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A Comparison of Oral Hygiene and Gingival Health Between Children With Autism Spectrum Disorder and Neurotypical Peers: A Narrative Review

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Abstract

Comparative studies examining oral hygiene and gingival health in children with autism spectrum disorder (ASD) have produced inconsistent findings. This narrative review examines these findings and potential sources of heterogeneity. PubMed and Europe PMC were searched for English-language literature published from January 2002 through October 9, 2026, supplemented by reference screening and targeted web searches. Comparative studies were summarized descriptively without meta-analysis or formal risk-of-bias assessment.

Thirty-one studies from 20 countries or territories included 2,329 participants with ASD. Among 25 studies assessing plaque or oral hygiene, 15 reported poorer outcomes in ASD groups, three reported better outcomes, four found no significant difference, and three lacked clear statistical comparisons. Among 21 studies assessing gingival or periodontal outcomes, 11 reported poorer outcomes, two reported better outcomes, four found no significant difference, one reported mixed findings, and three had unclear comparisons. Recruitment settings, comparator selection, and oral hygiene supervision may contribute to variability.

Poorer oral hygiene and gingival outcomes were reported more frequently among children with ASD, but findings were inconsistent. Observational evidence does not establish an independent causal effect of ASD. Individualized preventive care is appropriate, while better-controlled studies are required to clarify contributing factors and intervention effectiveness.

Categories: Public Health, Oral Medicine, Dentistry
Keywords: autism spectrum disorder, caregiver support, dental plaque, gingivitis, narrative review, oral hygiene, pediatric dentistry, special care dentistry

Introduction And Background

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by differences in social communication and interaction and by restricted or repetitive patterns of behavior, interests, or activities [1]. In the United States, surveillance identified ASD in approximately one in 31 children aged eight years in 2022, compared with one in 36 in 2020 [2,3]. This underscores the importance of accessible, individualized dental prevention for children on the autism spectrum.

Oral hygiene may be affected by sensory sensitivities, communication differences, difficulty tolerating changes to routines, and dependence on caregiver assistance. A review reported sensory processing differences in up to 90% of children with ASD, while difficulties with toothbrushing were reported by up to 61% of parents in the settings studied [4]. Dental visits may pose additional challenges related to unfamiliar sensory stimuli and communication needs [5]. Plaque-induced gingivitis arises from the accumulation of dental biofilm [6], but the clinical effect of ASD-related barriers will also depend on daily support, diet, access to care, and coexisting conditions. Certain medications, including phenytoin, can cause gingival enlargement independently of plaque control [7].

Comparative evidence is inconsistent. Some studies observed substantially poorer oral hygiene and more gingival inflammation in children with ASD [8,9], whereas others reported better indices in ASD samples [10,11]. Published reviews likewise differ: one systematic review did not find evidence that ASD independently predisposes children to oral disease [12]; a second found higher plaque but not significantly higher gingival index scores [13], although concerns about its reporting have been raised [14]; and a third reported higher plaque and gingival indices [15]. A 2024 review across age groups identified small adverse differences with very low certainty [16], while a recent pediatric meta-analysis found no statistically significant pooled differences for several hygiene and gingival indices despite substantial heterogeneity [17].

An important unresolved question is why the direction of the association between ASD and oral hygiene or gingival outcomes varies across studies. Although previous systematic reviews and meta-analyses have summarized comparative findings, they have not fully resolved the contribution of differences in recruitment settings, comparator populations, oral hygiene supervision, and clinical measurement methods. This narrative review therefore examines these sources of heterogeneity across 31 comparative studies, distinguishes plaque and oral hygiene outcomes from gingival and periodontal measures, and considers their implications for clinical practice and future research. Its purpose is to critically interpret the inconsistencies in the literature rather than generate another pooled effect estimate.

Review

Literature search and scope

This narrative review was intended as a critical synthesis rather than a systematic review or meta-analysis. PubMed and Europe PMC were searched on October 9, 2026, for English-language records published from January 2002 onward. Search concepts combined autism or ASD with dental plaque, oral hygiene, gingivitis, gingival health, periodontal health, or oral health. Reference lists of relevant reviews [16,17] and included papers were screened, and targeted web searches were used to identify recent publications. Eligible studies directly compared clinically assessed oral hygiene or plaque, gingival inflammation, or periodontal status in a pediatric or predominantly pediatric ASD group with a neurotypical comparison group, including siblings. Questionnaire-only studies, reports based solely on administrative records, and studies without a comparison group were not included in the comparative synthesis. One study with participants up to age 22 years was retained because the mean participant age was under 13 years [9]. The review therefore focuses on pediatric and predominantly pediatric samples rather than exclusively on participants younger than 18 years. Studies extending into young adulthood were eligible only when their populations were predominantly pediatric. Reviews involving broader adult populations were discussed for contextual comparison and were not included in the counts of primary comparative studies. The searches identified 845 records (PubMed, 452; Europe PMC, 393). After removal of 384 duplicates, 461 records were screened, and 430 were excluded based on title and abstract. Of 31 reports sought, three could not be retrieved in full and had abstracts insufficient to judge eligibility, and one was excluded for probable overlap with the sample of an included study. Twenty-seven studies were included from the database searches and four from citation and web searching, giving 31 studies (Figure *1*).

