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Erosive tooth wear in 3- to 6-year-old children: Prevalence trends and risk factors over two decades.

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Zusammenfassung des wissenschaftlichen Inhalts

Erosiver Zahnhartsubstanzverlust (ETW) bezeichnet säurebedingte, nicht-bakterielle Verluste von Zahnhartsubstanz. Während negative klinische Folgen von ETW für orale Funktion und Lebensqualität vor allem für das bleibende Gebiss gut belegt sind, gewinnt ETW im Milchgebiss zunehmend an wissenschaftlicher Bedeutung, da frühe erosive Veränderungen als möglicher Prädiktor für späteren Zahnhartsubstanzverlust im bleibenden Gebiss diskutiert werden. Trotz dieser potenziellen Langzeitrelevanz liegen bislang nur wenige populationsbasierte Prävalenzdaten und kaum belastbare Langzeitanalysen vor.

In der vorliegenden Untersuchung wurden 478 drei- bis sechsjährige Kinder in Göttingen (2024/25) klinisch untersucht und mit nahezu identisch durchgeführten regionalen Erhebungen aus den Jahren 2014/15 (n = 775) und 2004/05 (n = 432) verglichen. Über einen Zeitraum von 20 Jahren zeigte sich ein deutlicher Anstieg der ETW-Prävalenz von 31 % über 45 % auf aktuell 66 %. Gleichzeitig waren sowohl die Defektausprägung im Vergleich zu 2014/15 als auch die Anzahl der betroffenen Zähne im Vergleich zu beiden früheren Erhebungen signifikant geringer. Mit zunehmendem Alter der Kinder nahm der Schweregrad der Defekte zu, was auf einen vorwiegend physiologischen, altersabhängigen Zahnverschleiß hindeutet. Ebenfalls untersuchte potenzielle Risikofaktoren zeigten keine konsistenten Zusammenhänge. Die Ergebnisse sind klinisch relevant, da sie eine deutliche Zunahme der ETW-Häufigkeit im Vorschulalter bei gleichzeitig überwiegend milder Ausprägung belegen. Sie ermöglichen eine differenzierte Risikoeinschätzung, unterstützen eine zielgerichtete präventive Beratung und helfen, unnötige therapeutische Maßnahmen zu vermeiden.

Weitere Informationen:

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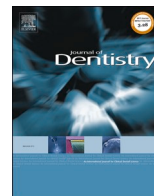
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Erosive tooth wear in 3- to 6-year-old children: Prevalence trends and risk factors over two decades

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ABSTRACT

Objectives: Long-term data on erosive tooth wear (ETW) in the primary dentition are limited. This study assessed ETW prevalence and severity in 3- to 6-year-old children in 2024/25, compared with surveys from 2004/05 and 2014/15, and analyzed potential risk factors.

Methods: Children were examined in 28 kindergartens using the Basic Erosive Wear Examination (BEWE). Potential risk factors were recorded via parental questionnaires. Prevalence, severity, and number of affected teeth were compared with earlier surveys (Chi², Kruskal-Wallis tests). Associations with risk factors were analyzed using multivariable regression ($p < 0.05$).

Results: 478 children participated. ETW prevalence (BEWE sum score > 0) was 66.1% ($n = 316$), while mean severity (BEWE sum score 3.3 ± 1.9) and number of affected teeth (4.3 ± 3.0) were low. Compared with earlier surveys, prevalence significantly increased (2014/15: 45.4%, 2004/05: 31.3%; $p_{\text{adj.}} < 0.001$). Severity decreased compared with 2014/15 and the number of affected teeth decreased compared with both earlier surveys. Increasing age was associated with higher prevalence (OR = 1.86, 95% CI: 1.36–2.54, $p < 0.001$) and severity ($B = 0.48$, 95% CI: 0.16–0.80, $p = 0.004$). Severity was also linked to male gender ($p = 0.039$) and toothbrushing frequency ($p = 0.016$).

Conclusion: ETW prevalence has risen in this population over two decades, while overall severity remained low, indicating an age-related increase consistent with physiological tooth wear. No specific risk groups requiring targeted prevention were identified.

Clinical significance: ETW in preschool children is usually mild and can be managed with general prevention.

