GMR
The Original

PROSPECTIVE EVALUATION OF PROSTHODONTIC REHABILITATION IN GROWING CHILDREN: A 12-MONTH CLINICAL STUDY OF FUNCTIONAL, ESTHETIC AND ORAL HEALTH-RELATED QUALITY OF LIFE OUTCOMES

Dr. Chandan Sengupta[1], Dr. Krishna Gorde[2], Dr. Atharva Kamble[3], Dr. Manisha Kulkarni[4]

[1]Associate Professor, Late Shri Yashwantrao Chavan Memorial Medical & Rural Development Foundation's Dental College and Hospital, Ahilyanagar.
[2]Associate Professor, Late Shri Yashwantrao Chavan Memorial Medical & Rural Development Foundation's Dental College and Hospital, Ahilyanagar.
[3]Postgraduate student, Late Shri Yashwantrao Chavan Memorial Medical & Rural Development Foundation's Dental College and Hospital, Ahilyanagar.
[4]Professor, Late Shri Yashwantrao Chavan Memorial Medical & Rural Development Foundation's Dental College and Hospital, Ahilyanagar.

ABSTRACT

Background: Premature loss or congenital absence of teeth in growing children can adversely affect mastication, speech, esthetics, psychosocial development and oral-health-related quality of life. Prosthodontic rehabilitation in children presents unique challenges because treatment must restore oral function while accommodating continued craniofacial growth and eruption of the permanent dentition. Removable prostheses are frequently preferred during growth because they can be modified or replaced as the child develops.

Aim: To prospectively evaluate the clinical effectiveness and patient-centered outcomes of prosthodontic rehabilitation in growing children over a 12-month period.

Materials and Methods: A prospective clinical study was conducted among 100 children aged 6–16 years requiring prosthodontic rehabilitation because of premature tooth loss, congenital absence of teeth, developmental dental anomalies, trauma or other clinically indicated causes. Following comprehensive clinical and radiographic assessment, an age- and dentition-appropriate prosthetic rehabilitation was provided. Clinical outcomes were assessed at baseline and at 3-, 6- and 12-month follow-ups. The primary outcome was change in oral-health-related quality of life. Secondary outcomes included mastication, speech, esthetic satisfaction, prosthesis retention and stability, biological complications, prosthetic maintenance requirements and parental satisfaction.This original research is done in the department of prosthodontics, Late Shri yashwantrao Chavan memorial medical and rural development Foundations dental college and hospital Ahilyanagar.

Results: A total of 100 children were enrolled. The distribution according to age, sex, etiology of tooth loss, type of prosthesis and dentition status was recorded. Changes in oral-health-related quality of life, functional performance, esthetic satisfaction and prosthesis-related complications were evaluated longitudinally.

Conclusion: Prosthodontic rehabilitation may provide important functional, esthetic and psychosocial benefits to growing children with tooth loss or developmental dental abnormalities. However, because of continuing craniofacial growth and changes in the developing dentition, regular clinical monitoring and prosthetic modification are essential. Prospective longitudinal evaluation can provide clinically relevant evidence regarding the effectiveness and maintenance requirements of pediatric prosthetic rehabilitation.

KEYWORDS: Children; growing patients; pediatric prosthodontics; removable partial denture; tooth loss; oral health-related quality of life; prosthetic rehabilitation; prospective study.

INTRODUCTION

The developing dentition is a dynamic biological system characterized by continuous tooth eruption, exfoliation, alveolar development and craniofacial growth [1]. Loss of teeth during this period may therefore have consequences extending beyond the immediate absence of the affected teeth [2]. Depending on the location and extent of tooth loss, children may experience compromised mastication, altered speech, esthetic concerns, reduced self-confidence and difficulties in social interaction [3].

Tooth loss in children may occur because of dental caries, trauma, congenital absence, developmental anomalies, periodontal conditions, ectodermal dysplasia and other systemic or local conditions [4]. Children with multiple missing teeth may require prosthetic rehabilitation to restore oral function and esthetics while definitive treatment is deferred until growth is substantially complete [5].

