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Evaluation of oral health and dental hygiene habits in adolescents with intellectual and developmental disabilities: a longitudinal pilot study

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Objectives: Adolescents with intellectual and developmental disabilities are at increased risk of oral diseases due to physical limitations, poor oral health awareness, and inadequate dental hygiene practices. The aim of this study was to evaluate the oral health status of adolescents with intellectual and developmental disabilities and to analyze changes in their dental hygiene habits following subsequent visits and oral hygiene education. **Method and materials:** This pilot longitudinal observational study involved students with mild to moderate intellectual and developmental disabilities from a special needs school. Oral health was assessed using the decayed, missing, and filled teeth (DMFT) index, International Caries Detection and Assessment System (ICDAS-II), Basic Erosive Wear Examination (BEWE), Developmental Defects of Enamel (DDE), and Simplified Oral Hygiene (OHI-S) indices. Participants received oral hygiene training, and their brushing techniques were evaluated using the Oral Hygiene Skills Survey. Data on brushing frequency, skills, toothpaste use, and OHI-S scores were collected at baseline and at 1-, 3-, and 6-month follow-ups. **Results:** Twenty-three participants aged 14 to 19 years were evaluated, showing high DMFT scores (mean 10.91 ± 6.06), advanced caries in 78.3%, and enamel defects and erosive tooth wear in 65.2%. Significant improvements were observed in toothbrushing frequency ($P = .008$), with reductions in OHI-S scores ($P = .001$) and enhanced brushing skills ($P = .016$) during follow-ups. **Conclusion:** The findings indicate a high prevalence of dental caries, enamel defects, and erosive tooth wear among adolescents with intellectual and developmental disabilities. Despite poor baseline oral hygiene practices, regular follow-ups and oral hygiene education significantly improved oral hygiene habits and outcomes. *(Quintessence Int 2025;56:402–410; doi: 10.3290/j.qi.b6156604)*

Keywords: dental caries, developmental enamel defects, erosive tooth wear, intellectual disability, oral hygiene, special care needs

Special educational needs is a term used to describe individuals who experience greater learning difficulties than their peers and require additional support due to disabilities or specific impairments. Individuals with special educational needs often have multiple and complex health and educational needs, requiring interdisciplinary health care services to effectively address these challenges. These individuals may have various conditions, such as autism spectrum disorder, visual or hearing impairments, neurodevelopmental disorders, attention deficit hyperactivity disorder, and intellectual and developmental disabilities (IDDs).[1]

IDDs, as defined by the American Association on Intellectual and Developmental Disabilities, involve significant impairments in cognitive functioning, along with substantial limitations in performing daily activities and engaging in social interactions.[2] The term "intellectual disability," previously referred to as "mental retardation," is now preferred because it is less offensive to individuals with disabilities and aligns better with international terminology.[3] The global prevalence of IDDs ranges from 0.33% to 2.42%, indicating significant disparities based on socioeconomic status.[4] Although IDDs are frequently observed in the child population, their prevalence has in-

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creased in older age groups due to improved survival rates.[5] Individuals with IDDs often experience difficulties in understanding, learning, and applying new or complex skills. As a result of challenges in performing daily living activities, they are at a higher risk of encountering health issues.[6] IDDs are at increased risk of developing oral diseases due to their inability to perform physical tasks independently, higher rates of comorbid conditions, dysphagia, limited understanding of oral health, lack of adequate preventive care, and inadequate access to dental care services.[7-9] IDDs exhibit a higher prevalence of periodontal disease compared to the general population, primarily due to inadequate oral hygiene practices.[10,11] This issue extends to dental caries as well, with children who have IDDs showing a significantly higher prevalence of cavities compared to their peers without disabilities.[12]