1. Introduction

Caries prevalence in children has been extensively monitored over time, providing insight into the global burden of disease and guiding preventive strategies that have improved oral health [1–4]. In contrast, erosive tooth wear (ETW) in the primary dentition has received comparatively little attention, despite its potential consequences for children's oral health [5].

ETW is defined as the chemical loss of dental hard tissues caused by acids of non-bacterial origin, often exacerbated by mechanical forces [6]. Such lesions can result in hypersensitivity, functional impairment, or restorative needs [7], and ETW in the primary dentition may also indicate an increased risk of future wear in the permanent dentition [8].

Although interest in ETW has grown in recent years, relatively few studies have assessed its prevalence and risk factors in the primary dentition. Systematic reviews and meta-analyses estimate prevalence at 35 to 40 %, based on fewer than 30 studies worldwide over the past three decades [9,10]. Most existing studies are cross-sectional, providing little insight into temporal trends. A few investigations in identical populations found no short-term change [11], but significant increases over a decade [12,13].

In addition to the lack of long-term data, there is little research on changes in risk factors. While gastroesophageal reflux plays a role, dietary acids remain the dominant risk factors for ETW in children [9].

Therefore, the aim of this study was to assess prevalence, severity, and distribution of ETW and associated risk factors in 3- to 6-year-old

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children (2024/25) and compare the results with sequential regional cross-sectional studies conducted over the past two decades (2014/15 [13] and 2004/05 [14]). We hypothesized that ETW prevalence has increased over time, whereas severity and risk factor patterns may have shifted.

2. Methods

2.1. Ethical approval and study design

The present cross-sectional study was approved by the local ethics committee of the University Medical Center Göttingen (approval no: 8/7/24) and registered in the German Clinical Trials Register (DRKS-ID: DRKS00034955) prior to its initiation. The study was conducted in accordance with the Declaration of Helsinki and reported following the STROBE guidelines [15]. Data obtained in the present study (2024/25) were compared with regional cross-sectional surveys conducted in 2014/15 [13] and 2004/05 [14].

2.2. Sample size calculation

The sample size was calculated according to Naing et al. [16] using Scalex SP version 1.0.1 (<https://sites.google.com/view/sr-ln/ssc>). A minimum of $n = 424$ was required based on an estimated prevalence P of 45.4 % [13], a precision d of 5 % (95 % confidence interval: 40.3 % - 50.3 %), and an assumed loss of 10 %.

2.3. Population and recruitment

Children were recruited from urban kindergartens in the city of Göttingen between October 2024 and February 2025. Inclusion criteria were age 3 to 6 years, exclusion criteria were age < 3 years or > 6 years.

Head teachers of 74 kindergartens were contacted. Twenty-eight kindergartens with 1258 children agreed to participate. Written

informed consent was obtained from parents/legal guardians of 575 children. At examination, 69 children were absent, 18 children did not cooperate, and 10 had missing demographic data, resulting in a final sample of $n = 478$ children (Fig. 1). This number exceeded the calculated minimum sample size ($n = 424$) and corresponded to approximately 11 % of all 3- to 6-year-olds living in Göttingen ($n = 4258$) [17]. The participating kindergartens were located across all urban districts, representing the same catchment areas as in the previous surveys (2004/05 and 2014/15). The number of eligible children per kindergarten varied depending on group size and parental consent.

2.4. Clinical examination

All examinations were conducted by a single calibrated examiner in the kindergartens using magnification (SV2.7, starMed Germany; 2.7×), standardized light (starlight nano, starMed Germany), and dental mirrors. ETW was assessed using the Basic Erosive Wear Examination (BEWE) [18] in accordance with the recommendations for standardized health reporting for dental services in the public health service in Germany [19]. Each tooth was examined, and the most severely affected surface determined the score for that tooth (0 = no ETW; 1 = initial loss of surface texture; 2 = distinct defect, hard tissue loss < 50 % of the surface area, dentin often involved; 3 = hard tissue loss \geq 50 % of the surface area, dentin often involved). Teeth with extensive carious lesions or large restorations were excluded. All accessible surfaces, including occlusal surfaces, were examined in accordance with the BEWE protocol. BEWE sextant and sum scores were calculated [18].

