

Comparative Assessment of Oral Hygiene Practices Between Institutionalized and Non-Institutionalized Individuals with Intellectual Disabilities

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HOW TO CITE:

Kanhu Keshav Mahapatra,
Jamsheera Vadakkan, Natasha Sahu,
Aatya Takuli, Shree Mishra, Mokshika
Y. Patil, Gaurav Patri (2026).
Comparative Assessment of Oral
Hygiene Practices Between
Institutionalized and Non-
Institutionalized Individuals with
Intellectual Disabilities.
International Journal of Special
Education, 41(17s), 421-429.

ABSTRACT:

Background: Individuals with intellectual disabilities (ID) are recognized as a vulnerable population with significant unmet oral health needs. The care environment—whether institutional or community-based—may substantially influence their oral hygiene practices and clinical oral health outcomes.

Objectives: This cross-sectional study aimed to compare oral hygiene practices, caregiver involvement, and clinical oral health indices between institutionalized and non-institutionalized individuals with intellectual disabilities.

Methods: A total of 240 participants (120 institutionalized, 120 non-institutionalized) with intellectual disabilities aged 15–45 years were enrolled. Data on oral hygiene practices were collected using a structured questionnaire administered to caregivers. Clinical examination included the Oral Hygiene Index – Simplified (OHI-S), Plaque Index (PI), Gingival Index (GI), Decayed-Missing-Filled Teeth (DMFT) index, and Community Periodontal Index (CPI). Statistical analysis was performed using the Student's t-test and Chi-square test (SPSS v26.0; $p < 0.05$ considered significant).

Results: Non-institutionalized individuals demonstrated significantly better oral hygiene practices including higher rates of twice-daily brushing (50.8% vs. 24.2%), fluoride toothpaste use (65.0% vs. 40.0%), and regular dental visits (55.8% vs. 29.2%) ($p < 0.001$). Institutionalized individuals exhibited significantly higher mean OHI-S (2.81 ± 0.64 vs. 1.94 ± 0.52), PI (2.43 ± 0.58 vs. 1.71 ± 0.49), GI (1.98 ± 0.46 vs. 1.42 ± 0.38), and DMFT

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scores (5.34 ± 2.18 vs. 4.12 ± 1.96) ($p < 0.001$). Severity of ID was significantly correlated with poorer oral health in both groups.

Conclusion: Institutionalized individuals with intellectual disabilities demonstrate significantly poorer oral hygiene practices and clinical oral health status compared to their non-institutionalized counterparts. Targeted caregiver training, routine dental surveillance programs, and policy-level intervention are urgently needed to bridge this disparity.

Keywords: Intellectual disability, oral hygiene, institutionalized, OHI-S, DMFT, caregiver, periodontal health, special needs dentistry.

1. INTRODUCTION

Intellectual disability (ID), previously termed mental retardation, is a neurodevelopmental condition characterized by significant limitations in both intellectual functioning and adaptive behavior, with onset before the age of 18 years. The American Association on Intellectual and Developmental Disabilities (AAIDD) defines ID based on an intelligence quotient (IQ) below 70–75 along with concurrent deficits in adaptive functioning across conceptual, social, and practical domains.¹ Globally, the prevalence of ID is estimated to range between 1% and 3% of the population, with higher rates reported in low- and middle-income countries.²

Oral health represents one of the most neglected aspects of healthcare among individuals with ID. Several studies have consistently documented that this population bears a disproportionate burden of oral diseases, including dental caries, periodontal disease, malocclusion, bruxism, and oral mucosal lesions.^{3–5} The etiology is multifactorial: limited cognitive ability reduces comprehension of oral hygiene instructions; impaired motor coordination hinders effective toothbrushing; inadequate caregiver training results in suboptimal home oral care; financial constraints limit access to dental services; and behavioral challenges complicate clinical dental management.⁶

The care environment plays a pivotal role in shaping oral health behaviors. Individuals with ID may reside in institutional settings such as government-run special schools, care homes, or rehabilitation centers, or they may live with their families in community settings. Institutionalized individuals typically depend on facility-employed

caregivers for daily activities including oral care, while non-institutionalized individuals rely primarily on family members. The quality, consistency, and dental awareness of caregiving differ substantially between these two settings, potentially creating disparities in oral health outcomes.⁷