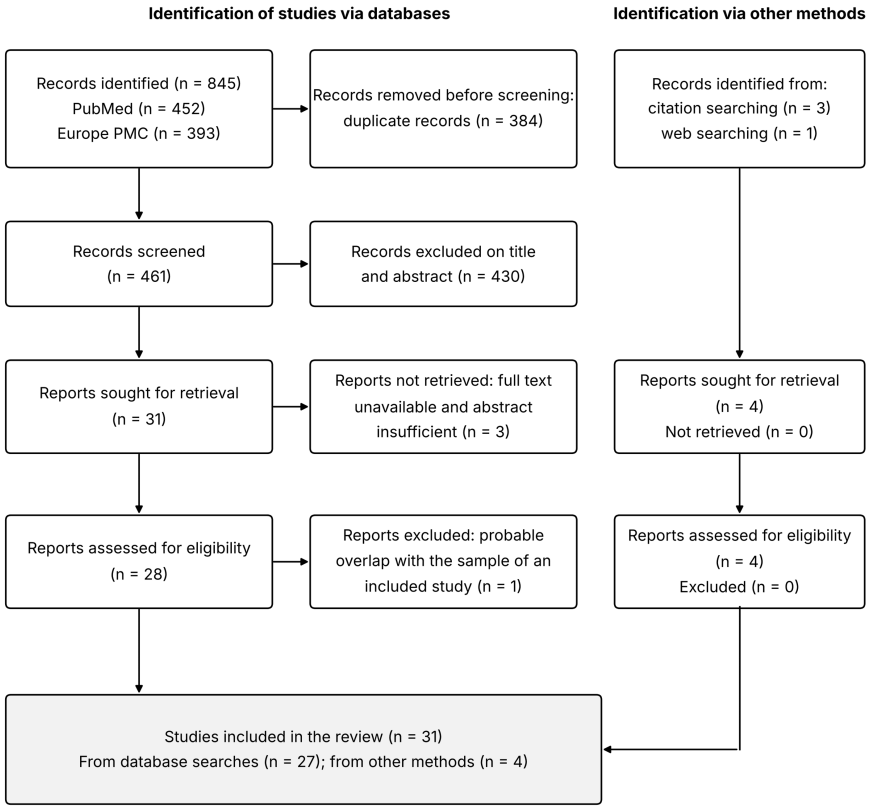

FIGURE 1: Flowchart of study identification and selection.

Counts are from the PubMed and Europe PMC searches run on October 9, 2026. Records were deduplicated before screening; reports not retrieved were those with no accessible full text and an abstract insufficient to judge eligibility.

Study identification, selection, data abstraction, and interpretation were undertaken by a single author, with AI assistance disclosed below. There was no registered protocol, duplicate independent screening, formal risk-of-bias assessment, or quantitative pooling. Results were organized by outcome and reported direction of between-group differences, with significance judgments drawn from the primary authors' reports. These counts are descriptive and should not be interpreted as pooled effect estimates or as an assessment of the certainty of evidence.

Study-level sample sizes, participant characteristics, and clinical outcome measures are summarized in Tables *1* and 2. Group-specific numerical results, reported effect estimates, p-values, and 95% confidence intervals are presented where available from the accessible sources. Missing numerical data were not imputed, and no pooled effect estimates or independent statistical tests were calculated.

For 16 of the 31 included studies, the author did not have access to the full text; data for those studies were derived from abstracts and publisher records, as indicated in Table *1*. Claims based on those records should therefore be interpreted with particular caution.

Overview of the comparative studies

The 31 comparative studies were published between 2010 and 2026, including 14 published from 2020 onward, and were conducted in 20 countries or territories. India contributed seven studies, and Turkey contributed four (Table *1*). Across studies, 2,329 participants with ASD were included, ranging from 20 to 285 per study; at least 2,020 neurotypical controls were reported, with one study not specifying the control-group size in its abstract [10]. Participants were generally aged 3-16 years, although reported age ranges extended from 1 to 22 years. Accordingly, the findings concern predominantly pediatric samples rather than exclusively children younger than 18 years.