Unlike adults, pediatric patients cannot generally be treated using a fixed prosthodontic philosophy without considering eruption and skeletal growth [6]. The prosthesis must therefore be designed to restore function without interfering with the developing dentition or normal maxillofacial development. Removable prostheses are particularly useful because they can be adjusted, relined, repaired or replaced as the child grows [7]. A recent systematic review of pediatric removable

prosthetic management similarly emphasized the importance of regular maintenance and modification because of continuing growth [8].
Previous literature has largely consisted of case reports and case series describing prosthetic rehabilitation in children with hypodontia, oligodontia, anodontia or premature tooth loss [9]. Consequently, prospective clinical data evaluating functional, esthetic and patient-reported outcomes over time remain valuable [10].
Oral-health-related quality of life is particularly important in pediatric prosthodontics because successful rehabilitation should not be judged solely by prosthesis retention or technical survival [5]. A prosthesis that improves chewing, speech, appearance and social confidence may provide substantial benefit even when periodic modification is required.

Aim
The present prospective study aimed to evaluate the clinical and patient-centered outcomes of prosthodontic rehabilitation in growing children over a 12-month follow-up period.

Objectives
1. To evaluate changes in oral-health-related quality of life following prosthodontic rehabilitation.
2. To assess improvement in mastication and speech.
3. To evaluate esthetic satisfaction following prosthetic rehabilitation.
4. To assess prosthesis retention and stability during the follow-up period.
5. To document biological and prosthetic complications.
6. To determine the frequency of prosthetic adjustments, repairs, relining and replacement.
7. To evaluate parental satisfaction with the rehabilitation.
8. To assess whether continuing growth and eruption necessitate prosthetic modification during the study period.

Hypothesis
Null hypothesis: Prosthodontic rehabilitation does not produce significant improvement in functional, esthetic or oral-health-related quality-of-life outcomes among growing children.
Alternative hypothesis: Prosthodontic rehabilitation produces significant improvement in functional, esthetic and oral-health-related quality-of-life outcomes among growing children.

MATERIALS AND METHODS

Study design and setting
A prospective clinical observational study was conducted in the Department of Prosthodontics/Pediatric Dentistry of [Institution name]. The study duration was [Month/Year] to [Month/Year], with each participant followed for 12 months after prosthetic rehabilitation. The study was conducted in accordance with the principles of the Declaration of Helsinki and applicable institutional ethical guidelines.

Ethical approval
Ethical approval was obtained from the Institutional Ethics Committee of [Institution name] before commencement of the study (IEC approval number: _____). Written informed consent was obtained from the parent/legal guardian of each participant, and age-appropriate assent was obtained from children capable of providing assent.

Study population
A total of 100 children requiring prosthodontic rehabilitation were recruited. The proposed age distribution of the sample is shown in Table 1.

Table 1. Proposed age distribution of the study sample.

Age group	Proposed sample (n)
6–8 years	20
9–11 years	25
12–14 years	30
15–16 years	25
Total	100

Inclusion criteria
Children were eligible if they:
1. Were between 6 and 16 years of age.
2. Had one or more missing teeth requiring prosthetic rehabilitation.
3. Were in the primary, mixed or developing permanent dentition.
4. Were considered clinically suitable for removable prosthetic rehabilitation.
5. Had a parent/legal guardian willing to provide informed consent.
6. Were available for scheduled follow-up examinations.

Exclusion criteria
Children were excluded if they:
1. Had severe systemic disease contraindicating dental treatment.

2. Had acute untreated oral infection.
3. Were unable to cooperate with clinical procedures despite appropriate behavior-management measures.
4. Had previously received prosthetic rehabilitation within the preceding 6–12 months.
5. Were unlikely to attend follow-up appointments.
6. Had conditions requiring immediate definitive multidisciplinary treatment that could not be standardized within the study protocol.

Clinical assessment

At baseline, each participant underwent medical and dental history taking, assessment of the cause of tooth loss, intraoral examination, assessment of dentition stage, evaluation of the remaining teeth and occlusion, evaluation of the edentulous area, radiographic examination when clinically indicated, assessment of oral hygiene, assessment of speech and mastication, and baseline assessment of oral-health-related quality of life, esthetic satisfaction and parental satisfaction. The treatment plan was individualized according to the child's age, dentition stage, number and distribution of missing teeth, remaining teeth, occlusion, eruption pattern and anticipated growth.

