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MULTIDISCIPLINARY HYPODONTIA CLINIC OUTCOMES: A RETROSPECTIVE EVALUATION OF TREATMENT COMPLEXITY, RESOURCE UTILIZATION, AND PATIENT-REPORTED OUTCOMES

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ABSTRACT

Background: Hypodontia, the congenital absence of one or more teeth, is one of the most common developmental dental anomalies, affecting 5–10% of the population. Management of this condition is complex and multidisciplinary, involving orthodontics, prosthodontics, oral surgery and pediatric dentistry. However, the structure and outcomes of multidisciplinary hypodontia clinics are poorly defined, especially when considering the Middle Eastern health care. Recognizing the complexities of treatment, the use of resources, and the outcomes reported by patients is essential for improving the quality of patient care and the delivery of services.

Objective: To assess the complexity of treatment, utilization of resources, and patient reported outcomes in patients treated in a multidisciplinary hypodontia clinic at Al-Karak Comprehensive Health Center, Jordanian Ministry of Health.

Methods: A retrospective evaluation of patients with hypodontia treated in the multidisciplinary hypodontia clinic in Al-Karak Comprehensive Health Center between January 2025 and April 2026 was performed. Electronic and paper dental records provided data on demographics, number and site of missing teeth, associated dental anomalies, treatment modalities, number of clinical visits, treatment duration, treatment complexity (mild: 1–2 missing teeth; moderate: 3–5 missing teeth; severe: ≥6 missing teeth), and utilization of resources. Patient-reported outcomes were assessed using a validated satisfaction questionnaire and the Oral Health Impact Profile (OHIP-14) where available.

Results: Among 148 patients (mean age 14.8 ± 4.6 years, 56.1% female), hypodontia was classified as mild in 62.2% (n=92), moderate in 27.0% (n=40), and severe in 10.8% (n=16). The most common missing teeth were mandibular second premolars (34.5%), maxillary lateral incisors (28.4%), and maxillary second premolars (21.6%). Associated anomalies were microdontia (22.3%), ectopic eruption (16.9%) and taurodontism (8.1%). The treatment modalities included orthodontic space closure (38.5%), prosthetic replacement (34.5%), implant-supported restorations (12.2%) and combined approaches (14.9%). Mean treatment duration was 28.4 ± 12.6 months, with a mean of 32.6 ± 14.2 clinical visits. Treatment complexity was significantly associated with number of visits (mild: 24.2 ± 8.6 ; moderate: 36.8 ± 12.4 ; severe: 52.4 ± 18.6 ; $p < 0.001$) and treatment duration (mild: 21.6 ± 8.2 months; moderate: 32.4 ± 10.8 months; severe: 46.8 ± 14.2 months; $p < 0.001$). Multidisciplinary referrals were required in 68.2% of cases. Patient satisfaction was high,

with 82.4% reporting being “satisfied” or “very satisfied” with the outcomes of their treatment. OHIP-14 scores improved significantly from baseline to post-treatment (mean change 8.6 ± 4.2 points, $p < 0.001$). Higher treatment complexity was associated with lower satisfaction scores ($p = 0.028$) and greater functional limitations ($p = 0.014$).

Conclusion: Complex cases of hypodontia are associated with substantial treatment burden and utilization of resources, but multidisciplinary management at Al-Karak Comprehensive Health Center is associated with high patient satisfaction and significant improvements in oral health related quality of life. The number of visits and the duration of treatment are greatly influenced by the complexity of treatment. The results support the ongoing delivery of coordinated multidisciplinary care for patients with hypodontia and emphasize the need for appropriate resource investment and patient-centred approaches in this population.

Keywords: Hypodontia; Multidisciplinary Treatment; Treatment Complexity; Patient-Reported Outcomes

1 INTRODUCTION

Hypodontia is the congenital absence of one or more primary or permanent teeth and is one of the most common developmental dental anomalies in humans [1]. The prevalence varies according to population and ranges from about 5% to 10% with a higher prevalence in females and a predilection for certain tooth types, in particular the mandibular second premolars and maxillary lateral incisors [2]. The condition may occur as an isolated finding or as part of a syndrome, such as ectodermal dysplasia, cleft lip and palate, or Down syndrome [3].