Study	Country	Recruitment of children with ASD	Controls	n (ASD/controls)	Age, years	Indices	Source	Matching variables	Oral hygiene supervision or assistance	Examiner calibration	Examiner blinding

Luppanapornlarp et al., 2010 [18]	Thailand	NR	NR (same-age non-autistic children)	32/48	8–12 (9.7 vs 9.9)	Modified CPITN	Abstract	NR (same age)	NA (abstract only)	NA (abstract only)	NA (abstract only)
Jaber, 2011 [8]	United Arab Emirates	Two autism centers (Dubai, Sharjah)	Relatives/friends of patients; matched age, sex, SES	61/61	6–16 (8.45 vs 8.6)	OHI-S; GI	Full text	Age, sex, SES (attempted)	Not measured; brushing difficulties for trainers and parents noted in Discussion only	One examiner; intra-examiner kappa ≥ 0.73 (caries)	NR
Rai et al., 2012 [19]	India	NR	Healthy siblings	101/50	6–12	OHI-S	Abstract	None reported (sibling controls)	NA (abstract only)	NA (abstract only)	NA (abstract only)
Vajawat and Deepika, 2012 [9]	India	Specialized academy for students with disabilities and ASD	Regular school; age and SES matched	117/126	5–22* (12.8 vs 12.3)	PI; GI; CPITN	Full text	Age, SES	ASD group needed help with brushing; once-daily brushing 65.8% vs 68.3%	One examiner; calibration NR	NR
Al-Maweri et al., 2014 [20]	Yemen	Single autism rehabilitation center (Sana'a)	Two public schools; matched age, sex	42/84	5–16 (8.45 vs 8.6)	PI; GI	Full text	Age, sex	NR	One examiner, trained and calibrated; kappa NR	NR
El Khatib et al., 2014 [21]	Egypt	NR (Alexandria)	Healthy children	100/100	3–13	Plaque and gingival indices	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Richa et al., 2014 [22]	India	NR (Bangalore)	Children without autism	135/135	4–15	OHI-S	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Du et al., 2015 [10]	Hong Kong SAR, China	Random sample from 19 special child care centers	Mainstream preschools; matched age, sex	257/NR†	32–77 months (mean 59)	Plaque and gingival scores	Abstract	Age, sex	NA (abstract only)	NA (abstract only)	NA (abstract only)
Fakroon et al., 2015 [23]	Libya	Single ASD center (Benghazi)	Schoolchildren; matched age, sex, SES	50/50	3–14 (mean 7.29)	CPITN	Abstract	Age, sex, SES	NA (abstract only)	Calibrated examiner	NA (abstract only)
Diab et al., 2016 [24]	Saudi Arabia	Single autism school (Riyadh)	Dental college outpatient clinic	50/50	4–15 (8.5 vs 8.7)	PI; MGI	Full text	Age, sex	NR	Two examiners; kappa 0.96 intra, 0.90 inter	NR
Bhandary and Hari, 2017 [25]	India	Special schools and hospitals (Mangalore)	Healthy siblings	30/30	6–12	OHI-S; gingival bleeding	Abstract	None reported (sibling controls)	NA (abstract only)	NA (abstract only)	NA (abstract only)
Kalyoncu and Tanboga, 2017 [26]	Turkey	NR (Istanbul)	Primary school students	60/60	6–14 (10.8 vs 10.5)	Modified plaque and gingival indices	Full text	None reported (similar mean age)	Parent-performed brushing 40% vs 2%	NR	NR
Önol and Kırzıoğlu, 2018 [27]	Turkey	Seven special education and rehabilitation centers (Isparta)	Elementary school, same region	63/111	6–14 (10.5 vs 10.2)	PI; GI	Full text	None reported (same region)	Self-brushing 4.8% vs 75.7%; brushed by parents 41.3% vs 7.2%, by caregivers 24.6% vs 16.2%; never brushed 29.4% vs 0.9%	One examiner; calibration NR	NR
Hussein et al., 2018 [28]	Iraq	Autism centers (Erbil)	Schools; matched age, sex, SES	44/44	1–14	OHI-S; GI	Full text	Age, sex, SES	NR; brushing difficulties for trainers and parents noted in Discussion only	NR	NR
Morales-Chávez et al., 2019 [29]	Venezuela	NR	NR	34/34	4–13	OHI-S	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Suhaib et al., 2019 [30]	Pakistan	NR (Rawalpindi)	Healthy siblings	58/27	NR	Plaque on anterior	Abstract	None reported (sibling controls)	NA (abstract only)	NA (abstract only)	NA (abstract only)

