaction with fixed restorations	No peri-implantitis observed, high success in immediate loading
Patel K et al. (2021) (42)	97.5 % (153/157 implants)	Minimal	Ceramic chipping, decementation	Overload osteolysis in 2 patients	High satisfaction due to immediate loading	No peri-implantitis, rigid prosthesis, successful function in atrophic ridges
Awadalkreem F et al. (2022) (20)	100 %	Minimal (<0.2 mm/year)	6.7% veneer fracture	None	100% overall satisfaction	Increased bone-implant contact, no peri-implantitis, excellent prosthesis stability

Sahoo et al. (2023) (22)	Not reported	Not reported	Not reported	Significant differences in pain, infections/swelling, sleeping problems, self-confidence, taste, chewing discomfort, and food choice ($p < 0.05$)	Overall satisfaction: 4.92 (scale 0-5), articulation speech: 4.12, implants: 4.80, construction: 4.88	Satisfaction levels were higher post-implant placement, even in patients with diabetes, smoking, and periodontitis
Vajdi Mitra G et al. (2023) (5)	90.67 % (3 out of 30 implants failed)	1.48 ± 0.38 mm (overall), higher in maxilla (1.74 ± 0.37 mm) than mandible (1.23 ± 0.35 mm)	Not reported	Reduced gingival inflammation, improved soft tissue health	Mean Score: 34.77 ± 5.54 (3rd day), 41.11 ± 6.27 (3 months), 40.77 ± 10.91 (6 months)	Pain reduction (VAS Score: 2.00 ± 1.15 on day 3, 0.40 ± 0.84 at 3 months, 0.00 at 6 months), improved soft tissue health (gingival index: 1.30 ± 0.48 at day 3, 0.10 ± 0.31 at 3 months, 0.00 at 6 months)

Footnote: Abbreviations: OHRQoL – Oral Health-Related Quality of Life; VAS – Visual Analog Scale. Marginal bone loss is reported in millimeters (mm) per year, where specified. Prosthetic complications include issues such as veneer fractures, ceramic chipping, and decementation. Biological complications cover infection, pain, implant mobility, and peri-implantitis. Patient satisfaction scores were assessed using study-specific scales or questionnaires, reflecting functional, esthetic, and psychosocial outcomes. Data represent reported outcomes during each study's follow-up period.

Newcastle-Ottawa Scale (NOS) was used to analyse the quality of the 6 included cohort studies as shown in Table 3. Each study attained a quality rating of "Good," representing a strong methodological framework and reliability. The 3 studies with the maximum ratings (7 out of 9) were by Oleg D et al. (2019), Patel K et al. (2021), and Vajdi Mitra G et al. (2023). These studies showed good selection, comparability, and outcome measurements. The remaining studies by Marchesi M et al. (2015), Awadalkreem F et al. (2021) showed a score of 5 out of 9, and the study by Sahoo et al. (2023) was of excellent quality, however there was certain limitations in terms of comparability or outcome reporting in the study. The overall findings in immediate loading corticobasal implant research are more genuine as depicted by the NOS analysis, which signifies the methodological robustness and constancy of the included studies.

Table 3: Quality assessment done for the cohort studies done using the Newcastle Ottawa Scale (NOS)

S. No	Author & Year of study	Selection (S1)	S 2	S 3	S 4	Comparability (C1)	Outcome (O1)	O 2	Total Score (Quality)
	Marchesi M et al. (2015) (40)	*	-	*	*	*	-	*	5 Good
	Oleg D et al. (2019) (41)	*	*	*	*	*	*	*	7 Good
	Patel K et al. (2021) (42)	*	*	*	*	*	*	*	7 Good
	Awadalkreem F et al. (2022) (20)	*	*	-	*	*	*	-	5 Good
	Sahoo et al. (2023) (22)	*	-	*	*	*	-	*	5 Good