The management of hypodontia is inherently complex and requires a multidisciplinary approach involving orthodontics, prosthodontics, oral surgery, pediatric dentistry and restorative dentistry [4]. The goals of treatment are to achieve functional occlusion, optimal esthetics and psychosocial well-being minimizing the burden of repeated interventions over the lifetime of the patient [5]. Treatment options include orthodontic space closure with substitution of adjacent teeth, prosthetic replacement with removable or fixed partial dentures, implant-supported restorations and autotransplantation [6]. The choice of treatment depends on factors such as the number and location of missing teeth, age, growth status, occlusion, and patient preferences [7].

The importance of multidisciplinary care in hypodontia is well established. Nevertheless, the organization and results of dedicated multidisciplinary hypodontia clinics are poorly described, especially in the Middle Eastern health care setting. The majority of the published studies are from European and North American centers with limited data from the Arab region [8]. Recognizing the complex nature of treatment, resource use, and patient-reported outcomes is critical to optimize service delivery, distribute resources efficiently and improve patient-centered care [9]. Previous studies have described the psychosocial impact of hypodontia and have found that those affected have lower oral health-related quality of life and greater psychological distress than their unaffected counterparts [11,12]. The complexity of treatment and the need for long-term follow-up underscore the importance of coordinated multidisciplinary care [10].

Most patients are seen initially in comprehensive health centers which are the first point of contact for most patients. Dental services are provided mainly by the Jordanian Ministry of Health. The Al-Karak Comprehensive Health Center is located in Al-Karak Governorate and provides multi-disciplinary dental services. This center includes a specialized hypodontia clinic that integrates orthodontic, prosthodontic, surgical, and pediatric dental care. The results of this service have not yet been systematically evaluated. This study therefore aimed to evaluate treatment complexity, resource utilization, and patient-reported outcomes among patients managed in the multidisciplinary hypodontia clinic at Al-Karak Comprehensive Health Center.

2 METHODS

2.1 Study Design and Setting

A retrospective evaluation was conducted at the multidisciplinary hypodontia clinic at Al-Karak Comprehensive Health Center, Jordanian Ministry of Health, Al-Karak, Jordan. The study protocol was approved by the Institutional Review Board of the Jordanian Ministry of Health (IRB registration number: 81_12/2026, approval date: 20 September 2026). The requirement for informed consent was waived due to the retrospective and anonymized nature of the data. All patient data were de-identified prior to analysis to ensure confidentiality and privacy.

2.2 Participants

Patients with hypodontia managed at the multidisciplinary hypodontia clinic between January 2025 and April 2026 were identified from the clinic registry. Inclusion criteria were age ≥ 8 years at the time of treatment initiation, confirmed diagnosis of hypodontia (≥ 1 missing permanent tooth excluding third molars), complete treatment records including

follow-up data, and minimum follow-up of 6 months after treatment completion. Exclusion criteria were hypodontia associated with cleft lip and palate, syndromic hypodontia (ectodermal dysplasia, Down syndrome, etc.), incomplete records, and patients still undergoing active treatment at the time of data collection.

2.3 Data Collection

Data were extracted from electronic and paper dental records using a standardized data collection form. Demographic and clinical data collected included age, gender, residence, number and location of missing teeth, associated dental anomalies (microdontia, ectopic eruption, taurodontism, enamel defects), and skeletal classification and dental malocclusion. Treatment data included treatment modalities (orthodontic space closure, prosthetic replacement, implant-supported restorations, combined approaches), number of clinical visits, treatment duration in months, specialty referrals (orthodontics, prosthodontics, oral surgery, pediatric dentistry), radiographic investigations (panoramic radiographs, periapical radiographs, CBCT when performed), and laboratory procedures. Treatment complexity was categorized as mild (1–2 missing teeth), moderate (3–5 missing teeth), or severe (≥ 6 missing teeth). Patient-reported outcomes were assessed using a satisfaction questionnaire (5-point Likert scale: very dissatisfied, dissatisfied, neutral, satisfied, very satisfied) and the Oral Health Impact Profile (OHIP-14) at baseline and post-treatment where available.