Prior to data collection, the examiner was calibrated against the reference examiner from the previous surveys to ensure methodological continuity across all studies. For this purpose, inter-examiner reliability (reference vs. current examiner; $n = 177$ children) and intra-examiner reliability (current examiner; $n = 56$ children) were assessed using intraclass correlation coefficients (ICC(A,2) and ICC(A,1), respectively), yielding values of 0.785 and 0.888 [20].

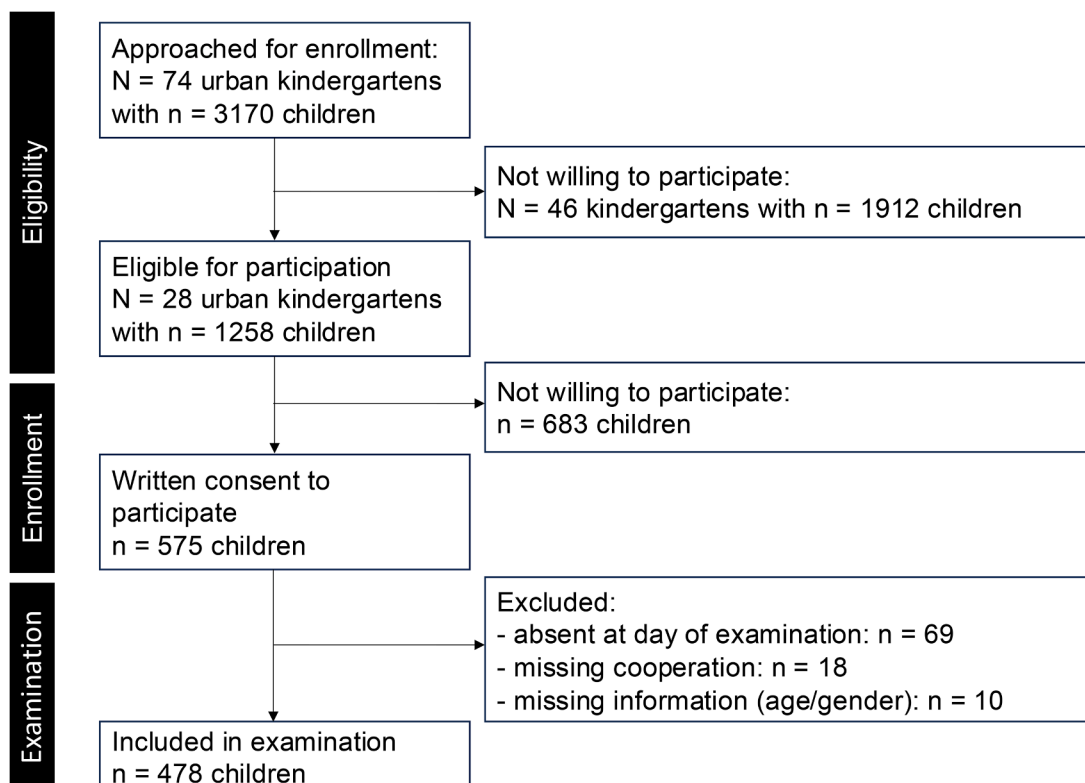


Fig. 1. Study flow chart showing recruitment, consent, exclusions, and final sample size.

2.5. Questionnaire

Parents/legal guardians completed a questionnaire addressing chronic illness related to gastric acid reflux or vomiting, erosion-related medications, dietary habits, and oral hygiene habits. The questionnaire was identical to those used in the previous surveys [13,14].

2.6. Data recording and statistical analysis

Clinical findings were recorded on coded paper forms by a trained assistant and entered into Microsoft® Excel (Mac, v.16.94). Statistical analyses were performed using the software R (version 4.4.1, www.r-project.org) and the packages “irr” (version 0.84.1), “rstatix” (version 0.7.2), and “MASS” (version 7.3.63).

ETW prevalence (BEWE sum score > 0), severity (BEWE sum score), and number of affected teeth were descriptively analyzed. Comparisons of prevalence, severity, number of affected teeth, BEWE risk levels, and tooth-level BEWE scores between the three surveys were performed using Chi²-tests and Kruskal-Wallis tests with Dunn’s post hoc test. P-values were adjusted for multiple testing using the Bonferroni-Holm method.