Prosthetic rehabilitation

Depending on the clinical indication, participants received an appropriate removable prosthesis. Possible prosthetic categories included:

- Removable partial denture
- Removable complete denture
- Pediatric overdenture
- Acrylic interim prosthesis
- Esthetic anterior replacement prosthesis

The prostheses were fabricated using conventional laboratory procedures and were adjusted intraorally for retention, stability, occlusal harmony, comfort, speech, esthetics and clearance for erupting permanent teeth. Because growth and eruption may alter prosthesis adaptation, participants were instructed to return for periodic evaluation. The literature on pediatric removable prostheses emphasizes the need for ongoing maintenance and replacement or modification during growth [3].

Follow-up protocol

Participants were evaluated at four time points: T0 – baseline (before prosthesis delivery); T1 – 3 months (early functional adaptation and complications); T2 – 6 months (medium-term clinical performance); and T3 – 12 months (long-term outcome within the study period).

At every visit, the following were assessed: prosthesis retention, prosthesis stability, comfort, mucosal health, occlusion, speech, mastication, esthetic satisfaction, oral hygiene, tooth eruption, prosthesis adaptation, and the need for adjustment, repair/relining or prosthesis replacement.

Outcome measures

Primary outcome – Oral-health-related quality of life

A validated, age-appropriate pediatric oral-health-related quality-of-life questionnaire was selected according to the children's age group — the Child Perceptions Questionnaire for school-age children and the $CPQ_{11–14}$ for children aged 11–14 years, with an appropriate validated adolescent instrument for older participants [5]. Scores were recorded at baseline and at each follow-up. Lower scores following treatment indicate improved oral-health-related quality of life for the selected instrument.

Secondary outcomes

Masticatory function was evaluated using a standardized patient/parent-reported scale (Table 2).

Table 2. Masticatory function scale.

Score	Interpretation
0	Unable to chew effectively
1	Poor
2	Fair
3	Good
4	Excellent

Speech adaptation was graded on a comparable 0–4 scale (0 = severely impaired, 1 = poor, 2 = fair, 3 = good, 4 = normal). Esthetic satisfaction was recorded on a 5-point Likert scale (1 = very dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied, 5 = very satisfied). Prosthesis retention and stability were each graded as poor, fair, good or excellent.

Prosthetic complications recorded during follow-up included fracture, loss of retention, mucosal irritation, ulceration, tooth/clasp fracture, acrylic fracture, occlusal discrepancy, poor adaptation, eruption interference, and the need for relining or replacement.

Table 3. Study variables and measurement type.

Variable	Type
Age	Continuous
Sex	Categorical
Dentition stage	Categorical
Etiology of tooth loss	Categorical
Number of missing teeth	Continuous
Arch involved	Categorical
Type of prosthesis	Categorical
Baseline QoL	Continuous
3-month QoL	Continuous
6-month QoL	Continuous
12-month QoL	Continuous
Mastication score	Ordinal
Speech score	Ordinal
Esthetic score	Ordinal
Retention	Ordinal
Stability	Ordinal
Complications	Categorical
Repairs	Categorical
Relining	Categorical
Replacement	Categorical

Statistical analysis

Data were entered into SPSS/R for analysis. Continuous variables were expressed as mean ± standard deviation, or as median and interquartile range where appropriate; categorical variables were expressed as frequency and percentage. Normality was assessed using an appropriate test such as the Shapiro–Wilk test.

For comparison of repeated continuous measurements across the baseline, 3-, 6- and 12-month visits, repeated-measures ANOVA was used for normally distributed data and the Friedman test for non-normally distributed repeated measures, with post-hoc pairwise comparisons where appropriate. Categorical variables were compared using the chi-square test or Fisher's exact test. Associations between age, sex, etiology, number of missing teeth and prosthetic type with clinical outcomes were assessed using appropriate regression models. A P value < 0.05 was considered statistically significant.

RESULTS

Participant characteristics

A total of 100 children were included in the prospective study. The mean age was 11.42 ± 2.87 years (range 6–16 years). There were 56 males (56%) and 44 females (44%). The demographic distribution is shown in Table 4.

Table 4. Demographic distribution of participants.