A systematic review by Landers et al. (2010) established that individuals with ID have poorer oral hygiene and a higher prevalence of periodontal disease compared to the general population, though caries rates may be comparable or even lower due to the use of sugar-free medications and controlled diets in some institutional settings.⁸ A Lebanese study by Diab et al. (2017) comparing institutionalized ID individuals with the national oral health survey found notable differences in caries and periodontal indices.⁹ Similarly, studies from Indonesia and Saudi Arabia have highlighted the critical dental treatment needs of institutionalized ID populations.^{10,11}

Despite growing international literature, data from India remain limited, particularly regarding comparative analyses between institutionalized and non-institutionalized ID groups. The Indian subcontinent presents unique challenges including heterogeneous socioeconomic conditions, variable caregiver literacy, and an underdeveloped special needs dentistry infrastructure. Understanding the differences in oral hygiene practices and clinical outcomes across these care settings is essential for designing targeted public health interventions.

Therefore, this study was undertaken to comparatively assess oral hygiene practices,

caregiver involvement, and clinical oral health indices (OHI-S, PI, GI, DMFT, and CPI) between institutionalized and non-institutionalized individuals with intellectual disabilities in Odisha, India, with the aim of identifying modifiable factors and informing future care protocols.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This cross-sectional observational study was conducted over a period of twelve months (January 2023 – December 2023) at three institutional care facilities and three community-based special education centers in Bhubaneswar and Durg, India. Ethical approval was obtained from the Institutional Ethics Committee of Kalinga Institute of Dental Sciences, KIIT Deemed to be University (Ref. No. KIDS/IEC/2022/147). Written informed consent was obtained from the legal guardians or caregivers of all participants.

2.2 Study Participants and Sampling

A total of 240 individuals with ID were enrolled: 120 institutionalized (residing in residential care facilities) and 120 non-institutionalized (living with families and attending day-care special education schools). Convenience sampling was employed. Inclusion criteria: diagnosed intellectual disability as per DSM-5 criteria, age between 15 and 45 years, presence of at least 20 natural teeth, and caregiver availability for interview. Exclusion criteria: severe systemic illnesses, subjects on medications known to affect oral tissues (e.g., phenytoin, calcium channel blockers), and those with autism spectrum disorder as a primary diagnosis.

2.3 Data Collection

A pre-validated, structured questionnaire was administered to caregivers in their preferred language (Odia, Hindi, or English) to record sociodemographic variables and oral hygiene practices, including frequency of tooth brushing, type of cleaning aid, use of fluoride toothpaste, caregiver assistance during brushing, use of dental

floss and mouthwash, and frequency of dental visits. The questionnaire was pilot-tested on 20 participants and demonstrated good internal consistency (Cronbach's $\alpha = 0.81$).

2.4 Clinical Examination

Clinical oral examinations were performed by two calibrated examiners (inter-examiner reliability $\kappa = 0.87$) under adequate natural and artificial illumination using standardized WHO criteria. The following indices were recorded: (1) Oral Hygiene Index – Simplified (OHI-S) by Greene and Vermillion; (2) Plaque Index (PI) by Silness and L  e; (3) Gingival Index (GI) by L  e and Silness; (4) DMFT Index (Decayed, Missing, Filled Teeth); and (5) Community Periodontal Index (CPI) by the WHO. All examinations were performed after participants were instructed to refrain from eating, drinking, or tooth brushing for two hours prior to assessment.

2.5 Statistical Analysis

Data were entered into Microsoft Excel 2021 and analyzed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics including frequencies, percentages, means, and standard deviations were computed. The Chi-square (χ^2) test was used to compare categorical variables between groups. The independent samples Student's t-test was used to compare continuous variables. One-way ANOVA with post-hoc Tukey's test was used to assess differences across severity categories of ID. A p-value of < 0.05 was considered statistically significant.

3. RESULTS

3.1 Sociodemographic Characteristics

The two groups were comparable in terms of age ($p = 0.512$), gender distribution ($p = 0.695$), and severity of ID ($p = 0.431$), ensuring that any observed differences in outcomes could be attributed to the care setting rather than demographic confounders. The sociodemographic profile is summarized in Table 1.