The impact of potential risk factors on prevalence and severity was assessed using multiple logistic and linear regression analyses. A p-value < 0.05 was considered statistically significant.

3. Results

A total of *n* = 478 children were included in the final analysis (Fig. 1). The distribution by age and gender is presented in Table 1.

Overall, 316 children (66.1 %) showed signs of ETW (BEWE sum score > 0). Compared with previous surveys, prevalence significantly increased (2004/05: 31.3 %, 2014/15: 45.4 %; *p*_{adj.} < 0.001, Table 1). Regarding BEWE risk levels, most children in all surveys presented no or low risk (Table 2). However, the distribution of risk levels changed significantly over time (*p* < 0.001), with a higher proportion of children in the low-risk category in 2024/25.

Among affected children, mean ETW severity (BEWE sum score: 3.3 ± 1.9) was lower than in 2014/15 (*p*_{adj.} < 0.001) but slightly higher than in 2004/05 (Fig. 2). The mean number of affected teeth (4.3 ± 3.0) significantly decreased compared with both earlier surveys (2004/05: 5.6 ± 3.6, 2014/15: 8.2 ± 5.1; *p*_{adj.} < 0.001).

The tooth-level distribution of ETW is shown in Fig. 3. In 2004/05, ETW predominantly affected maxillary anterior teeth; in 2014/15, it was evenly distributed between anterior teeth and first primary molars. In 2024/25, ETW occurred mainly on first primary molars and less frequently on anterior teeth. A significantly lower proportion of teeth showed BEWE scores 2 or 3 compared with both previous surveys (*p*_{adj.} < 0.001).

Regression analyses confirmed that age was significantly associated with ETW prevalence (OR = 1.86, 95 % CI: 1.36 to 2.54, *p* < 0.001). ETW severity was associated with age (*B* = 0.48, 95 % CI: 0.16 to 0.80, *p* = 0.004) and male gender (*B* = 0.58, 95 % CI: 0.03 to 1.14, *p* = 0.039) and was lower in children with daily toothbrushing (*B* = -3.48, 95 % CI: -6.32 to -0.65, *p* = 0.016). Other potential risk factors, such as reflux-related conditions and dietary habits, were not significantly associated with ETW (all *p* > 0.05; Table 3).

4. Discussion

The present study revealed that the prevalence of ETW in 3- to 6-year-old German children has increased over the past two decades. Mean severity was lower than in 2014/15 but slightly higher than in 2004/05, whereas the number of affected teeth decreased compared with both earlier surveys. In addition, the distribution of ETW within the dentition changed, with first primary molars now more frequently affected than anterior teeth.

Table 1 Total number of children included in the 2024/25, 2014/15, and 2004/05 surveys and number affected by erosive tooth wear (BEWE sum score > 0) stratified by age and gender.

Age	Number of children, n						Children affected from erosive tooth wear, n (%)								
	2024/25		2014/15		2004/05		2024/25		2014/15		2004/05				
	total	female	male	total	female	male	total	female	male	total	female	male			
3	92	39	53	134	63	71	46 (50.0)	22 (56.4)	24 (45.3)	19 (14.2)	5 (7.9)	14 (19.7)	9 (22.5)	3 (14.2)	6 (31.6)
4	154	87	67	246	118	128	93 (60.4)	50 (57.5)	43 (64.2)	81 (32.9)	31 (26.3)	50 (39.0)	32 (27.4)	14 (24.1)	18 (30.5)
5	171	85	86	243	117	126	126 (73.7)	64 (75.3)	62 (72.1)	143 (58.8)	65 (55.5)	78 (61.9)	43 (30.5)	13 (25.5)	30 (33.3)
6	61	26	35	152	72	80	51 (83.6)	23 (88.5)	28 (80.0)	109 (71.7)	49 (68.0)	60 (75.0)	51 (38.1)	24 (36.4)	27 (39.7)
total	478	237	241	775	370	405	316 (66.1)	159 (67.1)	157 (65.1)	352 (45.4)	150 (40.5)	202 (49.9)	135 (31.3)	54 (27.6)	81 (34.3)

Table 2

Distribution of children by BEWE risk levels (none, low, medium, high) in the 2004/05, 2014/15, and 2024/25 surveys.