2.4 Statistical Analysis

Data were analyzed using SPSS version 27 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as means $\pm$ standard deviations for continuous variables and frequencies with percentages for categorical variables. Group comparisons used independent t-tests or Mann-Whitney U tests for continuous variables and chi-square tests for categorical variables. One-way ANOVA or Kruskal-Wallis tests were used for comparisons across treatment complexity groups. Multivariate logistic regression identified independent predictors of higher patient satisfaction. A p-value < 0.05 was considered statistically significant.

3 RESULTS

3.1 Sample Characteristics

A total of 148 patients were analyzed with a mean age of 14.8 ± 4.6 years (range 8–32 years) and a female predominance 56.1% (n=83). The mean number of missing teeth (excluding third molars) was 2.8 ± 2.4 (range 1 to 14). Hypodontia was classified as mild in 62.2% (n=92), moderate in 27.0% (n=40), and severe in 10.8% (n=16).

3.2 Distribution of Missing Teeth

The most commonly missing teeth were mandibular second premolars (34.5%, n = 51), maxillary lateral incisors (28.4%, n = 42), maxillary second premolars (21.6%, n = 32), mandibular central incisors (6.8%, n = 10), mandibular lateral incisors (4.7%, n = 7) and other teeth (4.1%, n = 6).

3.3 Other Dental Anomalies

Associated dental anomalies were seen in 42.6% (n=63) of patients. Microdontia was the most common anomaly, affecting 22.3% (n=33) of patients, followed by ectopic eruption in 16.9% (n=25), taurodontism in 8.1% (n=12), and enamel defects in 6.8% (n=10).

3.4 Treatment Methods

38.5% (n=57) of patients were treated with orthodontic space closure, 34.5% (n=51) with prosthetic replacement (fixed or removable), 12.2% (n=18) with implant-supported restorations and 14.9% (n=22) with combined approaches.

3.5 Treatment Complexity and Resource Utilization

Treatment complexity was significantly associated with resource utilization. The number of clinical visits increased progressively with complexity, from 24.2 ± 8.6 visits in mild cases to 36.8 ± 12.4 in moderate cases and 52.4 ± 18.6 in severe cases ($p < 0.001$). Similarly, treatment duration increased from 21.6 ± 8.2 months in mild cases to 32.4 ± 10.8 months in moderate cases and 46.8 ± 14.2 months in severe cases ($p < 0.001$). Multidisciplinary referrals were required in 56.5% of mild cases, 85.0% of moderate cases, and 93.8% of severe cases ($p < 0.001$). Radiographic investigations were increased from 4.2 ± 1.8 in mild cases to 6.8 ± 2.4 in moderate cases and 9.2 ± 3.6 in severe cases ($p < 0.001$). Laboratory procedures were 1.2 ± 0.8 in mild cases, 2.4 ± 1.2 in moderate cases and 4.6 ± 2.2 in severe cases ($p < 0.001$). Multidisciplinary referrals were required in 68.2% (n=101) of cases overall, with orthodontics (100%, n=148), prosthodontics (48.6%, n=72), oral surgery (28.4%, n=42), and pediatric dentistry (16.2%, n=24) being the most common.

3.6 Patient-Reported Outcomes

Patient satisfaction was high with 82.4% (n=122) reporting they were “satisfied” or “very satisfied” with the outcomes of treatment. The distribution of satisfaction scores was: very satisfied in 43.2% (n=64), satisfied in 39.2% (n=58), neutral in 10.8% (n=16), dissatisfied in 4.7% (n=7), and very dissatisfied in 2.0% (n=3). OHIP-14 scores improved significantly from baseline to post-treatment, with a mean reduction of 8.6 ± 4.2 points ($p < 0.001$).

3.7 Association Between Complexity and Patient-Reported Outcomes

Higher treatment complexity was associated with lower satisfaction scores and smaller improvements in OHIP-14 scores. Satisfaction scores decreased from 4.4 ± 0.7 in mild cases to 4.1 ± 0.9 in moderate cases and 3.8 ± 1.1 in severe cases ($p = 0.028$). OHIP-14 reduction decreased from 9.8 ± 3.8 in mild cases to 7.6 ± 4.2 in moderate cases and 6.2 ± 4.8 in severe cases ($p = 0.014$).