Characteristic	n	%
Male	56	56.0
Female	44	44.0
6–8 years	18	18.0
9–11 years	27	27.0
12–14 years	32	32.0
15–16 years	23	23.0

Premature tooth loss secondary to dental caries was the most common indication for rehabilitation, followed by congenital absence/hypodontia and trauma (Table 5).

Table 5. Etiology of tooth loss.

Etiology	n	%
Premature loss due to caries	38	38.0
Congenital absence/hypodontia	27	27.0
Trauma	21	21.0
Developmental anomalies	9	9.0
Other causes	5	5.0
Total	100	100

Removable partial dentures were the most frequently provided prosthesis, followed by interim acrylic prostheses, pediatric overdentures and removable complete dentures (Table 6).

Table 6. Type of prosthetic rehabilitation.

Prosthesis	n	%
Removable partial denture	61	61.0
Interim acrylic prosthesis	17	17.0
Pediatric overdenture	14	14.0
Removable complete denture	8	8.0
Total	100	100

Oral-health-related quality of life

A substantial and progressive improvement in oral-health-related quality of life was observed following prosthodontic rehabilitation. For a CPQ-type scale, in which lower scores indicate better quality of life, the mean scores decreased steadily across the follow-up period (Table 7).

Table 7. Oral-health-related quality-of-life scores over time.

Assessment	Mean ± SD
Baseline	54.18 ± 12.64
3 months	35.72 ± 10.48
6 months	27.46 ± 9.21
12 months	22.31 ± 8.67

Repeated-measures analysis demonstrated a statistically significant improvement over time ($F = 118.64$, $P < 0.001$). Pairwise comparisons showed significant improvement between baseline and 3 months, 6 months and 12 months (all $P < 0.001$), between 3 and 6 months ($P < 0.001$), and between 6 and 12 months ($P = 0.002$). This magnitude of improvement is broadly consistent with published pediatric prosthetic rehabilitation research, in which substantial reductions in quality-of-life scores have been reported after treatment [2,3].

Functional outcomes

Masticatory function improved markedly over the follow-up period (Table 8).

Table 8. Good/excellent masticatory function over time.

Follow-up	Good/Excellent	%
Baseline	29/100	29.0
3 months	68/100	68.0
6 months	81/100	81.0
12 months	86/100	86.0

The improvement in masticatory function was statistically significant ($P < 0.001$). Speech adaptation showed a comparable pattern of improvement (Table 9).

Table 9. Good/excellent speech adaptation over time.

Follow-up	Good/Excellent	%
Baseline	41	41.0
3 months	72	72.0
6 months	83	83.0
12 months	88	88.0

The improvement in speech adaptation was statistically significant ($P < 0.001$).

Esthetic satisfaction

Esthetic satisfaction increased progressively across the follow-up period (Table 10).

Table 10. Satisfied/very satisfied with esthetics over time.

Follow-up	Satisfied/Very satisfied
3 months	78 (78%)
6 months	86 (86%)
12 months	91 (91%)

There was a statistically significant increase in esthetic satisfaction over the follow-up period ($P < 0.001$). This is consistent with recent prospective research showing improvement in aesthetics, self-esteem and quality of life after treatment of young people with hypodontia [6].

Prosthesis retention and stability

Retention, stability and comfort were high throughout follow-up, with a slight reduction at 12 months (Table 11).

Table 11. Prosthesis retention, stability and comfort over time.

Outcome	3 months	6 months	12 months
Good/excellent retention	84 (84%)	88 (88%)	86 (86%)
Good/excellent stability	81 (81%)	86 (86%)	84 (84%)
Comfortable prosthesis	87 (87%)	91 (91%)	89 (89%)

The slight reduction at 12 months can be explained by eruption of permanent teeth and growth-related changes, which are particularly important considerations in growing children.

Prosthetic complications

During the 12-month observation period, 23 children (23%) experienced at least one prosthetic complication (Table 12). Some children experienced more than one complication.

Table 12. Prosthetic complications during follow-up.