Survey year	Age	BEWE risk level, n (%)											
		None (BEWE sum score ≤ 2)			Low (BEWE sum score 3 - 8)			Medium (BEWE sum score 9 - 13)			High (BEWE sum score ≥ 14)		
		total	female	male	total	female	male	total	female	male	total	female	male
2024/25	3	74 (80.4)	31 (79.5)	43 (81.1)	18 (19.6)	8 (20.5)	10 (18.9)	0	0	0	0	0	0
	4	101 (65.6)	56 (64.4)	45 (67.2)	52 (33.8)	31 (35.6)	21 (31.3)	1 (0.6)	0	1 (1.5)	0	0	0
	5	86 (50.3)	50 (58.8)	36 (41.9)	80 (46.8)	32 (37.6)	48 (55.8)	5 (2.9)	3 (3.5)	2 (2.3)	0	0	0
	6	27 (44.3)	12 (46.2)	15 (42.9)	33 (54.1)	13 (50.0)	20 (57.1)	1 (1.6)	1 (3.8)	0	0	0	0
	total	288 (60.3)	149 (62.9)	139 (57.7)	183 (38.3)	84 (35.4)	99 (41.1)	7 (1.5)	4 (1.7)	3 (1.2)	0	0	0
2014/15	3	124 (92.5)	62 (98.4)	62 (87.3)	10 (7.5)	1 (1.6)	9 (12.7)	0	0	0	0	0	0
	4	193 (78.5)	94 (79.7)	99 (77.3)	43 (17.5)	21 (17.8)	22 (17.2)	9 (3.7)	2 (1.7)	7 (5.5)	1 (0.4)	1 (0.8)	0
	5	142 (58.4)	73 (62.4)	69 (54.8)	87 (35.8)	37 (31.6)	50 (39.7)	14 (5.8)	7 (6.0)	7 (5.6)	0	0	0
	6	56 (36.8)	29 (40.3)	27 (33.8)	77 (50.7)	36 (50.0)	41 (51.3)	16 (10.5)	7 (9.7)	9 (11.3)	3 (2.0)	0	3 (3.8)
	total	515 (66.5)	258 (69.7)	257 (63.5)	217 (28.0)	95 (25.7)	122 (30.1)	39 (5.0)	16 (4.3)	23 (5.7)	4 (0.5)	1 (0.3)	3 (0.7)
2004/05	3	36 (90.0)	19 (90.5)	17 (89.5)	4 (10.0)	2 (9.5)	2 (10.5)	0	0	0	0	0	0
	4	103 (88.0)	55 (94.8)	48 (81.4)	14 (12.0)	3 (5.2)	11 (18.6)	0	0	0	0	0	0
	5	122 (86.5)	46 (90.2)	76 (84.4)	17 (12.1)	5 (9.8)	12 (13.3)	2 (1.4)	0	2 (2.2)	0	0	0
	6	104 (77.6)	54 (81.8)	50 (73.5)	22 (16.4)	9 (13.6)	13 (19.1)	5 (3.7)	1 (1.5)	4 (5.9)	3 (2.2)	2 (3.0)	1 (1.5)
	total	365 (84.5)	174 (88.8)	191 (80.9)	57 (13.2)	19 (9.7)	38 (16.1)	7 (1.6)	1 (0.5)	6 (2.5)	3 (0.7)	2 (1.0)	1 (0.4)