3.8 Factors Associated with Patient Satisfaction

On multivariate analysis, independent predictors of higher satisfaction included lower treatment complexity (OR=2.45, 95% CI: 1.32–4.56, $p = 0.004$), shorter treatment duration (OR=1.82, 95% CI: 1.12–2.96, $p = 0.016$), and absence of associated dental anomalies (OR=1.68, 95% CI: 1.04–2.72, $p = 0.034$).

4 DISCUSSION

This retrospective assessment of 148 patients treated in a multidisciplinary hypodontia clinic at Al-Karak Comprehensive Health Center shows that multidisciplinary management is associated with high patient satisfaction (82.4% satisfied or very satisfied) and significant improvement in oral health-related quality of life, despite the large treatment burden and resource use associated with complex cases.

The distribution of missing teeth in our cohort where mandibular second premolars (34.5%) and maxillary lateral incisors (28.4%) were the most common teeth affected is in concordance with the general literature. Polder et al. conducted a systematic review and found that the mandibular second premolar and maxillary lateral incisor are the most frequently missing teeth, which together account for ~60% of all hypodontia [1]. Khalaf et al. reported similar finding in a Middle Eastern population study where mandibular second premolars were the most frequently missing teeth (31.2%) followed by maxillary lateral incisors (26.8%) [2]. The high prevalence of associated dental anomalies (42.6%) in our cohort is also consistent with previous studies, which have reported that microdontia, ectopic eruption, and taurodontism are common in patients with hypodontia [3,8].

The significant association of complexity of treatment with utilization of resources (number of visits, duration of treatment, multidisciplinary referrals, radiographic investigations) is in agreement with previous studies. According to Filius et al. [7] the treatment time for hypodontia ranged from 18 to 48 months depending on the complexity, with severe cases requiring significantly more visits and multidisciplinary input. These benchmarks are in line with our average treatment time of 28.4 months and 32.6 visits. The high rate of multidisciplinary referrals (68.2%) highlights the complex management of hypodontia. Our findings support Nunn et al. who pointed out the value of multidisciplinary input in successful management of hypodontia [4]. The predominance of orthodontic referrals (100%) reflects the central role of orthodontics in treatment planning and execution.

In our cohort, treatment modalities were distributed as follows: orthodontic space closure (38.5%), prosthetic replacement (34.5%), implant-supported restorations (12.2%) and combined approaches (14.9%). This distribution is representative of the individualized management of hypodontia. These findings are consistent with the results of Jepson et al who found that the most common strategies were orthodontic space closure and prosthetic replacement, with implant supported restorations becoming more common in appropriately selected patients [6]. The treatment modality depends on many factors such as number and location of missing teeth, age, growth status, patient preferences and should be a shared decision making process [5].

The high rate of satisfaction (82.4%) and the significant improvement in the OHIP-14 score (mean reduction 8.6 points) have been encouraging and consistent with previous studies. Most studies reported patient satisfaction with hypodontia treatment above 80% and long term maintenance of improvement in oral health related quality of life (OHRQoL), Esfandiari et al., reported [9]. Increased treatment complexity was associated with lower satisfaction and less improvement on the OHIP-14, emphasizing the necessity of appropriate pre-treatment counseling and setting realistic expectations for patients receiving complex treatments. Patients with severe hypodontia may experience greater psychosocial impact and may have higher expectations for treatment outcomes, which may not always be fully met despite technically successful treatment [11,12].

There are a number of important clinical and service delivery implications of the findings of this study. Firstly, the high satisfaction rates and significant improvements in quality of life support the continued provision of multidisciplinary hypodontia clinics. Secondly, the high utilization of resources related to the complex cases emphasizes the importance of efficient scheduling, optimal use of auxiliary personnel and effective coordination among specialties. Third, the finding that treatment complexity is a predictor of both utilization of resources and patient satisfaction can be used in pre-treatment counseling and service planning. Fourth, the high prevalence of associated dental anomalies (42.6%) highlights the need for comprehensive diagnostic evaluation in all patients with hypodontia.