Individuals with special needs often require ongoing assistance beyond the age of 7 due to their cognitive and physical challenges. Additionally, some individuals with special needs may struggle to comprehend not only their own behavior but also the behavior of others, which further complicates the development of self-care routines. Many of these individuals experience delayed learning, which can affect their ability to perform daily tasks, such as brushing their teeth.[12] Supervised toothbrushing has been shown to result in significant improvements in both Plaque Index and Gingival Index, indicating enhanced oral hygiene and reduced gingival inflammation.[13] Increasing learning intensity through repeated practice is suggested to be crucial for learning retention and skill development in students with IDDs.[14] Regular and frequent oral hygiene education in schools is believed to enhance oral hygiene practices, thereby preventing costly and prolonged dental treatments.[13]

The aim of the present study was to evaluate the oral health status of adolescents with IDDs and to analyze changes in their dental hygiene habits following subsequent visits and oral hygiene education. The null hypothesis of the study posited that oral hygiene education provided to adolescents with IDDs would not result in a longitudinal reduction in Oral Hygiene Index scores.

Method and materials

Study design and population

This pilot longitudinal observational study was approved by the Çanakkale Onsekiz Mart University Clinical Research Ethics Committee (Decision no: 2023/12-06, Decision date 20 September 2023). The study was conducted among 23 students with varying degrees of IDDs who were educated in a special needs school in the city of Çanakkale (Türkiye). The IDD status of participants in the study was assessed by a multidisciplinary team (neurologist, pediatrician, psychologist, psychiatrist, nutritionist, physiotherapist, occupational therapist, and social service specialist), and their IDD levels were officially determined. According to the International Classification of Diseases (ICD), IDD levels (mild, moderate, severe, and advanced) were determined using the Wechsler Intelligence Scale for Children (WISC-IV) for ages 6 to 16, and the Wechsler Adult Intelligence Scale for individuals over 16.[15,16] Based on these assessments and expert opinions, individuals were placed in schools for people with IDDs in Türkiye, where classes are organized according to IDD levels. This study included adolescents with mild and moderate IDD levels who could comprehend the given instructions and agreed to participate by providing informed written consent from their parents or legal guardians. All participants were capable of performing daily tasks independently, including toothbrushing, bathing, and meal preparation/consumption, without requiring caregiver assistance.

Sample size calculation

G*Power 3.1.9.7 (Universitat Kiel) statistical software was used to calculate the sample size. Based on the data from Ameer et al,[11] which reported that the OHI-S scores were 3.21 ± 1.04 in individuals with intellectual disabilities and 1.57 ± 1.13 in normal individuals, with a statistically significant difference ($P < .001$), the effect size was calculated as 1.51022. Using this effect size, with a significance level (α) of .05 and a power of 95%, the minimum total sample size required was determined to be 22.

Clinical examination

All clinical examinations were conducted by an experienced examiner under natural daylight in classrooms, with the aid of headlights to enhance visibility. The examiner had previously employed the examination methods and indices used in the present study in numerous published research studies. Additionally, to ensure standardization and calibration, the oral conditions of 15 individuals with varying intraoral statuses were evaluated using the indices applied in this study prior to the main research. The participants did not undergo toothbrushing or professional cleaning before the examination. The clinical examination was performed using a standard dental probe for tactile inspection and caries detection, a #5 front-surface mirror for visual inspection, a standard millimeter-scale periodontal probe for debris, calculus, and periodontal exam-

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ination, and gauze to dry the tooth surfaces. During the examinations, participants were seated, and communication was supported by responsible teachers. Information regarding participants' medical history and toothbrushing frequency was obtained through interviews with their caregivers.

Adolescents who agree to participate in the study had their oral health status assessed by a specialist dental practitioner a total of four times: at baseline, in the first month, in the third month, and in the sixth month. The indices used to assess participants' oral health include decay, missing, and filled teeth (DMFT),[17] International Caries Detection and Assessment System (ICDAS-II),[18] Basic Erosive Wear Examination (BEWE),[19] Developmental Defects of Enamel (DDE),[20] and Simplified Oral Hygiene (OHI-S) indices.[21] Although data for all indices were initially collected, only the OHI-S was reassessed at subsequent visits.