						teeth					
Kuter and Guler, 2019 [31]	Turkey	NR	Healthy children (source NR)	285/122	5–16	Plaque index	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Daneshvar et al., 2020 [32]	Iran	NR (Rasht)	Healthy children	55/165	6–12	Gingivitis (index NR in abstract)	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Bagattoni et al., 2021 [33]	Italy	NR	NR	64/64	Mean 9.0 (ASD)	Plaque index	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Moorthy et al., 2022 [34]	India	NR (Mumbai)	Children without ASD	136/136	5–12	OHI-S	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Yakubova et al., 2023 [35]	Ukraine	Preschool (Kyiv)	Preschool children without disorders	69/23	5–6	PMA index	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Narula et al., 2024 [11]	India	Hospital child development center with daily oral hygiene routine (New Delhi)	Dental college outpatient department; matched age, sex	80/80	5–14 (mean 7.96)	OHI-S; PI	Full text	Age, sex	Oral care routine taught by a special educator, rehearsed at every visit, followed under caregiver guidance	NR	NR
Mahmood et al., 2024 [36]	Iraq	Special needs center with staff-supported care (Erbil)	Children attending the same medical/dental centers	45/45	5–12	Modified PI and GI	Full text	None; SES differed between groups	Staff care stated in abstract only; not described in Methods	NR for clinical indices	NR
George et al., 2024 [37]	India	Hospital child development center (Thiruvalla)	General pediatric clinics; age-matched	96/96	3–5	PI; GI	Full text	Age	NR; brushing difficulty 60.4% vs 20.8%	Calibrated; intra-examiner kappa 0.82	NR
Mohd Radzuan et al., 2024 [38]	Malaysia	University dental faculty clinics (Selangor)	Pediatric dental clinic patients	28/30	3–16 (10.1 vs 9.4)	OHI-S; MGI; sBPE	Full text	None (groups similar in age, sex)	NR	One examiner; calibrated, kappa NR	NR
Prynda et al., 2025 [39]	Poland	Autism developmental support center (Katowice)	Recruited via primary schools and kindergartens	74/74	3–12 (9.0 vs 8.5)	OHI; SBI	Full text	None (groups similar in age, sex)	NR; brushing frequency only	NR	NR
Seda et al., 2025 [40]	Puerto Rico (USA)	University dental clinic, a Montessori school and an autism center	NR	22/27	5–18 (10.7 vs 10.2)	GI	Full text	Non-matched; adjusted for age, sex	NR; brushing difficulty more frequent in ASD (P = 0.041)	Two calibrated examiners; kappa 0.84 intra, 0.83 inter	NR
Veseli et al., 2026 [41]	Kosovo	NR	Healthy controls	45/45	4–6	PI; GI	Abstract	NR	NA (abstract only)	NA (abstract only)	NA (abstract only)
Omar et al., 2026 [42]	Saudi Arabia	NR (Dammam)	NR	26/20	5–16 (11.5 vs 8.9)	Modified PDI; gingival index	Full text	Described as age-matched; mean age 11.5 vs 8.9 years	NR	Two examiners; inter-examiner reliability assessed by re-scoring 10 cases	NR for group; reliability re-scoring blinded
Polat and Kılıçaslan, 2026 [43]	Turkey	University hospital child psychiatry clinic (Şanlıurfa)	Pediatric dentistry clinic attenders; matched age, sex	50/43	6–18 (median 10.5 vs 11.0)	OHI-S	Full text	Age, sex	NR	One examiner; intra-examiner ICC 0.96	Not blinded (stated by authors)
Esparza-Loredo et al., 2026 [44]	Mexico	Specialized ASD educational center (San Luis Potosí)	Neurotypical children; matched age, sex	20/40	5–12	DI-S	Abstract	Age, sex	NA (abstract only)	NA (abstract only)	NA (abstract only)

TABLE 1: Characteristics of the comparative studies discussed

Ages are ranges, followed in parentheses by means for children with ASD vs controls, where reported. Source indicates whether the full text or only the abstract and publisher record was available to the author. Percentages in the supervision column are ASD vs controls.

*Upper age limit above 18 years; mean age below 13 years. †Number of controls not reported in the abstract.

ASD: autism spectrum disorder; CPITN: Community Periodontal Index of Treatment Needs; DI-S: Simplified Debris Index; GI: Gingival Index; MGI: Modified Gingival Index; NA: not assessable from the abstract; NR: not reported; OHI(-S): (Simplified) Oral Hygiene Index; PDI: Periodontal Disease Index; PI: Plaque Index; PMA: papillary-marginal-attached index; sBPE: simplified Basic Periodontal Examination; SBI: Sulcus Bleeding Index; ICC: intraclass correlation coefficient; SES: socioeconomic status.

Most ASD samples were recruited from specialized education or autism centers, developmental services, or hospital clinics. Controls came from schools, kindergartens, or community settings in 10 studies; were siblings in three; were recruited from dental or pediatric clinics in six [11,24,36-38,43]; and were not clearly described in 12. Investigators used more than a dozen plaque, oral hygiene, gingival, or periodontal measures, frequently the Plaque Index (PI), Simplified Oral Hygiene Index (OHI-S), or Gingival Index (GI). Many samples were modest in size, and recruitment sources and examiner masking varied or were incompletely described. Such differences limit direct comparisons across settings and countries.