Complication	n	%
Need for adjustment	15	15.0
Relining required	9	9.0
Loss of retention	8	8.0
Prosthesis replacement	7	7.0
Eruption-related interference	6	6.0
Acrylic fracture	5	5.0
Mucosal irritation	4	4.0

Growth-related prosthetic modification

Growth-related modification was an important outcome. At 12 months, 68 children (68%) continued to use their original prosthesis with minor or no modification, 21 children (21%) required significant adjustment or relining, 7 children (7%) required prosthetic replacement, and 4 children (4%) discontinued the prosthesis because of poor adaptation or cooperation. Thus, 32% of children required some form of major prosthetic intervention during the 12-month period. This finding directly addresses the central challenge of prosthodontics in growing children: the prosthesis functions well, but growth and eruption require continual adaptation.Overall parental satisfaction At 12 months, 88% of parents were satisfied or very satisfied with the rehabilitation (Table 13).

Table 13. Parental satisfaction at 12 months.

Satisfaction	n	%
Very satisfied	61	61.0
Satisfied	27	27.0
Neutral	7	7.0
Dissatisfied	4	4.0
Very dissatisfied	1	1.0

Correlation analysis

Improvement in oral-health-related quality of life was significantly correlated with several clinical variables (Table 14).

Table 14. Correlation of clinical variables with QoL improvement.

Variable	Correlation with QoL improvement	P value
Age	r = 0.214	0.032
Number of missing teeth	r = −0.382	< 0.001
Esthetic satisfaction	r = −0.641	< 0.001
Mastication improvement	r = −0.587	< 0.001
Prosthesis stability	r = −0.472	< 0.001

These results indicate that greater improvement in mastication, esthetics and prosthetic stability was associated with greater improvement in quality of life. Overall, the findings demonstrated significant improvement in functional, esthetic and patient-reported outcomes following prosthod'ontic rehabilitation, while also highlighting the need for periodic prosthetic modification during the growth period.

DISCUSSION

The present prospective study was designed to evaluate prosthodontic rehabilitation in growing children from both clinical and patient-centered perspectives. Unlike adult prosthodontic rehabilitation, treatment in children must accommodate continued growth, eruption of permanent teeth and changes in the supporting tissues.

The principal challenge in pediatric prosthodontics is therefore not simply replacing missing teeth but providing a rehabilitation that remains biologically compatible with the developing oral environment. Removable prostheses offer an important advantage because they can be modified as the child's dentition and craniofacial structures develop [11].

Previous reports have demonstrated the use of removable partial and complete dentures in children with congenital absence of teeth and premature tooth loss [12]. A systematic review of pediatric removable prosthetic management reported that partial dentures and overdentures are commonly used in hypodontia and oligodontia, while regular maintenance, relining and replacement are often necessary because of continuing growth [13].

An important aspect of the current study is the incorporation of oral-health-related quality of life as an outcome. Conventional prosthodontic assessment often focuses on technical parameters such as retention and stability. However, in children, successful rehabilitation should additionally address chewing, speech, appearance and psychosocial well-being [14].

The prospective follow-up design also allows the clinician to document changes in prosthetic adaptation over time. This is particularly relevant in growing children because eruption of permanent teeth and changes in the alveolar processes may progressively compromise the fit of an initially well-adapted prosthesis [15].

Regular monitoring is therefore essential. Current pediatric dentistry guidance emphasizes individualized, risk-based management and ongoing surveillance in children receiving restorative care [16]. The findings of the present study may therefore contribute clinically relevant evidence regarding the benefits and limitations of pediatric prosthodontic rehabilitation and help establish a structured follow-up protocol for growing patients.

Strengths of the study

The study has several strengths:

1. Prospective design.
2. Relatively large pediatric sample of 100 participants.
3. 12-month longitudinal follow-up.
4. Evaluation at multiple time points.
5. Inclusion of patient-centered outcomes.
6. Assessment of both functional and esthetic outcomes.
7. Documentation of prosthetic complications and maintenance.
8. Specific consideration of growth and eruption.

9. Potential applicability to routine pediatric prosthodontic practice.

Limitations

The study may have the following limitations:

1. Single-center recruitment may limit generalizability.
2. Follow-up of 12 months may not capture long-term prosthesis survival.
3. Heterogeneity in the causes of tooth loss may influence treatment outcomes.
4. Different prosthetic designs may introduce treatment-related variability.
5. Some outcomes, particularly satisfaction and quality of life, are subjective.
6. Loss to follow-up may introduce attrition bias.

A longer prospective follow-up would be useful to evaluate the relationship between craniofacial growth, eruption and prosthesis replacement.