In the assessment of dental caries, the DMFT Index, approved by the World Health Organization and frequently preferred in clinical studies due to its simplicity, validity, reliability, and ease of use, was utilized.[17,22] The ICDAS-II criteria were used to assess the activity and severity of existing caries, classifying individuals into four categories based on the assessment: healthy (ICDAS-II scores 0), initial (ICDAS-II scores 1 and 2), moderate (ICDAS-II scores 3 and 4), and advanced (ICDAS-II scores 5 and 6).[18,23]

The erosive tooth wear (ETW) of participants was assessed and recorded according to the BEWE criteria. The four-level scoring stages for ETW severity are as follows: no ETW surface (code 0), initial loss of surface texture (code 1), loss of hard tissue affecting less than 50% of the surface area (code 2), and loss of hard tissue affecting more than 50% of the surface area (code 3).[19] The buccal/labial, palatal/lingual, and occlusal/incisal surfaces of all teeth were examined to establish the BEWE score for each sextant. The most affected dental surface within each sextant was assessed to provide a cumulative score, allowing for a comprehensive analysis of the participant's caries risk and informing targeted preventive strategies.[19]

The DDE Index is used to assess developmental defects of enamel. Demarcated or diffuse opacities, as well as hypoplasia, were evaluated through a visual and tactile intraoral examination. An individual was considered to have DDE if at least one tooth exhibited DDE.[20] Teeth with extensive caries were excluded from evaluation based on the DDE Index.[24]

The OHI-S index, approved by the World Health Organization, consists of two subcomponents: the Debris Index (DI) and the Calculus Index (CI).[17] This index, used to evaluate oral hygiene status, is calculated by dividing the sum of the debris and calculus scores observed on the buccal/vestibular (teeth 11, 16, and 26, according to FDI notation) and lingual/palatal (teeth 31, 36, and 46) surfaces of the reference teeth by the total number of tooth surfaces examined for each participant. The DI and CI scores are then calculated, and the overall OHI-S score is obtained by summing these two values. An increase in the OHI-S score indicates a deterioration in the individual's oral hygiene status.[21]

Dental hygiene education and Oral Hygiene Skills Survey

Following the oral examination, participants were provided with training on the importance of oral health and proper oral hygiene practices. After the educational session, each participant received individualized instruction in the roll toothbrushing technique, which is easier to apply, from a dental practitioner.[25] In the roll toothbrushing technique, the bristles are positioned at the gumline and moved in a rolling motion downwards (or upwards for the mandible) toward the chewing surfaces of the teeth.[26] Subsequently, participants were instructed to brush their teeth. Toothbrushing performance was assessed by the same observer at each visit, and toothbrushing training was repeated. The same observer recorded toothbrushing observations using a modified version of the Oral Hygiene Skills Survey, adapted for individuals with special needs.[27] The observer scored 14 steps in toothbrushing technique using a four-point Likert scale ranging from 0 to 3 (0, failure to complete the step; 1, the dental practitioner performs the step for the individual; 2, correction needed for the individual to complete the step; 3, the individual completes the step correctly without correction). Additionally, participants' toothbrushing frequency, toothbrushing method, and toothpaste quantity were systematically recorded at each visit.

Statistical analysis

The observed data were coded, organized, and analyzed using SPSS version 26 (IBM). Descriptive statistics were presented as mean ± standard deviation (SD) for continuous variables and as frequencies and percentages for categorical variables. The Shapiro–Wilk test was employed to assess the normality of the data. Since the data were found to be normally distributed, parametric tests, including the Pearson correlation coefficient, were used to examine relationships between variables. A repeated measures analysis of variance (ANOVA) was conducted to evaluate the statistical significance of changes in OHI-S scores across different time periods following oral hygiene training. In cases of statistical significance, the Bonferroni multiple comparison test was applied to identify specific group