	Vajdi Mitra G et al. (2023) (5)	*	*	*	*	*	*	*	7 Good

The risk of bias evaluation of the included studies, carried out using the ROBINS-I method, is shown in Figures 2 and 3. Each study's domain-wise risk of bias is evaluated in Figure 2. Across the seven evaluated domains, most of the research showed a low risk of bias (green). Notably, Vajdi Mitra G et al. (2023) 12 and Sahoo et al. (2023) 24 demonstrated consistently low risk across all domains, limiting bias risks and demonstrating strong research designs. However, because of participant selection and confounding, Marchesi M et al. (2015) (29) and Patel K et al. (2021) 7 showed moderate risk (yellow). Awadalkreem F et al. (2021) 5and Oleg D et al. (2019) (13) had areas with no information (blue), particularly in participant selection and outcome reporting. An overview of the total risk of bias across studies and domains is shown in Figure 3. Most areas, including assessment of outcomes, missing data, and bias resulting from intervention variations, showed minimal risk in all investigations. Nonetheless, there were still moderate risks in participant selection (D2) and confounding variables (D1), while other studies lacked data in areas like outcome selection (D7). Overall, the included studies show excellent methodology with low risks of bias, which increases the validity of their conclusions about the immediate loading of corticobasal implants.

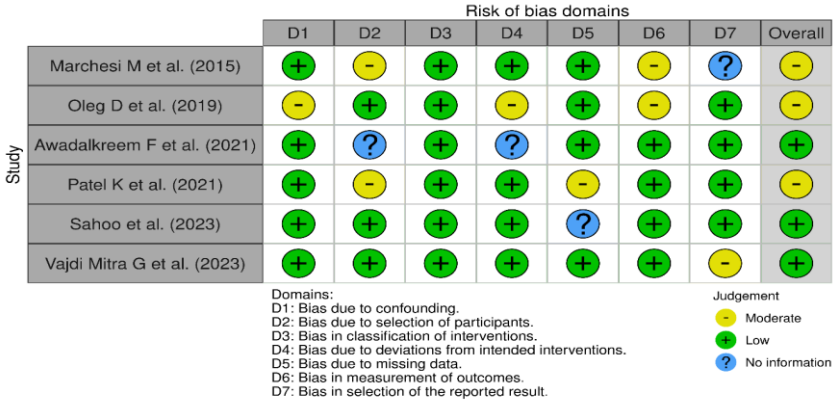

Figure 2: Individual studies Risk of Bias assessment using the ROBINS I Tool

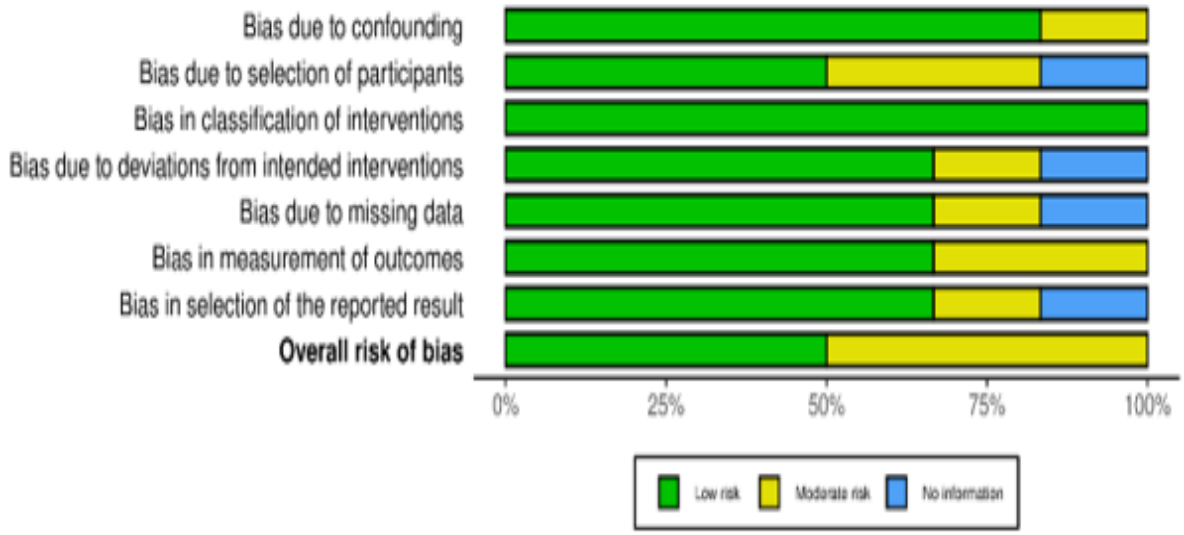

Figure 3: Overall Risk of Bias assessment using the ROBINS I Tool

Discussion

Corticobasal implants (CBIs) is a reliable substitute to conventional implantology, specifically in patients with severely atrophic jaws where traditional implant placement is challenging or contraindicated 23. This systematic review determines the data from observational studies, prospective trials etc to evaluate the clinical performance, predictability, and drawback of CBIs in the rehabilitation of atrophic maxillary and mandibular ridges. CBIs use the dense cortical bone for anchorage, which permits immediate functional loading and eradicates the necessity for bone augmentation procedures 23. The findings highlight their biomechanical benefits, high survival rates, and improved patient satisfaction, consistent with outcomes reported in previous studies 1.

Clinical Outcomes, Survival Rates, and Biomechanical Advantages of CBI

This systematic review emphasizes the significant high survival rates and clinical success of CBIs in rehabilitation of extensively atrophied jaws. The implant survival rates ranged from 90.67% to 100% as was evident amongst the included studies 5, 7, 8, 10. For

example, Awadalkreem et al. (2022) 5 demonstrated a 100% survival rate for 5 years with stable peri-implant tissues and improved bone-implant interaction. Patel et al. (2021) 7 demonstrated a 97.5% survival rate in patients with atrophic bone. Vajdi Mitra et al. (2023) 12 observed a survival rate of 90.67% and observed that the marginal bone loss was greater in the maxilla than the mandible. This highlighted the significance of accurate biomechanical planning in these cases. Immediate cortical bone engagement ensures primary stability and supports immediate functional loading, enhancing clinical predictability 2, 3, 4, 30.