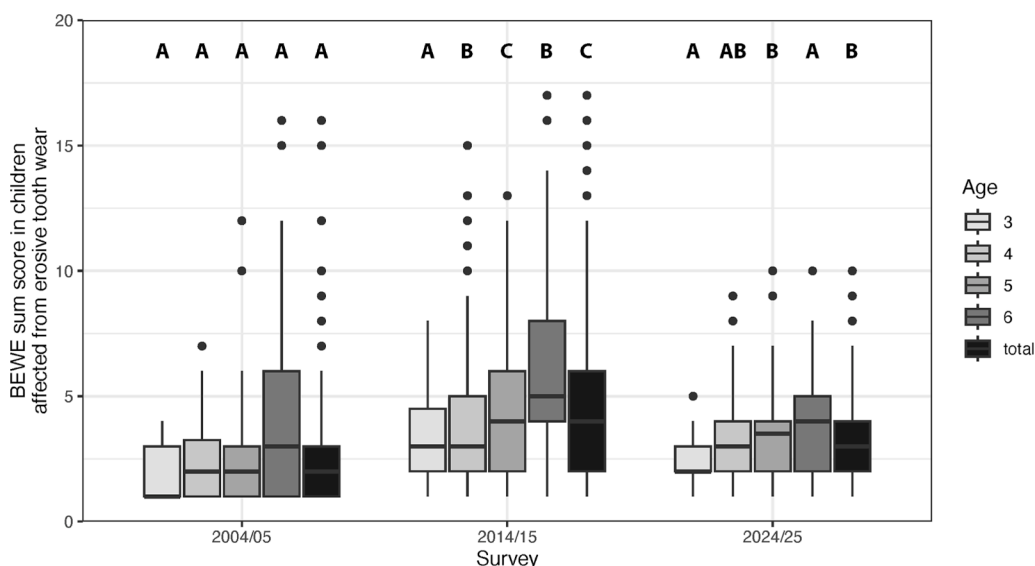


Fig. 2. Severity of erosive tooth wear (BEWE sum score) among affected children (BEWE sum score > 0) in the different surveys / age groups. Significant differences between the surveys and within the same age group are marked with different letters.

This is the first survey monitoring ETW prevalence in preschool children over a 20-year period in a large German city, using comparable methodology across all surveys and conducted under similar demographic and socio-economic conditions. The study benefits from a large sample size recruited through kindergartens covering all districts of the city, ensuring good representativeness of the urban population. Additional strengths include the standardized clinical assessment by a single, well-calibrated examiner with excellent reliability [20].

Prevalence of ETW significantly increased compared with 2004/05 and 2014/15 and is currently higher than the global prevalence in primary dentition (35–40 %) reported in systematic reviews [9,10]. However, recent European studies report prevalence levels exceeding 70–80 % in similar age cohorts [21,22]. Given that the global estimates in these systematic reviews were largely based on studies conducted before 2015 (with only few more recent data sets included), and that our earlier survey waves (2004/05 and 2014/15) showed similar prevalence levels to those global figures, the present findings suggest that the true global prevalence of ETW in preschool children may currently be substantially

higher than previously assumed. Gatt et al. [21] further noted that despite such high prevalence, most children still fell into the no-risk or low-risk BEWE categories. This is consistent with our findings: the overall severity and number of affected teeth were low, and the increase in prevalence was largely attributable to teeth with BEWE score 1. In our study, mean severity among affected children was significantly lower than in 2014/15, but slightly higher than in 2004/05, indicating that the peak observed in the intermediate survey may reflect natural temporal variation rather than a consistent long-term trend.

As previously discussed by Ganss [23], ETW may not necessarily represent a pathological condition, but may occur physiologically over a lifetime. Our observation that prevalence and severity were strongly age-dependent supports this view, consistent with earlier studies in the primary dentition [11,24].

In the present survey, only very few children presented teeth with BEWE scores 2 or 3, resulting in a limited number of medium-risk cases requiring mainly preventive measures. For these children, evidence on the effect of ETW on oral health-related quality of life is still scarce and