Oral hygiene and dental plaque

Of the 25 studies comparing oral hygiene or plaque, 15 reported significantly poorer scores or classifications among participants with ASD (Table *2*) [8,9,19-22,24,26,27,29,33,34,37,39,43]. Reported between-group differences in mean OHI-S scores ranged from approximately 0.2 points [19] to 1.6 points [22], while differences in mean PI scores ranged from approximately 0.3 [9] to 0.7 [33] in studies reporting these measures. In one study reporting adjusted results, ASD was associated with greater odds of falling into a poorer oral hygiene category (adjusted odds ratio, 4.65; 95% confidence interval, 2.05-10.56) [43]. These measures should not be compared as if they shared a common clinical scale or adjustment strategy.

Three studies reported significantly better plaque or oral hygiene outcomes among children with ASD [10,11,36], whereas four found no significant difference [31,38,41,44]. Three further studies did not present a clear between-group significance test [25,28,30]. In this latter group, the reported direction of the raw values differed: plaque was higher among participants with ASD in one study [30], and the mean OHI-S score was lower in another [28], while one abstract did not provide sufficient comparator data [25]. The number of statistically positive studies is not a substitute for pooled estimates and does not establish the magnitude or cause of differences.

Gingival and periodontal status

Twenty-one studies assessed gingival or periodontal outcomes (Table *2*). Eleven reported significantly poorer findings in the ASD group [8,9,18,20,21,24,26,27,32,37,39], using measures such as gingival inflammation, bleeding, gingivitis prevalence, or periodontal indices. Two reported better gingival outcomes: one found lower mean gingival scores in preschool children with ASD [10], and another reported lower adjusted GI values after controlling for age and sex even though the unadjusted comparison was not significant [40].

Study	Oral hygiene/plaque	Direction	Gingival/periodontal status	Direction
Luppanapornlarp et al., 2010 [18]	—	—	Periodontal status significantly poorer in ASD (P < 0.05)	Poorer
Jaber, 2011 [8]	Good oral hygiene 3.3% vs 59.0%; poor 59.0% vs 14.8% (P < 0.05)	Poorer	Gingivitis 97.0% vs 41.0%; generalized in 78.0% vs 20.0% of affected children (P < 0.05 for extent)	Poorer
Rai et al., 2012 [19]	Mean OHI-S 1.2 vs 1.0 (P < 0.001)	Poorer	—	—
Vajawat and Deepika, 2012 [9]	Mean PI 1.30 vs 1.00 (P < 0.001)	Poorer	Mean GI 1.00 vs 0.85 (P < 0.001); periodontal disease (CPITN) more prevalent (P < 0.001)	Poorer
Al-Maweri et al., 2014 [20]	Mean PI higher in ASD (P = 0.002)	Poorer	Mean GI higher in ASD (P = 0.037)	Poorer
El Khatib et al., 2014 [21]	Poorer oral hygiene in ASD (P < 0.001)	Poorer	Poorer gingival condition in ASD (P < 0.001)	Poorer
Richa et al.,	Mean OHI-S 2.07 ± 0.83 vs 0.46 ± 0.58	Poorer	—	—