A case report by Fogli et al. (2014) 26 exhibited excellent stability and predictability with intraoral welded titanium bars along with immediate loading protocols in complicated cases. Full-mouth rehabilitation with immediately loaded basal implants, showed rapid functional restoration and high patient satisfaction in severely resorbed ridges was also noted 6. Tomaselli L (2024) presented 3 cases using intraoral welding methods to stabilize immediately loaded implants and attained prolonged success and improved stability 17. The compatibility of CBI with immediate loading can decrease treatment time and may improve patient comfort 24,25 Several studies have shown effective immediate functional loading through intraoral welding and syncrystallization 15, 17, 18, 20. A 97% survival rate with intraoral welding was reported, signifying its function in accomplishing primary stability, equal load distribution, and improved implant stability during healing, thus supporting its efficiency in immediate loading protocols 15,29. These welding techniques improve the biomechanical aspect by augmenting the rigidity and stability of implant-supported prostheses, reducing stress concentrations, and dispensing occlusal forces equally 31.

A case report has described the versatility and efficiency of CBIs in immediate placement and loading protocols especially in interesting clinical situations such as trauma 26. Evidence highlighting the biomechanical advantages and long-term success associated with these implant systems support the principles of immediate functional loading 27,28. The strength and fatigue resistance of welded titanium joints are critical for the maintenance of prosthetic stability, reduction of the risk of mechanical difficulties and assurance of the achievement of immediate loading procedures 29. Intraoral welding techniques have also been authenticated as efficient tactics to augment primary stability, permitting for expectable consequences even in anatomically challenging cases 30. These results thus explain the use of CBIs as an advanced prosthetic technique which is a reliable approach for immediate functional restoration. This helps to contribute mechanical reliability and satisfactory prolonged clinical results 28. The clinical importance of basal implants in dealing with severe ridge resorption cases and their function in attaining immediate functional and aesthetic rehabilitation without the necessity for invasive grafting procedures has been established in prior studies 27. Therefore, the high survival rates, biomechanical stability, and efficacious immediate loading of CBIs make them a trustworthy treatment option for rehabilitating atrophic jaws. This has been proven in the present systematic review with collective evidence from multiple clinical and prospective studies which strengthens the clinical applicability of CBIs.