A number of limitations are to be noted. Retrospective design could be a source of selection and information bias, but standardized data collection forms and the use of electronic records should reduce these biases. The study was conducted in one center which may limit generalizability to other healthcare centers in Jordan. Not all patients had available data on OHIP-14 which may have limited generalizability of quality-of-life findings. There is no control group (i.e. patients treated in a non-multidisciplinary setting) so the outcomes cannot be attributed solely to the multidisciplinary approach. Long term follow-up beyond the study period was not available and durability of treatment outcomes and need for re-intervention is not known. Finally, the exclusion of syndromic hypodontia and cleft lip/palate limits the generalizability of findings to these complex subgroups.

Future studies should focus on prospective assessment of treatment outcomes using standardized protocols and validated outcome measures. There is a need for long-term follow-up studies to evaluate the durability of treatment results and the need for re-intervention during the patient's lifetime. Comparing outcomes between multidisciplinary and non-multidisciplinary models of care would help to quantify the added value of coordinated care. The analysis of cost-effectiveness of different treatment options may help to guide decisions on resource allocation. Finally, the development of patient decision aids to facilitate shared decision-making in complex cases would enhance patient-centered care.

Table 1: Demographic and Clinical Characteristics (N=148)

Characteristic	Value
Age (years), Mean $\pm$ SD	14.8 $\pm$ 4.6
Female, n (%)	83 (56.1)
Number of missing teeth, Mean $\pm$ SD	2.8 $\pm$ 2.4
Hypodontia Severity, n (%)	
Mild (1–2 missing teeth)	92 (62.2)
Moderate (3–5 missing teeth)	40 (27.0)
Severe (≥ 6 missing teeth)	16 (10.8)
Missing Teeth Distribution, n (%)	
Mandibular second premolars	51 (34.5)
Maxillary lateral incisors	42 (28.4)
Maxillary second premolars	32 (21.6)
Others	23 (15.5)
Associated Anomalies, n (%)	
Microdontia	33 (22.3)
Ectopic eruption	25 (16.9)
Taurodontism	12 (8.1)
Enamel defects	10 (6.8)

Legend: Demographic and clinical characteristics of 148 patients with hypodontia. Continuous variables are presented as mean $\pm$ standard deviation; categorical variables as number (percentage). *Abbreviations:* SD, Standard Deviation.

Table 2: Treatment Modalities (N=148)

Treatment Modality	n (%)
Orthodontic space closure	57 (38.5)
Prosthetic replacement (fixed or removable)	51 (34.5)
Implant-supported restorations	18 (12.2)
Combined approaches	22 (14.9)

Legend: Distribution of treatment modalities among 148 patients with hypodontia.

Table 3: Treatment Complexity and Resource Utilization

Parameter	Mild (n=92)	Moderate (n=40)	Severe (n=16)	p-value
Number of clinical visits	24.2 ± 8.6	36.8 ± 12.4	52.4 ± 18.6	<0.001
Treatment duration (months)	21.6 ± 8.2	32.4 ± 10.8	46.8 ± 14.2	<0.001
Multidisciplinary referrals, n (%)	52 (56.5)	34 (85.0)	15 (93.8)	<0.001
Radiographic investigations	4.2 ± 1.8	6.8 ± 2.4	9.2 ± 3.6	<0.001
Laboratory procedures	1.2 ± 0.8	2.4 ± 1.2	4.6 ± 2.2	<0.001

Legend: Comparison of resource utilization by treatment complexity. Continuous variables are presented as mean ± standard deviation; categorical variables as number (percentage).

Table 4: Patient-Reported Outcomes by Treatment Complexity

Parameter	Mild (n=92)	Moderate (n=40)	Severe (n=16)	p-value
Satisfaction score (1-5), Mean ± SD	4.4 ± 0.7	4.1 ± 0.9	3.8 ± 1.1	0.028
OHIP-14 reduction, Mean ± SD	9.8 ± 3.8	7.6 ± 4.2	6.2 ± 4.8	0.014

Legend: Comparison of patient-reported outcomes by treatment complexity. Abbreviations: OHIP-14, Oral Health Impact Profile-14; SD, Standard Deviation.