Table 1: Sociodemographic Characteristics of Study Participants

Variable	Institutionalized (n=120)	Non-Institutionalized (n=120)	Total (n=240)	p-value
Age (Mean $\pm$ SD, years)	24.3 $\pm$ 6.8	23.7 $\pm$ 7.1	24.0 $\pm$ 6.9	0.512
Gender: Male	68 (56.7%)	65 (54.2%)	133 (55.4%)	0.695
Gender: Female	52 (43.3%)	55 (45.8%)	107 (44.6%)	
Mild ID	42 (35.0%)	48 (40.0%)	90 (37.5%)	0.431
Moderate ID	51 (42.5%)	46 (38.3%)	97 (40.4%)	
Severe ID	27 (22.5%)	26 (21.7%)	53 (22.1%)	
Duration of disability > 10 yrs	89 (74.2%)	82 (68.3%)	171 (71.3%)	0.287

*p < 0.05 denotes statistical significance; ID = Intellectual Disability; Inst. = Institutionalized

3.2 Oral Hygiene Practices

Significant differences in oral hygiene practices were identified between the two groups. Non-institutionalized individuals exhibited markedly higher rates of twice-daily brushing (50.8% vs. 24.2%), use of fluoride toothpaste (65.0% vs. 40.0%), and regular dental visits (55.8% vs.

29.2%). Conversely, institutionalized participants showed greater reliance on caregiver-assisted brushing (78.3% vs. 44.2%). Flossing and mouthwash use remained low across both groups and did not reach statistical significance (Table 2).

Table 2: Comparison of Oral Hygiene Practices Between Groups

Oral Hygiene Practice	Institutionalized n (%)	Non-Institutionalized n (%)	Chi-square	p-value
Brushes teeth daily	81 (67.5%)	103 (85.8%)	10.28	0.001*
Brushes twice daily	29 (24.2%)	61 (50.8%)	17.35	<0.001*
Uses fluoride toothpaste	48 (40.0%)	78 (65.0%)	14.52	<0.001*
Requires caregiver assistance	94 (78.3%)	53 (44.2%)	29.01	<0.001*
Uses dental floss regularly	8 (6.7%)	14 (11.7%)	2.14	0.143
Uses mouthwash	12 (10.0%)	22 (18.3%)	3.53	0.060
Regular dental visits (≥ 1 /year)	35 (29.2%)	67 (55.8%)	16.88	<0.001*
Caregiver-supervised brushing	74 (61.7%)	39 (32.5%)	19.40	<0.001*

*p < 0.05 denotes statistical significance

3.3 Clinical Oral Health Indices

Institutionalized individuals demonstrated significantly higher mean values across all clinical oral health indices. The OHI-S was 2.81 ± 0.64 in the institutionalized group versus 1.94 ± 0.52 in

the non-institutionalized group ($t = 11.32$, $p < 0.001$). Similarly, the PI, GI, DMFT, and CPI were all significantly elevated in institutionalized individuals. Detailed comparisons are presented in Table 3.

Table 3: Comparison of Clinical Oral Health Indices Between Groups

Index	Institutionalized Mean $\pm$ SD	Non-Institutionalized Mean $\pm$ SD	t- value	p-value
OHI-S (Oral Hygiene Index – Simplified)	2.81 $\pm$ 0.64	1.94 $\pm$ 0.52	11.32	<0.001*
Plaque Index (PI)	2.43 $\pm$ 0.58	1.71 $\pm$ 0.49	10.14	<0.001*
Gingival Index (GI)	1.98 $\pm$ 0.46	1.42 $\pm$ 0.38	9.87	<0.001*
DMFT Score	5.34 $\pm$ 2.18	4.12 $\pm$ 1.96	4.41	<0.001*
CPI (Community Periodontal Index)	2.24 $\pm$ 0.71	1.68 $\pm$ 0.59	6.49	<0.001*
Calculus Index (CI-S)	1.52 $\pm$ 0.48	0.98 $\pm$ 0.41	8.93	<0.001*

*p < 0.05 denotes statistical significance; OHI-S = Oral Hygiene Index-Simplified; PI = Plaque Index; GI = Gingival Index; DMFT = Decayed-Missing-Filled Teeth; CPI = Community Periodontal Index; CI-S = Calculus Index-Simplified

3.4 Effect of Severity of ID on Oral Health Indices

When stratified by severity of ID, poorer oral health indices were observed across all subcategories in the institutionalized group

compared to non-institutionalized counterparts. As severity increased from mild to severe ID, all indices worsened in both groups; however, the disparity was most pronounced among individuals with severe ID. Table 4 presents the stratified analysis.