The chief modes of the efficiency and acceptability of CBIs are patient-reported outcomes, demonstrating both functional and quality of life enhancements 31. Studies have shown that patients can identify noticeable benefits following CBI procedures, such as improved speech, masticatory efficacy, appearance, and psychological well-being 32. There is high possibility of patient satisfaction due to prosthetic stability, quick function restoration, and a lower incidence of peri-implantitis 3. CBIs can avoid long-lasting bone grafting procedures and thus the recovery of the patients are quicker and they experience less post-operative discomfort 33. This further enhances their happiness, satisfaction, and acceptability. CBIs are adaptable and can be used consistently with stable outcomes that are further established by their application in challenging clinical situations, like in cases of subtotal maxillectomy or prominent maxillary abnormalities 34. According to the present analysis, CBIs are a reliable treatment modality that satisfies functional requirements and substantially improves the patients' quality of life 31. CBIs have been successfully used in patients with oncologic resections, congenital conditions, and craniofacial injuries. Their design evades the disadvantages of decreased bone volume or quality by allowing attachment in basal cortical bone. In patients with cleidocranial dysplasia 33 and following subtotal maxillectomy 34, successful rehabilitations have been documented, providing both functional restoration and cosmetic rehabilitation without the requirement for bone grafts. The successful rehabilitation of a hemimaxillectomy patient with the help of zygomatic and corticobasal implants was reported by Akifuddin and Awadalkreem (2025) 35 who reinforced the compliance of CBIs in such complicated maxillofacial reconstructive cases. Thus, it can be deduced that CBIs are particularly beneficial for patients who need immediate prosthesis rehabilitation after trauma or oncological surgery since they minimize surgical invasiveness and treatment duration 34,35.

The prosthetic stage plays a significant role in estimating the prolonged success of CBIs, wherein correct planning and implementation assures functional efficiency and aesthetic results. The success rates of such techniques depend on the immediate loading protocols, rigid prosthetic frameworks and intraoral welding 36. These provide enhanced primary stabilization by splinting implants directly after placement, decreases micromovements and helps to dissipate the load . This technique supports immediate function and reduces the risk of mechanical complications with time 3. Despite these advantages, prosthetic disadvantages like prosthetic fractures and ceramic chipping have been recognized 37, underlining the requirement for robust material selection and prosthetic design considerations. Studies emphasize that the use of welded frameworks enhances the biomechanical stability of prostheses and distributes functional loads equally and minimizes the possibility for biological complications (overload osteolysis). The effective management of mandibular non-union fractures

and marginal mandibulectomy cases using single-piece corticobasal implants 14, demonstrates their potential utility in intricate maxillofacial rehabilitation and immediate prosthetic loading cases. However, discrepancies in the characterization of atrophic jaws, study procedures, and loading protocols test the generality of results . However, comparative data prove that CBIs offer predictable high success rates, particularly in complex cases with compromised bone conditions, severely resorbed ridges, or deficient bone structures. More randomized controlled trials are required to establish standardized protocols and long-term outcomes even though existing evidence highlights their clinical efficiency .

Conclusion

The clinical effectiveness, predictability, and adaptability of CBIs in the rehabilitation of atrophic jaws are highlighted here. The excellent survival rates, instant loading capacity, and avoidance of bone grafting are also discussed in this review. Prosthesis stability is further upgraded using intraoral welding procedures. The use of CBIs is associated with minimal complications. Hence, future research should focus on standardizing treatment options and performing long-term, high-quality clinical investigations, given the differences in study methodologies and the scarcity of randomized controlled trials. Clinically, CBIs broaden the reach of implant dentistry by providing a minimally invasive approach for treating complicated situations, such as severe ridge resorption. Corticobasal implantology offers a reliable substitute for difficult rehabilitations and augments patient-centered results.