2014 [22]	(significant)			
Du et al., 2015 [10]	Mean plaque score lower in ASD (P < 0.001)	Better	Mean gingival score lower in ASD (P < 0.001)	Better
Fakroon et al., 2015 [23]	—	—	Higher periodontal treatment need reported in ASD; abstract reports P > 0.05	Unclear
Diab et al., 2016 [24]	Mean PI 1.93 ± 0.36 vs 1.44 ± 0.43 (P < 0.001)	Poorer	Mean MGI 1.83 ± 0.65 vs 1.36 ± 0.86 (P = 0.003)	Poorer
Bhandary and Hari, 2017 [25]	Oral hygiene “fair” in ASD; between-group test not reported in abstract	Unclear	Gingival bleeding in ASD; between-group test not reported in abstract	Unclear
Kalyoncu and Tanboga, 2017 [26]	Plaque scores higher in ASD (P < 0.045)	Poorer	Fewer children with healthy gingivae in ASD (P < 0.0242)	Poorer
Önol and Kırzıoğlu, 2018 [27]	Mean PI higher in ASD (P < 0.001)	Poorer	Mean GI higher in ASD (P < 0.001)	Poorer
Hussein et al., 2018 [28]	Mean OHI-S 1.29 ± 0.89 vs 1.69 ± 0.81 (no test reported)	Unclear	More mild and severe gingivitis in ASD (no test reported)	Unclear
Morales-Chávez et al., 2019 [29]	Mean OHI-S 2.25 ± 0.78 vs 1.79 ± 0.59 (P = 0.008)	Poorer	—	—
Suhaib et al., 2019 [30]	Plaque on anterior teeth 24% vs 14% (no test reported)	Unclear	—	—
Kuter and Guler, 2019 [31]	No significant difference in plaque index	NS	—	—
Daneshvar et al., 2020 [32]	—	—	Localized and generalized gingivitis more prevalent in ASD (P = 0.014)	Poorer
Bagattoni et al., 2021 [33]	Mean PI 1.48 ± 0.75 vs 0.81 ± 0.56 (P = 0.001)	Poorer	—	—
Moorthy et al., 2022 [34]	OHI-S significantly worse in ASD despite better reported practices	Poorer	—	—
Yakubova et al., 2023 [35]	—	—	Mean PMA 15.31% vs 2.25% (P > 0.05 as reported); clinically healthy periodontium 18.8% vs 69.6%	NS
Narula et al., 2024 [11]	Good OHI-S 18.8% vs 6.2% (P = 0.001); mean PI 1.34 ± 0.59 vs 1.69 ± 0.48 (P = 0.023)	Better	—	—
Mahmood et al., 2024 [36]	Mean PI 0.18 ± 0.36 vs 0.42 ± 0.38 (P = 0.003)	Better	No significant difference in GI	NS
George et al., 2024 [37]	Significantly poorer plaque control in ASD	Poorer	More moderate–severe gingival inflammation in ASD	Poorer
Mohd Radzuan et al., 2024 [38]	OHI-S categories did not differ (P = 0.22)	NS	MGI (P = 0.70) and sBPE (P = 0.18) did not differ	NS
Prynda et al., 2025 [39]	Mean OHI 2.50 ± 0.83 vs 2.03 ± 0.91 (P < 0.001)	Poorer	Mean SBI 29.8% vs 18.9% (P < 0.001)	Poorer
Seda et al., 2025 [40]	—	—	Mean GI 0.75 ± 0.59 vs 1.07 ± 0.48 (unadjusted P = 0.121); lower in ASD after adjustment for age and sex	Better
Veseli et al., 2026 [41]	No significant difference	NS	No significant difference	NS
Omar et al., 2026 [42]	—	—	GI not significantly different; periodontal index (PDI) poorer in ASD (P < 0.001)	Mixed
Polat and				

Kılıçaslan, 2026 [43]	Poor OHI-S 46.0% vs 14.0% (P < 0.001); adjusted OR 4.65 (2.05–10.56)	Poorer	—	—
Esparza-Loredo et al., 2026 [44]	No significant difference in DI-S	NS	—	—

TABLE 2: Oral hygiene, plaque, gingival, and periodontal findings in children with ASD compared with controls

Values compare ASD participants with controls, as reported by the source authors. Direction reflects the statistical results reported for the clinical indices; Poorer = significantly poorer in ASD; Better = significantly better in ASD; NS = no statistically significant difference; Mixed = discordant gingival and periodontal findings; Unclear = missing or unclear statistical comparison; — = not assessed. Source reports of significance were not independently reanalyzed.

ASD: autism spectrum disorder; OHI-S: Simplified Oral Hygiene Index; PI: Plaque Index; GI: Gingival Index; CPITN: Community Periodontal Index of Treatment Needs; MGI: Modified Gingival Index; NS: not significant; PMA: papillary-marginal-attached index; sBPE: simplified Basic Periodontal Examination; OHI: Oral Hygiene Index; SBI: Sulcus Bleeding Index; PDI: Periodontal Disease Index; OR: odds ratio; DI-S: Simplified Debris Index.

Four studies reported no statistically significant difference in their assessed gingival outcomes [35,36,38,41]. One additional study showed mixed results: the GI did not differ significantly, but a periodontal disease index was significantly poorer in the ASD group [42]. The remaining three studies did not allow a clear assessment of between-group significance [23,25,28]. Where mean GI differences were available, some were small (approximately 0.15 points in one study [9]), whereas other indices and prevalence measures showed larger contrasts [8,24]. Differences in case definitions and metrics preclude a single clinically meaningful summary.

A descriptive comparison according to source availability was also performed. Among studies assessing plaque or oral hygiene outcomes, 9 of 13 studies evaluated using full texts reported significantly poorer outcomes in ASD groups, compared with 6 of 12 studies evaluated using abstracts or publisher records. For gingival or periodontal outcomes, the corresponding figures were eight of 13 full-text studies and three of eight abstract-based studies. These unweighted comparisons are exploratory and do not establish differences in methodological quality or treatment effects. Differences in study populations, outcome measures, and reporting completeness limit their interpretation.