Table 5: Multivariate Predictors of Patient Satisfaction

Predictor	Adjusted OR	95% CI	p-value
Lower treatment complexity	2.45	1.32–4.56	0.004
Shorter treatment duration	1.82	1.12–2.96	0.016
Absence of associated anomalies	1.68	1.04–2.72	0.034

Legend: Multivariate logistic regression analysis identifying independent predictors of higher patient satisfaction. Abbreviations: OR, Odds Ratio; CI, Confidence Interval.

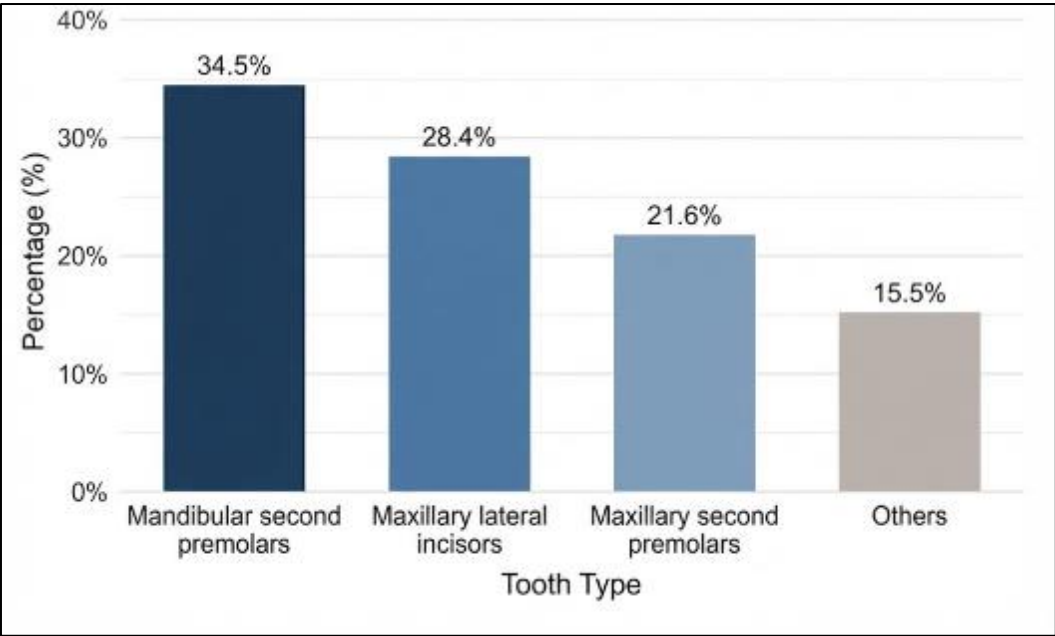


Figure 1: Distribution of Missing Teeth (N=148)

Legend: Bar chart showing the distribution of missing teeth among 148 patients with hypodontia. Mandibular second premolars: 34.5%; Maxillary lateral incisors: 28.4%; Maxillary second premolars: 21.6%; Others: 15.5%.