Table 4: Oral Health Indices Stratified by Severity of Intellectual Disability

Severity of ID	Group	OHI-S (Mean $\pm$ SD)	PI (Mean $\pm$ SD)	GI (Mean $\pm$ SD)	DMFT (Mean $\pm$ SD)	p
Mild ID	Inst.	2.31 $\pm$ 0.51	2.02 $\pm$ 0.47	1.64 $\pm$ 0.38	4.21 $\pm$ 1.89	0.002*
	Non-Inst.	1.82 $\pm$ 0.44	1.61 $\pm$ 0.41	1.29 $\pm$ 0.33	3.54 $\pm$ 1.72	
Moderate ID	Inst.	2.88 $\pm$ 0.60	2.51 $\pm$ 0.55	2.01 $\pm$ 0.44	5.41 $\pm$ 2.04	<0.001*
	Non-Inst.	1.98 $\pm$ 0.50	1.73 $\pm$ 0.48	1.44 $\pm$ 0.37	4.21 $\pm$ 1.98	
Severe ID	Inst.	3.42 $\pm$ 0.71	2.98 $\pm$ 0.62	2.45 $\pm$ 0.51	6.88 $\pm$ 2.31	<0.001*
	Non-Inst.	2.17 $\pm$ 0.58	1.89 $\pm$ 0.52	1.61 $\pm$ 0.44	4.78 $\pm$ 2.11	

*p < 0.05 denotes statistical significance; Inst. = Institutionalized; Non-Inst. = Non-Institutionalized

4. FIGURES

The following figures illustrate the key findings of this study. Figure 1 presents a bar chart comparing mean OHI-S scores across groups and ID severity. Figure 2 depicts the proportion of participants practicing twice-daily brushing in

both groups. Figure 3 illustrates the DMFT score distribution across mild, moderate, and severe ID categories. Figure 4 shows the percentage distribution of caregiver assistance dependency in each group.

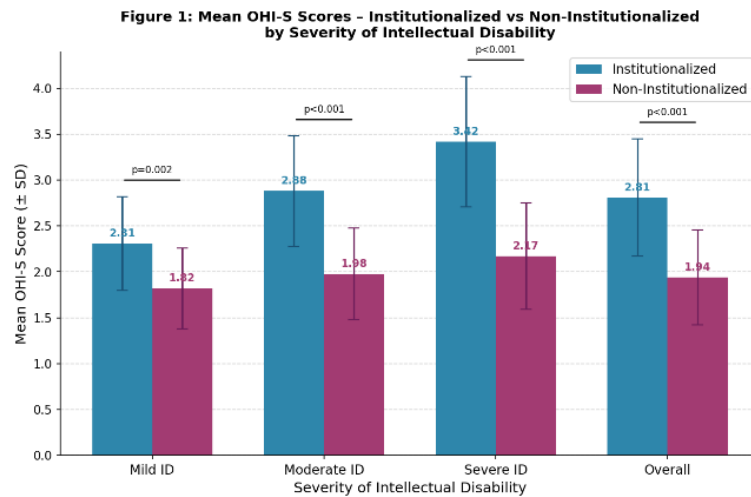


Figure 1: Bar Chart – Mean OHI-S Scores: Institutionalized vs Non-Institutionalized by Severity of ID