Author Contributions

Geetha Priyadharshini – Conceptualization, Methodology, Data curation, Writing – Original draft

Navneethan R – Supervision, Methodology, Critical review & editing

Bharath Kumar Jayam – Data extraction, Analysis, Writing – Review & editing

Aravind kumar S– Conceptualization, Clinical expertise, Final manuscript review

Conflict of Interest

The authors declare that they have no conflict of interest related to this study.

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Data Availability Statement: The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Statement: Ethical approval was not required for this study as it is a systematic review of previously published studies.

References

1. Kalburgi V, Amborkar S. Comprehensive Approaches to Managing Ridge Atrophy with Basal Implants: A Systematic Review. 2025: https://doi.org/10.4103/jhnps.jhnps_135_24
2. Devadoss DrP, Prasad D, Kumar D, S J. Zygomatic Implants with Conventional Implants as a Treatment Modality for Severely Atrophic Maxilla- Case Series. African Journal of Biomedical Research [homepage on the Internet] 2024 [cited 2025 Nov];27. Available from: https://doi.org/10.53555/ajbr.v27i3s.7983
3. Awadalkreem F, Khalifa N, Satti A, Suliman AM. Rehabilitation of Patients with Compromised Ridge Support Using Immediately Loaded Corticobasal Implant-supported Prostheses: A Prospective Observational Study. 2023 [cited 2026 Aug];Available from: https://doi.org/10.5005/jp-journals-10024-3416
4. Suin MBF, Pintado JPG, Carrasco MFL. Basal implants and their importance in clinical Dentistry: Literature review. 2024 [cited 2026 Mar];Available from: http://dx.doi.org/10.33448/rsd-v13i5.45835
5. Mitra G, Agrawal N, Shukla NK, Aishwarya K, C.C P, Raj A. An Evaluation of the Efficacy and Acceptability of Basal Implants in Traumatically Deficient Ridges of the Maxilla and the Mandible. 2023 [cited 2026 Mar];Available from: http://dx.doi.org/10.7759/cureus.43443
6. Selvakumar M, Viswanathan K, Srinivasan S, Kavitha J, Sowndharyalakshmi R. Enhanced Stability and Functionality with Basal Implants in Complex Edentulous Patients: A Case Report. 2026 [cited 2026 Mar];Available from: https://doi.org/10.31254/dentistry.2025.10301
7. Wadhwani N, Bhola N, Mundada BP, Beri A, Patekar V. A Case of Accelerated Rehabilitation: Immediate Loading of Full Mouth Basal Implants. 2024 [cited 2026 Mar];Available from: http://dx.doi.org/10.7759/cureus.65556
8. Albiero AM, Bevilacqua L, Pegoraro F, et al. Mechanical and fatigue resistance of restorations supported by welded-framework and realized using computer-aided designed prosthetic shells: In vitro pilot study. 2024 [cited 2025 Nov];Available from: https://hdl.handle.net/11368/3067198
9. Degidi M, Gehrke P, Spanel A, Piattelli A. Syncrystallization: A Technique for Temporization of Immediately Loaded Implants with Metal-Reinforced Acrylic Resin Restorations. 2006 [cited 2026 Jan];Available from: https://doi.org/10.1111/j.1708-8208.2006.00011.x
10. Fodor CR, Romania ILS Gherla, Cretu R, Purghel T, Romania CDrPT Jibou,. Implant rehabilitation with Strategic Implant® technology in two stage implants – bone addition, sinus-lift failure (cases presentation). 2022 [cited 2026 Jan];Available from: http://doi.org/10.37897/rjs.2022.1.4
11. Berglundh T, Persson LG, Klinge B. A systematic review of the incidence of biological and technical complications in implant dentistry reported in prospective longitudinal studies of at least 5 years. Journal Of Clinical Periodontology [homepage on the Internet] 2002 [cited 2026 Jan];29:197–212. Available from: https://doi.org/10.1034/j.1600-051x.29.s3.12.x