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Table 1 Correlation between DMFT, DI, CI, and OHI-S scores at baseline

Score		DMFT	Baseline DI score	Baseline CI score	Baseline OHI-S score
DMFT	r†	1	0.076	0.435	0.273
	P	NA	.731	.038*	.208
Baseline DI score	r†	.076	1.000	0.599	0.908
	P	.731	NA	.003*	<.001*
Baseline CI score	r†	.435	0.599	1.000	0.880
	P	.038*	.003*	NA	<.001*
Baseline OHI-S score	r†	.273	0.908	0.880	1.000
	P	.208	<.001*	<.001*	NA

*Statistically significant ($P<.05$).
†Pearson correlation coefficient.
CI, Calculus Index; DI, Debris Index; DMFT, Decayed Missing Filled Teeth Index; NA, not applicable; OHI-S: Simplified Oral Hygiene Index.

differences. The relationship between categorical variables was analyzed using the Friedman test for ordinal data and the Cochran Q test for dichotomous outcomes. Following the Friedman test, the Wilcoxon signed-rank test was used for pairwise comparisons to identify specific time points with significant differences. A significance level of .05 was set for the analysis.

Results

A total of 23 participants were included in the study during the data collection period. The mean age of the participants was 16.69 years (±1.22), with ages ranging from 14 to 19 years. Of the 23 participants, 11 (47.8%) were female, and 12 (52.2%) were male. An analysis of the participants' parental education levels revealed that 16 (69.6%) participants had parents with an education level of elementary school or below, while 7 (30.4%) participants had parents with a high school education.

The baseline oral examination results showed a mean DMFT score of 10.91±6.06, with a minimum of 2.00 and a maximum of 28.00. Based on ICDAS-II classification, participants were categorized according to their highest recorded ICDAS-II score. Specifically, 1 (4.3%) participant was categorized as healthy (ICDAS-II score 0), 4 (17.4%) participants had moderate caries (ICDAS-II scores 3 and 4), and 18 (78.3%) participants had advanced caries (ICDAS-II scores 5 and 6).

According to the BEWE scoring system, 8 (34.8%) participants exhibited no erosive tooth wear, 5 (21.7%) participants showed an initial loss of surface texture, 7 (30.4%) participants demonstrated hard tissue loss involving less than 50% of the surface area, and 3 (13.0%) participants had hard tissue loss affecting more than 50% of the surface area.

In the assessment using the DDE Index, 8 (34.8%) participants exhibited no developmental enamel defects, while 15 (65.2%) participants displayed at least one developmental enamel defect.

When the relationship between the participants' baseline DMFT (10.91±6.06), DI (1.26±0.82), CI (0.56±0.73), and OHI-S (1.83±1.39) scores was assessed using the Pearson correlation coefficient, a moderately positive and significant correlation ($r=0.435$, $P=.038$) was found between DMFT and CI. Strong positive and significant correlations were also observed between DI and CI ($r=0.599$, $P=.003$), DI and OHI-S ($r=0.908$, $P<.001$), and CI and OHI-S ($r=0.880$, $P<.001$) (Table 1).

Analysis of DI, CI, and OHI-S index scores at baseline and post-visit assessments revealed a statistically significant decrease in scores. Additionally, the total scores from the Oral Hygiene Skills Survey, which were used to assess participants' toothbrushing behavior, showed a significant increase following the visits (Table 2).

