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Factors influencing the oral health of children undergoing general anesthesia: a parent survey

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Keywords

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Abstract

This study investigates factors in children undergoing general anesthesia for dental treatment at the University Children's Hospital of Basel (UKBB). A cross-sectional survey was conducted among parents of children (n = 119) receiving dental treatment under general anesthesia. A multilingual questionnaire collected data on demographics, oral hygiene practices, dietary habits, and dental experiences. Children's mean age was 5.9 years; 47.9% were aged between 5 and 8 years. A total of 18.5% had an underlying medical condition and 84.0% had a migration background. Children of migrant parents had significantly lower German proficiency than those of Swiss nationals ($p < 0.05$). Lower household incomes were predominantly observed in families with a migration background. Parental awareness of oral health varied with 58.8% unaware of whether their child's toothpaste contained fluoride. Children of Swiss parents were more likely to begin brushing their teeth at 6–8 months, whereas children with a migration background tended to start later ($p < 0.05$). High sugar consumption was prevalent, with 40.7% of children consuming sweets daily. Dental anxiety was reported in 60.7% of children, particularly in older age groups ($p < 0.05$). These findings highlight the need for targeted preventive measures focusing on early dental care education for risk groups to reduce the need for invasive treatments under general anesthesia.

Introduction

Dental caries remains a widespread issue in children globally, with untreated caries in primary teeth being the most prevalent disease in children aged 0–14 years (1). Globally, the prevalence of early childhood caries is 17% in one-year-olds and 36% in two-year-olds (2); in children between three and six years, caries are observed more frequently at 57.3% (3).

Since 1992, caries studies have been carried out regularly in the canton of Basel-Landschaft to provide an insight into the condition of children's teeth and the dental care practices. Around the turn of the millennium, it appeared that caries was successfully under control: each subsequent study reported improved results with reduced prevalence of caries lesions. This success was the result of the combined efforts of children, parents, dentists and prophylactic measures in kindergartens and schools. The caries study conducted in 2011 revealed that the previously steady decline in caries experience has plateaued since 2001, emphasizing a need for improvement in dental hygiene (4). In 2021, the University Centre for Dental Medicine Basel (UZH) conducted another representative dental examination among schoolchildren on behalf of the canton of Basel-Landschaft. While the majority of caries indices showed improvement, the average number of teeth with untreated caries lesions remained unchanged over the past three decades. As in previous surveys, risk groups included schoolchildren with a foreign background as well as those attending schools in the A-level track (5).

Certain patients require dental treatment under general anesthesia, especially if treatment under local anesthesia or conscious sedation is not possible due to the scope of treatment and/or the lack of cooperation. At the University Children's Hospital of Basel (UKBB), general anesthesia is typically used for young children in pain, those with special needs (e.g., cognitive impairments, multimorbidity, severe hemophilia, or undergoing oncological treatment), as well as children with extensive treatment needs due to dental neglect or painful molar incisor hypomineralization (MIH). It has been observed that the frequency of general anesthesia use is increasing in this patient population, especially in children under six years of age and in people with mental impairments who cannot tolerate dental treatment (6–8). Therefore, special attention should be paid to the promotion of oral health and early prevention in such risk groups (6).

In the canton of Basel-Stadt, the UZH and the Clinic for Paediatric Dentistry in particular, has a cooperation with the University Children's Hospital Basel (UKBB) to enable the performance of tasks in accordance with the Dentistry Ordinance in the area of intubation anesthesia. Approximately ten patients a week are treated under general anesthesia at the UKBB, with the majority coming from canton Basel-Stadt, approximately 20% from canton Basel-Landschaft, and 10% other cantons.

The aim of this study was to obtain information on the oral health and to identify risk factors in the group of children undergoing dental treatment under general anesthesia and to develop targeted measures to improve oral health in these patients.

Materials and methods

Population

Following a pilot trial in 2023, the study was conducted between November 30, 2023 and December 23, 2024. A cross-sectional design was applied to collect data from parents of children up to 18 years of age scheduled for dental treatment under general anesthesia at the UKBB. Emergency cases, including trauma patients, were excluded from the study as they were directly treated at the UKBB, which made it impossible to obtain informed consent for study participation. Caries was the main reason for treatment in the subjects to be included; no data on specific treatment indications were collected in the study due to the questionnaire addressed to the parents. During the study period, 119 participants were recruited from a total of 557 patients resulting in a response rate of 21.4%. Dental treatment was conducted by dentists working in the Department of Pediatric Dentistry at the University Center for Dentistry Basel.