12. Cairo F, Sanz-Sánchez I, Matesanz P, Nieri M, Pagliaro U. Quality of reporting of randomized clinical trials in implant dentistry. A systematic review on critical aspects in design, outcome assessment and clinical relevance. Journal Of Clinical Periodontology [homepage on the Internet] 2012 [cited 2025 Nov];39:81–107. Available from: https://doi.org/10.1111/j.1600-051x.2011.01839.x
13. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. PLoS Medicine [homepage on the Internet] 2021 [cited 2026 Mar];18(3). Available from: https://doi.org/10.1371/journal.pmed.1003583
14. Gaur V, Doshi A, Gandhi S. Immediate prosthetic rehabilitation of marginal mandibulectomy post radiation case by single-piece implant - A case report. Annals of Maxillofacial Surgery [homepage on the Internet] 2020 [cited 2026 July];10(2):501–501. Available from: https://doi.org/10.4103/ams.ams_260_20
15. Gaur V, Doshi AG, Bengani AKS. Management of Mandibular Nonunion Fracture with Single-Piece Implant - A Case Report. Annals of Maxillofacial Surgery [homepage on the Internet] 2022 [cited 2026 July];12(1):95–98. Available from: https://doi.org/10.4103/ams.ams_227_21
16. Spencer KR. Implant based rehabilitation options for the atrophic edentulous jaw. Australian Dental Journal [homepage on the Internet] 2018 [cited 2026 May];63. Available from: https://doi.org/10.1111/adj.12595
17. Hruska A, Borelli P, Bordanaro AC, Marzaduri E, Hruska K-L. Immediate Loading Implants: A Clinical Report of 1301 Implants. Journal of Oral Implantology [homepage on the Internet] 2002 [cited 2026 June];28(4):200–209. Available from: https://doi.org/10.1563/1548-1336(2002)028<0200:iliacr>2.3.co;2
18. Warda S, Eldibany R, Noureldin M. EVALUATION OF IMMEDIATE BASAL IMPLANTS PLACEMENT IN MAXILLARY PREMOLAR REGION. Alexandria Dental Journal [homepage on the Internet] 2020 [cited 2026 July];0(0):0. Available from: https://doi.org/10.21608/adjalexu.2020.86760
19. Gupta A, Madan B, Bakshi M, Garg M. Full Mouth Rehabilitation with Immediate Loading Basal Implants. International Journal of Preventive and Clinical Dental Research [homepage on the Internet] 2017 [cited 2026 July];4(2):159–161. Available from: https://doi.org/10.5005/jp-journals-10052-0101
20. Awadalkreem F, Khalifa N, Ahmad AG, Suliman AM, Osman M. Oral rehabilitation of maxillofacial trauma using fixed corticobasal implant-supported prostheses. International Journal of Surgery Case Reports [homepage on the Internet] 2022 [cited 2026 Aug];100:107769–107769. Available from: https://doi.org/10.1016/j.ijscr.2022.107769
21. Tomaselli L. Intra-oral welding technique: three case reports. Annal of stomatology 2024;4(2).