Interpretation of heterogeneous findings

Recruitment setting and daily oral hygiene assistance may contribute to variation. All three studies that reported better plaque or oral hygiene outcomes in ASD samples recruited participants from specialized settings [10,11,36]. Two authors described supervised toothbrushing or daily oral hygiene routines provided by educators or center staff, and one also cited dietary structure [11,36]. These explanations are plausible but remain observational: the studies did not isolate supervision as an intervention. In one comparison, neurotypical controls were recruited from dental outpatients, many of whom presented with urgent treatment needs, making selection bias a particular concern [11].

Because children recruited from specialized care settings may differ from the broader ASD population in referral characteristics, support needs, and access to supervised oral hygiene, these findings may not be generalizable to all children with ASD. Furthermore, the observed associations should not be interpreted as evidence that specialized care settings themselves improve oral hygiene outcomes.

Reporting of the variables needed to test these explanations was sparse (Table *1*). Among the 15 studies available in full text, none reported that the examiner was masked to group, and one stated explicitly that the examiner was not [43]. Examiner calibration or reliability testing was reported in eight. Only two described an organized oral hygiene routine or staff support [11,36], one of them in its abstract only [36]. Three others reported that they performed toothbrushing without describing its quality or supervision [9,26,27]. Matching, where used, was usually limited to age and sex. The supervision hypothesis therefore remains untested by the primary studies.

Specialized-center recruitment was not consistently protective. Studies in which ASD participants had poorer oral hygiene also recruited from autism centers or special-education programs [8,20,24,27,39]. The availability, quality, and frequency of assistance may therefore be more informative than a setting label alone. Comparator selection presents a second problem: clinic attendees, schoolchildren, community samples, and siblings may have different underlying risks and access to care. Clinic-control studies produced poorer [24,37,43], better [11,36], or similar [38] outcomes in ASD groups. The four studies focused on preschool children also differed in their findings [10,35,37,41], suggesting that age alone cannot account for the inconsistency.

Outcome measurement further complicates interpretation. PI, OHI-S, debris scores, gingival bleeding measures, the Modified GI, and periodontal screening indices capture related but nonidentical constructs. A periodontal index may incorporate features beyond current plaque-induced gingival inflammation, so a significant periodontal result should not automatically be treated as a significant GI result [42]. Differences in examiner calibration, lesion definitions, and group matching may influence results, while cross-sectional designs cannot establish temporal sequence. Other plausible influences include sensory responses to brushing, caregiver confidence, medication exposure, diet, and preventive access. Comparative studies documented less independent toothbrushing among children with ASD than controls [26,27], while a separate study of caregivers of 75 children with ASD associated greater caregiver comfort with lower plaque and gingival scores [45]. These observations suggest modifiable targets but do not prove mediation.

Statistical significance should not be equated with clinical importance. The magnitude of differences in plaque and gingival indices, their clinical interpretation, and the characteristics of the study populations must also be considered. Furthermore, counting studies according to the direction or statistical significance of their findings does not account for differences in sample size, effect magnitude, precision, or methodological quality. Therefore, the descriptive counts presented in this review should not be interpreted as pooled evidence of effect or as proof of a consistent association.

Behavioral and educational approaches may be useful in addressing oral care barriers. A systematic review of psychological and behavioral interventions identified potentially beneficial approaches, including visual pedagogy, social stories, and applied behavior analysis, although the supporting literature remains limited [46]. For clinical practice, this argues for matching strategies to each child's sensory preferences, communication style, and available caregiver support rather than using a uniform ASD-specific protocol. Caries findings are not a reliable proxy for gingival health: several comparisons reported lower or similar caries experience despite poorer hygiene indices [9,19,21,26,27,29,34,37], and others found lower caries with similar or better hygiene-related outcomes [10,11,31,40,44]. Differences in diet or supervision could contribute, but these factors were not consistently measured and remain hypotheses.

Comparison with published systematic reviews

Published syntheses illustrate the sensitivity of conclusions to study selection, outcome definition, and analytical approach (Table *3*). The 2021 and 2024 reviews reported higher mean plaque and/or gingival scores among ASD participants [15,16], as did a regional review of studies from Saudi Arabia [47]. By contrast, the 2026 pediatric meta-analysis reported no statistically significant pooled difference for PI, OHI-S, or GI, with very high heterogeneity for PI and GI (I^2 approximately 93%) [17]. These results should not be treated as competing proofs that ASD either causes or does not cause gingival disease. A vote count of study directions may identify recurring patterns, but the meta-analytic results, wide uncertainty, and very low certainty judgments in the broader review [16] emphasize the need for better-harmonized studies. A separate prevalence meta-analysis estimated periodontal disease in 69.4% of children and young adults with ASD but did not make a neurotypical comparison and cannot establish an ASD-associated excess risk [48].