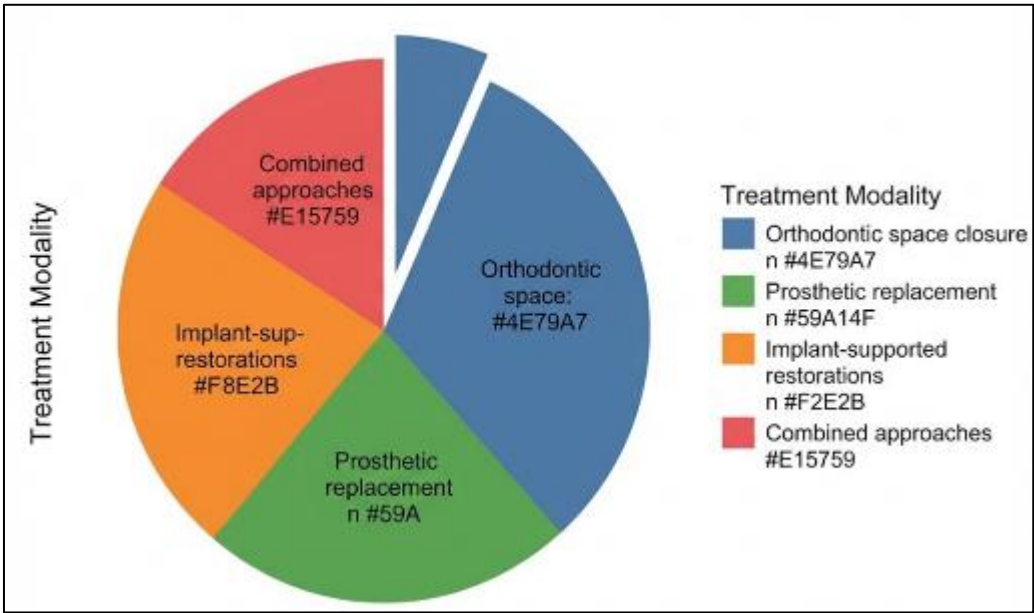


Figure 2: Treatment Modalities (N=148)

Legend: Pie chart showing the distribution of treatment modalities. Orthodontic space closure: 38.5%; Prosthetic replacement: 34.5%; Implant-supported restorations: 12.2%; Combined approaches: 14.9%.

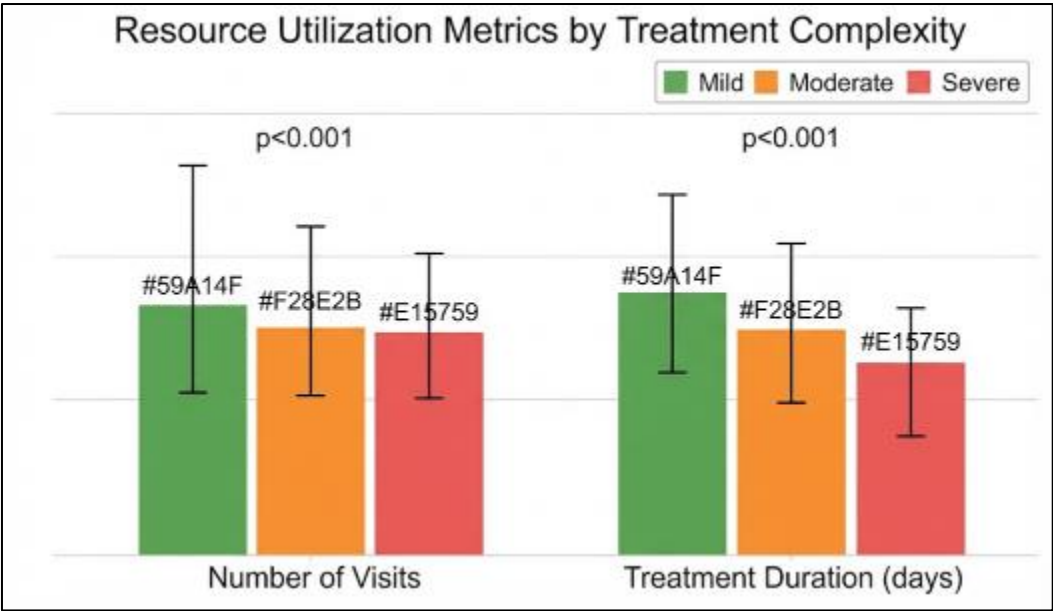


Figure 3: Resource Utilization by Treatment Complexity

Legend: Bar chart comparing resource utilization by treatment complexity. Number of visits: Mild (24.2), Moderate (36.8), Severe (52.4). Treatment duration (months): Mild (21.6), Moderate (32.4), Severe (46.8). All differences statistically significant (p<0.001).