Data on participants' toothbrushing frequency, brushing method, and toothpaste quantity observed during the visits are summarized in Table 3. Analysis of observational data from the initial visit and subsequent follow-ups revealed an increase in both the frequency of daily toothbrushing and the appropriate use of toothpaste. When examining the distribution of toothbrushing frequency across different visits, a statistically significant difference was identified ($P=.008$). Post-hoc analysis revealed a statistically significant difference between baseline

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Table 2 DI, CI, and OHI-S results at baseline and follow-up visits

Index	Baseline, mean ± SD	Month 1, mean ± SD	Month 3, mean ± SD	Month 6, mean ± SD	$P^{\dagger}$	F	Partial Eta-square	df
DI	1.27 ± 0.83[a]	0.59 ± 0.61[b]	0.86 ± 0.70[b]	0.67 ± 0.72[b]	<.001*	11.257	0.338	1.718
CI	0.57 ± 0.73[a]	0.28 ± 0.66[b]	0.41 ± 0.72[a,b]	0.34 ± 0.69[b]	.014*	6.021	0.215	2.008
OHI-S	1.83 ± 1.39[a]	0.86 ± 1.21[b]	1.28 ± 1.34[b]	1.01 ± 1.36[b]	.001*	12.718	0.366	1.876
Oral Hygiene Skills Survey	31.39 ± 1.90[a]	35.22 ± 2.43[b]	36.57 ± 1.85[b]	36.87 ± 1.91[b]	.016*	64.829	0.747	2.347

*Statistically significant ($P < .05$).
†Repeated measures ANOVA with post-hoc Bonferroni test.
[ab]Different superscript letters in the same line define statistically significance between different time intervals.
CI, Calculus Index; df, degree of freedom; DI, Debris Index; OHI-S, Simplified Oral Hygiene Index; SD, standard deviation.

and the first month ($P = .007$), while no significant differences were observed among the other time points ($P > .05$). Despite being instructed in the roll brushing technique, most participants were found to practice the scrub brushing method. Furthermore, no statistically significant differences were observed in the distributions of the correctness of brushing methods or the quantity of toothpaste used across subsequent visit ($P = .954$ and $P = .090$, respectively).

Discussion

Oral health plays a significant role in influencing various aspects of a patient's wellbeing, including their quality of life, self-esteem, speech, nutritional status, and broader social and psychological domains.[28] Individuals with IDDs often have limited access to preventive dental services and are therefore more likely to experience a higher incidence of tooth decay and the need for tooth extraction.[29] Consequently, poor oral health can adversely impact the quality of life and overall health of individuals with IDDs, whose life expectancy has increased under modern conditions.[1] In this context, the present study aimed to evaluate the oral health problems of adolescents with IDDs who require special education and to assess the effectiveness of a dental hygiene education program provided through subsequent visits. The findings demonstrated that the oral hygiene habits of adolescents with IDDs can improve with targeted oral hygiene education, leading to the rejection of the null hypothesis.

Individuals with IDDs are particularly vulnerable to the development of dental caries, a susceptibility arising from the complex interplay of inherent predispositions and the unique challenges posed by their condition. This heightened risk is shaped by a combination of biologic, behavioral, and social determinants, including difficulties in maintaining effective oral hygiene, limited access to regular dental care, and dietary habits that may create cariogenic environments.[30] Children with IDDs or autism spectrum disorder, assessed using the DMFT Index, exhibited a significantly higher prevalence of dental caries compared to their typically developing peers.[12] In a study conducted in China involving 450 children aged 12 to 17 enrolled in special education schools, the mean DMFT value was found to be 1.5 ± 2.0.[31] A scoping review of 31 studies in India, involving children and adolescents with IDDs, reported a mean score of DMFT Index of 2.4 (range 0.62 to 6.98).[30] A study conducted in special education schools in Türkiye revealed that individuals with IDDs had a mean DMFT score of 4.15 ± 1.90.[32] The primary determinants of the DMFT Index were identified as the severity of disability, socioeconomic status, and parental education level.[30] In comparison, adolescents in the current study, who had parents with relatively low educational attainment, exhibited a mean DMFT score of 10.91 ± 6.06, potentially accounting for this significant difference based on the aforementioned factors. Unlike the DMFT, which provides only a general overview, the ICDAS-II diagnostic criteria enable a more detailed assessment of the severity of dental caries.[33] In the current study, nearly all participants—except one—were found to have moderate or advanced caries, with 17.4% classified as moderate and 78.3% as advanced. These results underscore the urgent need for targeted dental interventions and comprehensive caries management strategies for adolescents with IDDs.