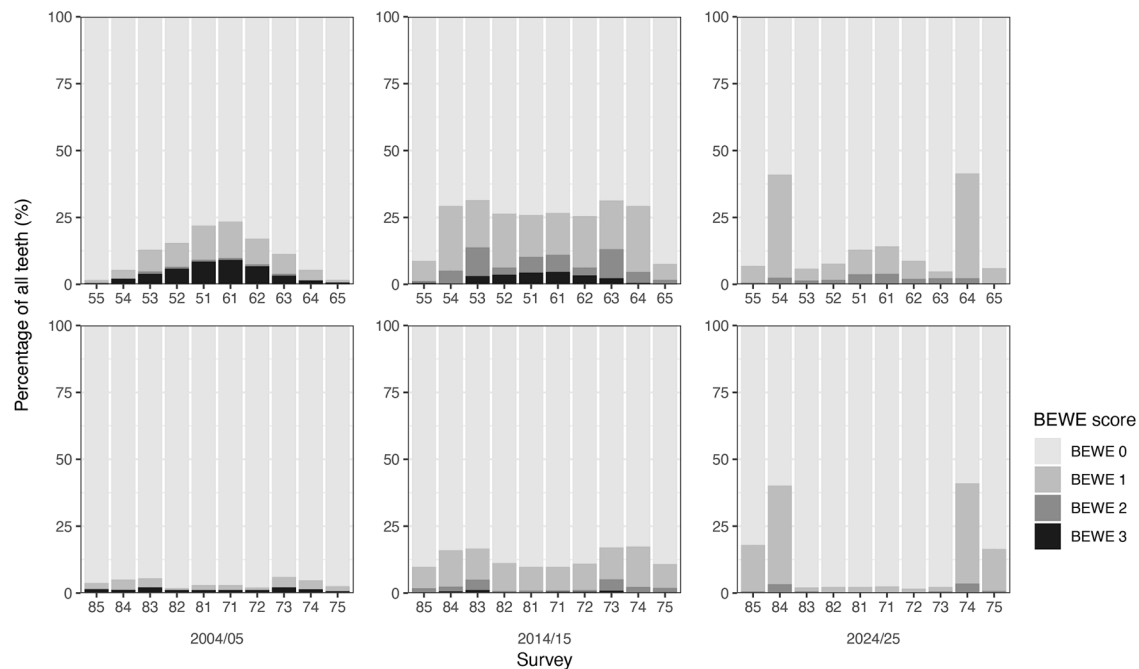


Fig. 3. Distribution of erosive tooth wear in the different surveys.

should be expanded in future studies [25].

Interestingly, the distribution pattern of ETW shifted over time: while the previous studies found erosive lesions mainly on the maxillary anterior teeth [14] or evenly distributed among anterior teeth and first molars [13], ETW in 2024/25 was more often located on first primary molars. The decrease in severity, combined with predominantly BEWE score 1, suggests that lesions on anterior teeth may have been masked by physiological attrition of the mixed dentition.

In the present study, ETW was almost exclusively confined to the primary dentition. Only one permanent incisor and two permanent first molars showed minimal signs of wear (BEWE score 1), indicating that ETW in the permanent dentition is very uncommon at this early age and suggesting that its onset occurs at a later stage.

Regarding potential risk factors, the same questionnaire as in the previous surveys [13,14] was used, allowing direct comparability. In our analyses, age emerged as the only consistent determinant, being significantly associated with both prevalence and severity of ETW. This finding is in line with earlier studies in the primary dentition [11,24] and reflects the physiological increase of tooth wear with age.

Gender and toothbrushing frequency showed associations with ETW severity, but these findings should be interpreted with caution. Previous studies have reported inconsistent results, and most failed to confirm toothbrushing frequency as a relevant factor [9]. It could be speculated that higher toothbrushing frequency is indirectly associated with lower intake of erosive foods or beverages, but this has not been substantiated by evidence and remains a theoretical consideration.

Other potential determinants, such as dietary habits or reflux-related conditions have been identified as relevant risk factors in previous studies [9,10], but were not significantly associated with ETW in our study. This is likely explained by the very small number of affected children. In line with national data showing that the vast majority (90.5 %) of 3- to 6-year-olds in Germany consume soft drinks less than once per day [26], only 17 children in our cohort reported daily soft drink intake, limiting the ability to detect significant associations. Similarly, only very few children were reported with reflux-related conditions. Moreover, socioeconomic factors were not included in our questionnaire, as it was intentionally kept identical to those used in previous surveys to ensure comparability across the 20-year observation period. This restricts comparability with studies that identified socioeconomic

background as a potential determinant of ETW [27].

An additional limitation of the questionnaire was that it did not capture newly emerging food trends. In recent years, pureed fruit pouches that can be directly consumed from squeezable packaging have gained considerable popularity in Germany [28]. These products usually contain fruit purees [28] with high acidity [29], but data on their potential role in ETW development are lacking and warrant future investigation.