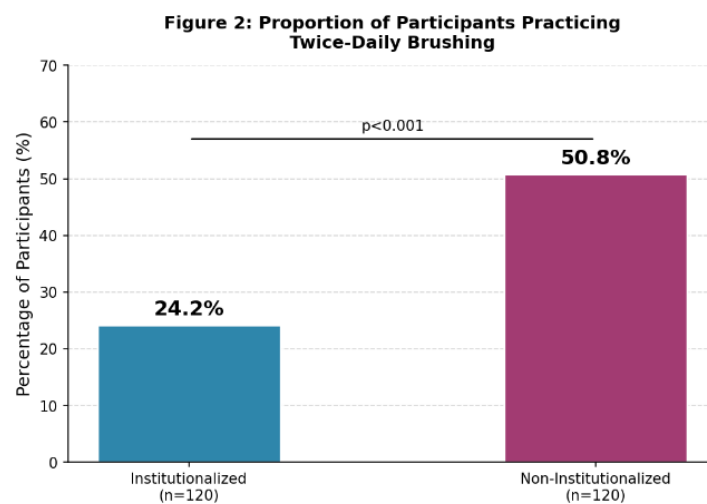


Figure 2: Bar Chart – Proportion Practicing Twice-Daily Brushing: Institutionalized vs Non-Institutionalized

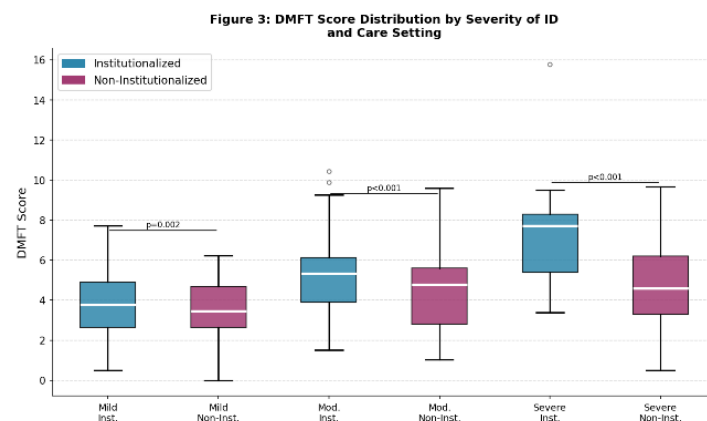


Figure 3: Box Plot – DMFT Score Distribution by ID Severity and Care Setting

Figure 4: Caregiver Assistance Dependency Comparison Between Groups (p<0.001)

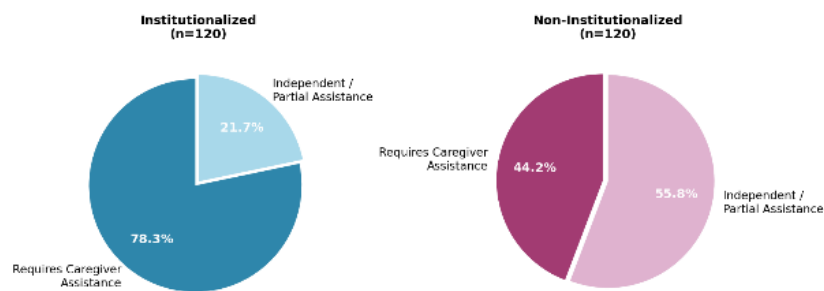


Figure 4: Pie Chart – Caregiver Assistance Dependency Comparison Between Groups

5. DISCUSSION

The present study provides a comprehensive comparative assessment of oral hygiene practices and clinical oral health status between institutionalized and non-institutionalized individuals with intellectual disabilities in India. The principal finding was that institutionalized individuals exhibited significantly poorer oral hygiene practices and higher indices of oral disease across all clinical parameters measured.

The higher OHI-S scores observed in institutionalized participants (2.81 ± 0.64) compared to non-institutionalized participants (1.94 ± 0.52) are consistent with findings reported by Diab et al. in Lebanon and Wulandari et al. in Indonesia.^{9,10} The reliance of 78.3% of institutionalized individuals on caregiver-assisted brushing, compared to 44.2% in the non-institutionalized group, underscores the critical dependence of this group on the quality and consistency of institutional caregiving. This mirrors the conclusions drawn by Abdullah et al. in Brunei Darussalam, who emphasized the pivotal role of caregiver education in determining oral hygiene outcomes among adults with ID.¹²