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Table 3 Distribution of toothbrushing frequency, technique, and toothpaste quantity across subsequent visits

Variable		Baseline	Month 1	Month 3	Month 6	*P*
Toothbrushing frequency	No brushing	12 (52.2%)	3 (13.0%)	6 (26.1%)	6 (26.1%)	.008*†
	Once	8 (34.85%)	14 (60.9%)	8 (34.8%)	10 (43.5%)	
	Twice	3 (13.0%)	5 (21.7%)	8 (34.8%)	6 (26.1%)	
	Three times	0 (0%)	1 (4.3%)	1 (4.3%)	1 (4.3%)	
Appropriate tooth-brushing method	True	5 (21.7%)	6 (26.1%)	5 (21.7%)	5 (21.7%)	.954‡
	False	18 (78.3%)	17 (73.9%)	18 (78.3%)	18 (78.3%)	
Appropriate toothpaste quantity	True	10 (43.5%)	12 (52.2%)	16 (69.6%)	16 (69.6%)	.090‡
	False	13 (56.5%)	11 (47.8%)	7 (30.4%)	7 (30.4%)	

*Statistically significant ($P < .05$).
†Friedmann test with Wilcoxon signed test.
‡Cochrane Q test.

ETW refers to the chemical degradation of dental structures caused by external or internal acids or chelating agents interacting with plaque-free tooth surfaces.[34] Common substances associated with erosive effects include energy drinks, sports drinks, alcoholic beverages, juice, fruit, mineral water, tea, coffee, salad dressings, and medications.[35,36] It is assumed that the consumption of acidic citrus fruits and related products can increase the risk of ETW by up to 37 times.[37] The educational level of parents may significantly influence their daily decisions regarding their children's dietary practices. Consequently, insufficient parental education could potentially increase the risk of ETW in children.[38] In addition to extrinsic acids introduced through diet, gastroesophageal reflux disease has been identified as a potential cause of ETW.[36] Moreover, ETW observed in individuals with IDDs may represent an oral manifestation of this condition.[39] Despite this, scientific literature on the prevalence of ETW among individuals with IDDs remains limited. For instance, a study by Marro et al[40] on Olympic athletes with IDDs found that 46.67% of young individuals with IDDs exhibited ETW. In the present study, 65.2% of the adolescents with IDDs were found to have ETW. This increased prevalence is likely due to multiple factors, including the participants' living conditions, dietary patterns, and prescribed medications. A review of studies regarding permanent dentition in children and adolescents has shown that the mean prevalence of ETW is approximately 21% in the United States, 20% in Asia, 22% in Europe, and 41% in the Middle East and Africa.[41] These figures suggests that the prevalence of ETW in adolescents with IDDs included in current study is significantly higher than in the general population.

Factors such as early embryologic changes, genetics, pregnancy or birth complications, external influences, and childhood health issues are considered potential causes of intellectual disability.[42] This condition may also be associated with developmental enamel defects, as systemic factors affecting neurologic development can influence enamel formation.[43] Moreover, the timing of developmental enamel defects occurrence during specific chronologic periods may play a crucial role in neurologic diagnosis, especially given that the etiology of many cases of intellectual disability remains unclear.[44] Research has shown that children with IDDs exhibit a higher prevalence of developmental enamel defects (27.78%) compared to their typically developing peers, who have a prevalence of 11.11%.[45] A study by Gerreth et al[43] on individuals with IDDs found that 19.4% of participants displayed developmental enamel defects. In the present study, 65.2% of adolescents with IDDs exhibited at least one tooth with developmental enamel defects. The higher prevalence of enamel defects observed in the present study, compared to rates reported in other research, may be attributed to environmental and congenital factors specific to the adolescents with IDDs included in the study.