22. Sahoo SK, Mishra S, Sangamesh N, Bajoria AA, Das A, Singh DK. Assessment of Oral Health-Related Quality of Life in Patients Receiving Corticobasal Dental Implants. Journal of Pharmacy And Bioallied Sciences [homepage on the Internet] 2023 [cited 2025 Nov];15. Available from: https://doi.org/10.4103/jpbs.jpbs_236_23
23. Rani S, Kamalakannan R, Sameera Y, Suriyanarayanan K. Basal Implants: A Narrative Review on Restoring the Unrestorable Ridges. JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH [homepage on the Internet] 2025 [cited 2025 Nov];Available from: https://doi.org/10.7860/jcdr/2025/77674.21120
24. Rossi F, Pasqualini ME, Carlo LD, Shulman M, Nardone M, Winkler S. Immediate Loading of Maxillary One-Piece Screw Implants Utilizing Intraoral Welding: A Case Report. Journal of Oral Implantology [homepage on the Internet] 2015 [cited 2025 Nov];41(4):473–475. Available from: https://doi.org/10.1563/aaid-joi-d-14-00332
25. Albiero AM, Benato R. Computer-assisted surgery and intraoral welding technique for immediate implant-supported rehabilitation of the edentulous maxilla: case report and technical description. International Journal of Medical Robotics and Computer Assisted Surgery [homepage on the Internet] 2015 [cited 2025 Nov];12(3):453–460. Available from: https://doi.org/10.1002/rcs.1715
26. Cheriyath NEP, Rahman NA, Angitha K, Narayanan N, Deepthi VS. Basal Implant - A Boon to Immediate Implant Loading: A Case Report. RGUHS Journal of Dental Sciences [homepage on the Internet] 2024 [cited 2025 Dec];16(3). Available from: https://doi.org/10.26463/rjds.16_3_2
27. Beri A, Pisulkar SG, Bansod A, Shrivastava A, Jain R, Deshmukh S. Rapid Smile Restoration: Basal Implants for the Edentulous Mandible With Immediate Loading. Cureus [homepage on the Internet] 2024 [cited 2026 Jan];16(6). Available from: https://doi.org/10.7759/cureus.62655
28. Awadalkreem F, Baroudi K, Minervini G, Zaineh Y, Al-Mehdhar E. Basal implants as a treatment alternative for severely resorbed ridges. Minerva Dental and Oral Science [homepage on the Internet] 2025 [cited 2026 Feb];74(6):393–404. Available from: https://doi.org/10.23736/s2724-6329.24.05066-6
29. Degidi M, Nardi D, Morri A, Sighinolfi G, Tebbel F, Marchetti C. Fatigue limits of titanium-bar joints made with the laser and the electric resistance welding techniques: microstructural characterization and hardness properties. Proceedings of the Institution of Mechanical Engineers Part H Journal of Engineering in Medicine [homepage on the Internet] 2017 [cited 2025 Nov];231(9):839–850. Available from: https://doi.org/10.1177/0954411917709835
30. Fogli V, Camerini M, Lauritano D, Carinci F. Success and High Predictability of Intraorally Welded Titanium Bar in the Immediate Loading Implants. Case Reports in Dentistry [homepage on the Internet] 2014 [cited 2025 Nov];2014:1–5.