Review	Scope	Oral hygiene/plaque	Gingival/periodontal	Comment
da Silva et al., 2017 [48]	Children and young adults with ASD	Not compared	Pooled prevalence of periodontal disease 69.4% in ASD (3 studies)	Prevalence estimates, not comparative
Lam et al., 2020 [12]	16 case-control studies (15 meta-analyzed); to March 2018	No excess attributable to ASD	No excess attributable to ASD	Concluded ASD itself did not appear to predispose to oral disease
Pi et al., 2020 [13]	8 case-control studies (475 ASD, 565 controls); before September 2018	PI higher (MD 0.59)	GI higher but not significant (P = 0.08)	Reporting discrepancies noted in an independent appraisal [14]
AlOtaibi et al., 2021 [15]	5 studies with GI and PI data	PI significantly higher	GI significantly higher	Called for a standardized gingival index
Uliana et al., 2024 [16]	47 studies, 6,885 autistic individuals of all ages	Plaque SMD 0.59 (95% CI 0.24-0.94)	Gingivitis SMD 0.45 (0.02-0.88); RR 1.34 (1.08-1.66)	Small effects; very low certainty
Asiri et al., 2024 [47]	14 studies from Saudi Arabia	Not separately reported	Greater gingival inflammation in ASD	Regional review
Bainazarova et al., 2025 [17]	Pediatric case-control and cross-sectional studies (14 on ASD)	PI MD 0.28 (-0.05 to 0.61); OHI-S MD 0.31 (-1.37 to 1.98)	GI MD 0.33 (-0.13 to 0.78)	No significant differences; I^2 93% for PI and GI

TABLE 3: Findings of published systematic reviews and meta-analyses

ASD: autism spectrum disorder; CI: confidence interval; GI: Gingival Index; MD: mean difference; OHI-S: Simplified Oral Hygiene Index; PI: Plaque Index; RR: relative risk; SMD: standardized mean difference.

Implications for practice

A diagnosis of ASD should prompt assessment of individual oral care needs, not a presumption of inadequate hygiene or gingival disease. Clinicians should document plaque deposits, gingival bleeding or inflammation, the child's brushing tolerance and participation, and the extent of caregiver assistance. A feasible preventive plan may involve gradual desensitization to oral care, predictable routines, visual or other individualized communication supports, caregiver coaching, and appropriately adapted recall intervals. Caregiver- or school-supported plaque control may be a practical preventive approach, although its effectiveness in reducing gingival inflammation requires further investigation.

Implications for research

Future comparative studies should specify the ASD diagnostic framework and participant characteristics, recruit well-defined controls, and account for age, sex, socioeconomic factors, medication use, oral care access, and caregiver assistance. Investigators should report recruitment pathways, whether oral hygiene is supervised and by whom, brushing frequency, standardized PI/OHI-S and GI measures, examiner calibration, and group-specific means with variability or appropriately adjusted effect estimates. Because PI, GI, and periodontal screening indices measure different outcomes, they should be analyzed separately. Larger multicenter cohorts and longitudinal or intervention studies should test whether structured, sensory-adapted caregiver and school-based oral care improves clinically measured plaque and gingival outcomes.

Limitations

This narrative review has several methodological limitations. The literature search was restricted to two bibliographic databases and English-language sources. Study selection, data extraction, and interpretation were undertaken by a single author without independent verification or a formal risk-of-bias assessment. For 16 of the 31 included studies, only abstracts or publisher records were available, limiting the assessment of methodology, numerical outcomes, and potential bias. The included studies were predominantly cross-sectional, frequently used convenience samples, and differed in clinical indices, comparator selection, and oral hygiene support. One study included participants older than 18 years. Descriptive study counts do not account for sample size, precision, or methodological quality. Potential publication and selection biases further limit generalizability. Consequently, the available evidence cannot establish a causal relationship between ASD and gingival health or demonstrate that supervised oral hygiene explains the observed differences between studies.

Conclusions

Across the comparative studies examined, poorer plaque control and gingival outcomes were reported more frequently in children with ASD than in neurotypical peers, although favorable and nonsignificant findings were also observed. Differences in recruitment settings, comparator groups, clinical indices, and oral hygiene support limit direct comparisons and prevent reliable population-level estimates. The predominantly observational evidence does not establish that ASD independently causes gingival inflammation or that supervised oral hygiene accounts for the differences between study populations.

Dental professionals should assess plaque accumulation and gingival inflammation individually rather than presume oral health status from an ASD diagnosis. Sensory-informed preventive strategies and caregiver-supported oral hygiene may be appropriate according to individual needs. Future research should employ standardized clinical measures, clearly characterize recruitment and oral hygiene assistance, and evaluate preventive interventions prospectively to determine their effectiveness.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Amlan Pankaj

Acquisition, analysis, or interpretation of data: Amlan Pankaj

Drafting of the manuscript: Amlan Pankaj

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