A major strength of this study is the unique observation period of two decades, combined with a substantial sample size and the use of standardized methodology with excellent calibration. These features ensure comparability across surveys and strengthen the reliability of the findings. The participating kindergartens were situated within the same urban districts as in the previous surveys, ensuring high comparability across the three study waves. Minor changes in individual institutions reflected administrative restructuring rather than regional differences. At the same time, some limitations need to be acknowledged. The study was restricted to an urban population, which may limit generalizability to rural settings. Its cross-sectional design does not allow conclusions on causality, and the small number of children with more severe ETW (BEWE 2 and 3) reduced statistical power to detect associations with potential risk factors. Although the achieved sample size exceeded the target defined by the sample size calculation, participation was limited to less than half of all kindergartens in the city, and within the participating kindergartens fewer than half of the parents consented to their child's participation. Therefore, the representativeness of the sample may be somewhat reduced despite coverage of all urban districts. Finally, the parent-reported questionnaire may be subject to recall bias and did not capture newly emerging dietary habits.

In conclusion, ETW is a prevalent but mostly low-severity condition in 3- to 6-year-old children. While prevalence increased over the past two decades, the number of affected teeth declined, and overall severity remained low. These findings support the view that ETW in the primary dentition largely reflects a physiological process of tooth wear. From a clinical perspective, no specific risk groups were identified, indicating that general preventive measures remain appropriate. Future studies should investigate ETW in more diverse populations and explore the influence of changing dietary trends and potential impacts on children's quality of life.

Table 3

Predictors for prevalence of erosive tooth wear (BEWE sum score > 0) and severity among children affected from erosive tooth wear (BEWE sum score) based on multiple logistic regression and multiple linear regression analyses. Results are shown as odds ratios (OR) or regression coefficients (B) with 95 % confidence intervals (CI).

Predictor	Prevalence		Severity	
	OR (95 % CI)	p-value	B (95 % CI)	p-value
Sociodemographics				
Age	1.86 (1.36 to 2.54)	<0.001	0.48 (0.16 to 0.80)	0.004
Gender (male vs. female)		0.866	0.58 (0.03 to 1.14)	0.039
General health				
Medical conditions (yes vs. no)		0.422		0.725
Reflux (yes vs. no)		1.000		0.258
Vomiting (yes vs. no)		0.992		0.463
Asthma (yes vs. no)		0.614		0.534
Medication				
Any medication (yes vs. no)		0.126		0.204
Use of asthma inhaler (yes vs. no)		0.875		0.563
Use of fluoride tablets (yes vs. no)		0.412		0.136
Oral hygiene				
Use of fluoride toothpaste (yes vs. no)		0.289		0.324
Toothbrushing frequency (at least once per day vs. less than once per day)		0.988	−3.48 (−6.32 to −0.65)	0.016
Duration of toothbrushing (at least 2 min vs. less than 2 min)		0.878		0.242
Toothbrushing by caregivers (yes vs. no)		0.803		0.337
Use of powered toothbrush (yes vs. no)		0.522		0.160
Drinks/food after toothbrushing in the evening (yes vs. no)		0.499		0.412
Food				
Citrus fruits (at least weakly vs. never/rarely)		0.426		0.851
Sweets (at least weakly vs. never/rarely)		0.699		0.145
Beverages				
Acidic beverages, e.g. juice, lemonade, cola (at least weakly vs. never/rarely)		0.828		0.830
Non-acidic beverages, e.g. water, milk (at least weakly vs. never/rarely)		0.992		0.228
Dietary habits				
Duration of breastfeeding (>24 months vs. ≤24 months)		0.385		0.781
Duration of bottle-feeding (>24 months vs. ≤24 months)		0.195		0.646
Nighttime bottle (yes vs. no)		0.647		0.660
Use of sippy cups/straw (never/rarely/sometimes vs. often/always)		0.182		0.092
Use of cups (never/rarely/sometimes vs. often/always)		0.387		0.511

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT (OpenAI) to assist with language editing and to improve grammar, style, and readability. After using this tool, the authors carefully reviewed, revised, and approved all content, and take full responsibility for the integrity and accuracy of the published article.

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CRedit authorship contribution statement

Jana Biermann: Writing – original draft, Validation, Resources, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Mara Fischer:** Writing – review & editing, Project administration, Investigation, Data curation. **Thomas Attin:** Writing – review & editing, Methodology, Conceptualization. **Philipp Kanzow:** Writing – original draft, Visualization, Validation, Software, Formal analysis, Data curation. **Annette Wiegand:** Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Investigation, Data curation, Conceptualization.

Declaration of competing interest

The authors declare no conflicts of interest.

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