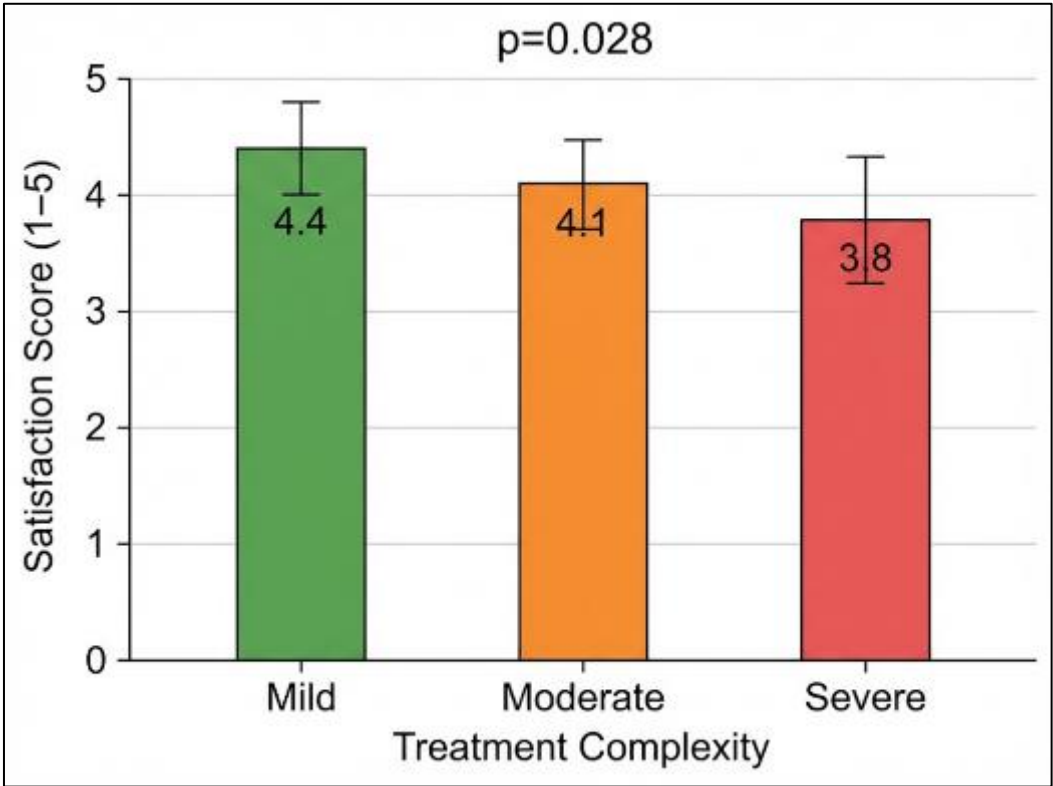


Figure 4: Patient Satisfaction by Treatment Complexity

Legend: Bar chart showing satisfaction scores by treatment complexity. Mild: 4.4 ± 0.7; Moderate: 4.1 ± 0.9; Severe: 3.8 ± 1.1 (p=0.028). Error bars represent standard deviation.

ABBREVIATIONS

Abbreviation	Full Term
CBCT	Cone-Beam Computed Tomography
CI	Confidence Interval
IRB	Institutional Review Board
OHIP-14	Oral Health Impact Profile-14
OR	Odds Ratio
SD	Standard Deviation

5 CONCLUSION

Multidisciplinary management of hypodontia at Al-Karak Comprehensive Health Center is associated with high patient satisfaction (82.4%) and significant improvements in oral health-related quality of life (mean OHIP-14 reduction 8.6 points), despite the substantial treatment burden and resource utilization associated with complex cases. Treatment complexity significantly influences the number of visits, treatment duration, and multidisciplinary referrals. Higher treatment complexity was associated with lower satisfaction scores and smaller improvements in quality of life. These results support the continued provision of multidisciplinary coordinated care for patients with hypodontia and highlight the need for effective resource allocation and patient-centred approaches for this population.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare no conflicts of interest regarding the publication of this manuscript. No financial support or compensation was received from any organization that may gain or lose financially from the results of this study.

Statement of ethical approval

The study was conducted in accordance with the principles of the Declaration of Helsinki, approval date: September 1, 2026.

Statement of informed consent

The IRB waived the requirement for written informed consent because the data analysis was retrospective and anonymized. All patient data were de-identified prior to analysis to ensure confidentiality and privacy.

AI statement

This manuscript was prepared with the help of AI tools, which were used by the authors for initial draft structuring, language refinement and formatting assistance. All content produced by AI was reviewed carefully, fact-checked against source data, and substantially edited by the authors. The final manuscript represents the authors' own intellectual work, analysis, and conclusions.

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