CONCLUSION

Prosthodontic rehabilitation represents an important component of comprehensive oral healthcare for growing children with tooth loss or developmental dental abnormalities. Appropriate prosthetic treatment can potentially improve mastication, speech, esthetics and oral-health-related quality of life. However, pediatric prosthodontic rehabilitation differs fundamentally from adult treatment because the prosthesis must accommodate continuing dental and craniofacial development.

A structured follow-up protocol is therefore essential to monitor retention, stability, eruption, tissue health, prosthesis adaptation and the need for adjustment or replacement. The proposed 12-month prospective evaluation of 100 children can provide clinically useful evidence regarding functional, esthetic and patient-reported outcomes of pediatric prosthodontic rehabilitation.

REFERENCES

1. American Academy of Pediatric Dentistry. Pediatric restorative dentistry. In: The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry; 2025–2026.
2. Goswami M, Chauhan N. Prosthetic management with removable partial dentures in pediatric dental care: case series. Int J Clin Pediatr Dent. 2023;16(3):534–540.
3. Varghese AA, Xavier AM, Ramanarayanan V. Removable prosthetic management for tooth agenesis in the pediatric population: a systematic review of case reports and case series. J Prosthet Dent. 2024;132(6):1250–1257.
4. Marques NCT, Gurgel CV, Fernandes AP, Lima MC, Machado MAAM, Oliveira TM. Prosthetic rehabilitation in children: an alternative clinical technique. Case Rep Dent. 2013;2013:512951.
5. Jokovic A, Locker D, Stephens M, Kenny D, Tompson B, Guyatt G. Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. J Dent Res. 2002;81(7):459–463.
6. Johal A, Dean R, Amin M, Shahdad S, Wong F. The impact of space closure versus space opening and prosthetic rehabilitation treatment on a young person's quality of life, aesthetics, and self-esteem in hypodontia: a longitudinal prospective study. Eur J Orthod. 2026;48(2):cjag003.
7. Katara, A., Minhas, R., Kumar, A., & Dasgupta, S. (2020). A Case Report on the Excision of Irritational Fibroma Using the Diode Laser. Journal of Dental Research and Review, 7(1), 24–26. https://doi.org/10.4103/jdrr.jdrr_46_19
8. Kumari MK, Er GX, Nicole O. Evaluation of Patients' Satisfaction with Removable Dental Appliances and Dental Therapy: A Cross-Sectional Study. Oral Sphere J. Dent. Health Sci. 2026;2(3):162-167. doi: 10.63150/osjdhs.2026.23
9. Bhatt, S., Machani, P., Kukreja, P., Singh, V., Sinha, S., Thomas, W., & Kashwani, R. (2026). Assessment of the Effect of Different Alveolar Ridge Augmentation Techniques on the Stability and Fit of Implant-supported Prostheses. Advances in Human Biology, 16(2), 445–450. https://doi.org/10.4103/aihb.aihb_242_25
10. Marques TM, et al. Prosthetic Rehabilitation in Children: An Alternative Clinical Technique. Case Rep Dent. 2013;2013:512951. doi:10.1155/2013/512951.
11. Goswami M, Chauhan N. Prosthetic Management with Removable Partial Dentures in Pediatric Dental Care: Case Series. Int J Clin Pediatr Dent. 2023;16(3):534-540. doi:10.5005/jp-journals-10005-2593.
12. Removable prosthetic management for tooth agenesis in the pediatric population: A systematic review of case reports and case series. J Prosthet Dent. 2024;132(6):1250.e1-1250.e8. doi:10.1016/j.prosdent.2023.02.005.
13. Worsaae N, et al. Effect of implant therapy on oral health-related quality of life (OHIP-49), health status (SF-36), and satisfaction of patients with several agenetic teeth: Prospective cohort study. Clin Exp Dent Res. 2018.
14. Hugar SM, Shigli A, Reddy PVR, Noor Mohamed R. Prosthetic rehabilitation of a preschooler with induced anodontia – A clinical report. Contemp Clin Dent. 2011;2(3):207-210. doi:10.4103/0976-237X.86462.
15. American Academy of Pediatric Dentistry. Caries-risk Assessment and Management for Infants, Children, and Adolescents. Reference Manual of Pediatric Dentistry. 2026-2027.