The lower rates of twice-daily brushing (24.2%) and fluoride toothpaste use (40.0%) among institutionalized individuals suggest systemic gaps in institutional oral care protocols. Institutions may prioritize broader medical and behavioral management over preventive dental care, resulting in dental neglect. This is in contrast to family caregivers, who may be more attentive to the individual oral hygiene needs of their dependents

due to personal connection and motivation. Previous literature has documented that caregiver attitude and dental health literacy are among the strongest predictors of oral health outcomes in individuals with ID.¹³

The mean DMFT score of 5.34 ± 2.18 among institutionalized participants is notably higher than the 4.12 ± 1.96 observed in non-institutionalized individuals. This finding is consistent with data from the systematic review and meta-analysis of Indian IDD children by Trivedi et al. (2024), which reported a pooled caries prevalence of 64% in children with ID, with poor oral hygiene present in 38% despite regular brushing.³ The high untreated caries burden observed in institutionalized settings reflects the gap between dental need and utilization of dental services, as evidenced by the finding that only 29.2% of institutionalized individuals accessed dental care at least once yearly compared to 55.8% of non-institutionalized individuals.

The elevated CPI and GI scores in the institutionalized group indicate greater periodontal morbidity. Periodontal disease in this population is multifactorial, attributable to inadequate plaque removal, xerostomia secondary to polypharmacy, nutritional deficiencies, and possible immunological alterations associated with ID.^{6,11} Institutionalization has been associated with a 2.4-fold greater odds of untreated dental decay in previous research, a finding corroborated by our data.¹⁴

The stratified analysis by ID severity revealed that the disparity between groups was most pronounced among individuals with severe ID. Severe ID is associated with profoundly limited adaptive capacity, making individuals almost entirely dependent on caregivers for daily oral hygiene. In institutional settings, where caregiver-to-resident ratios may be suboptimal (often 1:7 or more), adequate individualized oral care is difficult to maintain.¹⁰ This highlights the need for targeted policies specifically addressing the dental needs of individuals with severe ID in residential care.

The findings of this study align with the growing global recognition that oral health disparities in people with ID are not solely a consequence of the disability itself, but are significantly shaped by the environment, caregiver competence, and access to dental services.¹⁵ The Oral Sphere Journal of Dental and Health Sciences has increasingly featured research on preventive dentistry and oral health in special populations, reflecting the importance of this area.¹⁶ Additionally, Kashwani's body of work on knowledge, attitudes, and practices in dental health care underlines the critical role of stakeholder awareness and education in improving oral health outcomes across vulnerable populations.¹⁶

Limitations of this study include its cross-sectional design, which precludes establishment of causal relationships. Convenience sampling may limit generalizability. The use of caregiver-reported data for oral hygiene practices introduces potential recall and social desirability bias. Future longitudinal studies with interventional components—particularly caregiver oral health education programs—are needed to determine the effectiveness of targeted interventions in institutional settings.

6. CONCLUSION

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This study demonstrates that institutionalized individuals with intellectual disabilities have significantly inferior oral hygiene practices and poorer clinical oral health status compared to those living in community-based care. The disparities are evident across multiple domains including brushing frequency, fluoride toothpaste use, dental visit patterns, and clinical indices of plaque accumulation, gingival inflammation, caries experience, and periodontal status. These differences are amplified with increasing severity of intellectual disability. The findings underscore the urgent need for structured caregiver oral health training programs, mandatory oral health surveillance protocols in residential institutions, and integration of dental care within the broader framework of disability support services in India and similar developing-country contexts.

DECLARATIONS

Ethical Approval: Approved by Institutional Ethics Committee, Kalinga Institute of Dental Sciences, KIIT Deemed to be University (Ref. No. KIDS/IEC/2022/147).

Informed Consent: Written informed consent obtained from all legal guardians or caregivers of participants.

Conflict of Interest: The authors declare no conflicts of interest.

Funding: No external funding was received for this study.

Data Availability: Data are available from the corresponding author on reasonable request.

Author Contributions: KKM: data collection, manuscript preparation; JV: clinical examination; NS: statistical analysis; AT: literature review; SM: data interpretation; MYP: manuscript editing; GP: study design, supervision, corresponding author.

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