Available from: https://doi.org/10.1155/2014/215378
31. Doshi AG, Patel J, Awadalkreem F, Fernandes G, Gaur V. Does the Use of Corticobasal® Implant Treatment Improve the Patient\'s Quality of Life? A Cross-sectional Survey. The Journal of Contemporary Dental Practice [homepage on the Internet] 2025 [cited 2026 Mar];26(9):883–889. Available from: https://doi.org/10.5005/jp-journals-10024-3934
32. Ddm AL. THE INFLUENCE OF TREATMENT WITH CORTICO-BASAL IMPLANTS UNDER IMMEDIATE PLACEMENT IMMEDIATE LOADING (IPIL) PROTOCOLS ON PATIENTS' ORAL HEALTH-RELATED QUALITY OF LIFE. A PROSPECTIVE STUDY. World Journal of Advance Healthcare Research [homepage on the Internet] 2005 [cited 2025 Oct];2021. Available from: https://www.wjahr.com/home/article_abstract/731
33. Ahmad AG, Osman M, Awadalkreem F. Full-mouth rehabilitation of a patient with cleidocranial dysplasia using immediately loaded basal implant-supported fixed prostheses. International Journal of Surgery Case Reports [homepage on the Internet] 2019 [cited 2026 Jan];65:344–348. Available from: https://doi.org/10.1016/j.ijscr.2019.11.005
34. Osman M, Ahmad AG, Awadalkreem F. A Novel Approach for Rehabilitation of a Subtotal Maxillectomy Patient with Immediately Loaded Basal Implant-Supported Prosthesis: 4 Years Follow-Up. Case Reports in Dentistry [homepage on the Internet] 2020 [cited 2026 Jan];2020(1):9650164–9650164. Available from: https://doi.org/10.1155/2020/9650164
35. Akifuddin S, Awadalkreem F. Prosthetic rehabilitation of a hemimaxillectomy patient using a zygomatic - Corticobasal® implant- supported reconstructive prosthesis: A case report. PubMed Central [homepage on the Internet] 2025 [cited 2026 Mar];127:110815–110815. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/11763205
36. Zuffellato N, Massariol M, Gandini A, Dovigo S. Instantaneous dental implant loading technique by fixed dentures: A retrospective cohort study. Dental and Medical Problems [homepage on the Internet] 2023 [cited 2026 Jan];60(3):375–383. Available from: https://doi.org/10.17219/dmp/154981
37. Affendi NHK, Hakim A, Ahmad R, Mustafa N, Yusof MM, Mahmud M. The Effect of Crown Design on Fracture Strength and Mode of Implant-supported Molar Crown Bonded to Titanium-based Abutment. The Journal of Contemporary Dental Practice [homepage on the Internet] 2025 [cited 2026 Mar];26(6):565–672. Available from: https://doi.org/10.5005/jp-journals-10024-3887
38. Dandekar SG, Virani R, Premchandran B. Syncrystallization aka intra-oral welding for rehabilitation of basal implants: A case series. Journal of Dental Panacea [homepage on the Internet] 2024 [cited 2026 Mar];6(1):42–45. Available from: http://dx.doi.org/10.18231/j.jdp.2024.010
39. Habash G, Jayash SN, Albanna SJ, Omiri MKA. Literature Review Regarding the Applicability and Clinical Outcome of Basal Implant. The Open Dentistry Journal [homepage on the Internet] 2024 [cited 2026 Mar];18(1). Available from: https://doi.org/10.2174/0118742106283694240422063539
40. Marchesi M, Ferrari C, Superbi S, Jimbo R, Galli S. Modified Protocol of the Intraoral Welding Technique for Immediate Implant-Supported Rehabilitation of the Edentulous Maxilla. Implant Dentistry [homepage on the Internet] 2015 [cited 2026 July];24(1):110–116. Available from: https://doi.org/10.1097/id.0000000000000189
41. Oleg D, Alexander L, S. K, Olga S, Damir S, Biljana M. IMMEDIATE-FUNCTIONAL LOADING CONCEPT WITH ONE-PIECE IMPLANTS (BECES/BECES N/KOS/BOI) IN THE MANDIBLE AND MAXILLA- A MULTI-CENTER RETROSPECTIVE CLINICAL STUDY. Journal of Evolution of Medical and Dental Sciences https://doi.org/10.14260/jemds/2019/67
42. Trivedi V, Patel K, Madan S, Mehta D, Shah S, Seta H. Basal implants: An asset for rehabilitation of atrophied resorbed maxillary and mandibular jaw – A prospective study. Annals of Maxillofacial Surgery [homepage on the Internet] 2021 [cited 2026 Aug];11(1):64–64. Available from: https://doi.org/10.4103/ams.ams_446_20
43. Ma L, Wang X, Yang Z, Huang D, Weng H, Zeng X. Methodological quality (risk of bias) assessment tools for primary and secondary medical studies: what are they and which is better? Military Medical Research [homepage on the Internet] 2020 [cited 2026 Mar];7(1):7–7. Available from: https://doi.org/10.1186/s40779-020-00238-8
44. Awadalkreem F, Khalifa N, Satti A, Suleiman AM. The influence of immediately loaded basal implant treatment on patient Research Square2019 https://doi.org/10.21203/rs.2.18984/v1