Inadequate tooth cleaning in individuals with IDDs is primarily attributed to challenges in effectively controlling the toothbrush and learning difficulties. Consequently, these individuals require not only supervised oral hygiene practices but also regular dental check-ups to maintain optimal oral health.[46] A study comparing different disability groups found that individuals with IDDs had the highest OHI-S scores compared to those who were visually impaired, deaf-mute, or physically

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disabled. This suggests that individuals with IDDs may experience poorer oral hygiene and higher levels of periodontal disease due to difficulties in understanding and coordination.[11] In a study examining the OHI-S scores of individuals with different levels of IDDs, the results ranged from 1.85 to 2.39 on average, with no significant differences between the groups.[47] Similarly, in the present study, the baseline OHI-S scores for adolescents with mild and moderate IDDs were 1.83 ± 1.39. Improving the oral health of adolescents with IDDs may progress slowly at first, but persistence can lead to positive outcomes and invaluable rewards. Dental practitioners can make a significant impact not only on the oral health of these individuals but also on their overall quality of life.[48] In the present study, when the DI, CI, and OHI-S indices were evaluated at baseline and subsequent visits, a significant improvement in participants' oral hygiene was observed. Individuals with special needs require enhanced support from caregivers in daily activities and specialized oral health care from trained dental professionals. The establishment of dental clinics within special education schools or the implementation of regular on-campus dental visits is globally recommended.[12] This approach is supported by the current study, which demonstrates that subsequent visits can enhance Oral Hygiene Skills Survey scores and improve the daily toothbrushing habits of adolescents with IDDs requiring special education. In line with the present study, a 6-week intervention using a similar oral hygiene skills survey showed that oral hygiene education delivered to individuals with mild to profound IDDs improved adherence to the initial steps of toothbrushing and led to a reduction in plaque scores.[27]

In the present study, the roll brushing technique was chosen for teaching adolescents with IDDs due to its ease of application and effectiveness in plaque removal.[25] Despite this, participants continued to use the scrub method at each visit. The continued use of the scrub method was considered to be of limited significance, as there is insufficient evidence to suggest that one toothbrushing technique is more effective than another in terms of plaque removal and reduction of gingival inflammation.[49] Additionally, it was observed that participants tended to use excessive amounts of toothpaste, which was believed to stem from difficulties in decision-making and coordination of adolescents with IDDs.

The current study employed a questionnaire to assess participants' oral hygiene habits and practices at baseline, as well as at 1, 3, and 6 months; however, several limitations must be acknowledged. The 6-month follow-up period may be insufficient to fully assess overall health improvements. While positive changes were observed in certain parameters, these findings should be interpreted as potential indicators of long-term benefits rather than definitive outcomes. Additionally, the lack of a control group limits the ability to attribute observed changes solely to the intervention. The relatively small and homogenous sample further restricts the generalizability of the findings. Future research should involve longitudinal studies with extended follow-up periods and control groups to evaluate the sustainability of oral hygiene practices over time. Including participants across diverse age groups and intellectual levels would improve the study's relevance. Moreover, exploring digital educational methods, such as augmented reality, virtual reality, and other innovative digital tools, could provide valuable insights into effective strategies for improving oral health outcomes in this population. Given these limitations, the study should be regarded as a preliminary investigation that offers foundational insights for future research.

Conclusion

Based on the current findings, it was concluded that adolescents with IDDs requiring special education exhibit a high prevalence of dental caries, along with elevated rates of developmental enamel defects and erosive tooth wear. At baseline, participants demonstrated poor oral hygiene practices, with high debris, calculus, and Oral Hygiene Index scores. However, significant improvements in toothbrushing habits were observed during the follow-up period. While these findings suggest potential long-term benefits, the relatively short follow-up duration and absence of a control group limit the ability to draw definitive conclusions. Therefore, the present study should be considered a preliminary investigation. Regular dental check-ups and appropriate motivational strategies remain essential for improving the oral health of adolescents with IDDs.

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Disclosure

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