All treatments were planned procedures, with patients initially undergoing a consultation at the UZB. Before the start of the treatment, dentists provided parents with detailed information about the study. Upon obtaining informed consent, parents were asked to fill out a questionnaire related to epidemiological, socioeconomic, oral hygiene and nutritional data. A digital and anonymized questionnaire was developed using Microsoft Forms, available in multiple languages such as German, English, Spanish, French, Italian, Turkish, Albanian, Ukrainian, Serbian and Croatian to enable broad participation. If parents were not able to understand one of the languages offered, they were excluded from participation due to potential inaccuracies with translation applications. This applied to approximately 10 percent of the patients being unable to participate due to incompatibility with the available language options. The included children were grouped into those with and without a migration background, following the definition of the Swiss Federal Statistical Office (BFS). According to this definition, a person was considered to have a migration background if they were born abroad and later immigrated to Switzerland (first generation), or if they were born in Switzerland and at least one parent was born abroad (second generation).

After submitting the completed questionnaire, parents received oral hygiene products for their children as an incentive during their final consultation.

Ethics committee

The study was approved by the Ethics Committee of Northwestern Switzerland (“Ethikkommission Nordwestschweiz”; BASEC-Nr. Req.-2023-01201) and contractually cleared by both the UKBB and the UZB.

Statistical analysis

Descriptive statistics included median (IQR) or mean (SD) for continuous parameters and frequency (percentage) for categorical parameters. Comparisons between groups were performed using the corresponding significance tests including the Ranksum test, t-test, Fisher's exact test, and Chi-square test. Given the exploratory nature of the study, no adjustments for

multiple comparisons were applied, and the level of significance was set at $\alpha = 0.05$. All analyses were performed using R version 4.4.1.

Results

Between November 30, 2023 and December 23, 2024, a total of 122 participants completed the questionnaire. Three participants were excluded due to exceeding the age limit of 18 years, resulting in a final sample size of 119 participants. The age of the children ranged from 1 to 15 years, with a mean age of 5.9 years. The majority of participants fell within the age category of 5 to 8 years, accounting for 47.9% ($n = 57$; Table 1). The children’s mother tongue was German (32) or Swiss German (11), bilingual including German or Swiss German (11), Albanian (12), Turkish (7), Iranian (6), Ukrainian (6), Bosnian (3), English (3), Kurdish (3), Portuguese (3), Rumanian (3), Russian (3), Serbian (3), Tigrinya (3), Dari (2), French (2), Italian (2), and one participant each spoke Bilen, Chinese, Hungarian, Pashto, Somali, Swedish.

Among the 119 participants, 22 (18.5%) indicated to have underlying medical diseases, in particular 5.9% were diagnosed with autism spectrum disorder, 3.4% had cerebral disorders, 2.5% had syndromic conditions, 0.8% had developmental delay, 0.8% had post-cranial trauma status and 5.1% had other conditions. The presence of such diseases had a significant impact on tooth brushing: 54.6% brushing by parents, 31.8% with parental support, 4.5% child only and 9.1% did not brush at all, compared to 12.4%, 62.9%, 22.7% and 2.0% of the healthy participants respectively ($p < 0.001$).

Overall the frequencies of tooth brushing were as follows: once to twice a day (56.6%), twice to three times a day (23.3%), more than three times a day (0.8%), less than once a week (4.2%), a few times a week (3.3%), and zero to once a day (11.8%). With the given distribution, the first three categories with frequent tooth brushing and the last three categories with infrequent tooth brushing were summarized for further analysis.

Table 1. Descriptive statistics in relation to migration background.

Factor: Migration background	Yes (n=100)	No (n=19)	Total	p-value
Patients background data				
Age in yrs median (IQR) mean (\pm SD)	5 (4,7) 5.8 (2.7)	6 (4,8.5) 6.5 (3.4)	5 (4,7) 5.9 (2.8)	0.453
Age groups (%): 1–4/ 5–8/ >9 yrs	34/ 49/ 17	31.6/ 42.1/ 26.3	33.6/ 47.9/ 18.5	0.626
Mother: mean age in yrs (\pm SD)	37.1 (6.5)	36 (7.1)	36.9 (6.6)	0.493
Father: mean age in yrs (\pm SD)	42 (17.9)	38.1 (6.9)	41.4 (16.7)	0.428
Native language (%): German/ Non-German	36/ 64	94.7/ 5.3	45.4/ 54.6	<0.001
Parents’ German skills (%): Average/ Rather insufficient/ Good/ Insufficient/ Native speaker/ Very good	9/ 10/ 19/ 7/ 29/ 26	5.3/ 0/ 0/ 0/ 94.7/ 0	8.4/ 8.4/ 16/ 5.9/ 39.5/ 21.8	<0.001
Chronic medical conditions (%): Yes/ No	16/ 84	31.6/ 68.4	18.5/ 81.5	0.118
Medication use (%): Yes/ No	11/ 89	26.3/ 73.7	13.4/ 86.6	0.133

Household net income/Month (CHF) (%): 0–3,000/ 3,000–5,000/ 5,000–10,000/ > 10,000/ no answer	15.0/26.0/29.0/12.0/18.0	10.5/10.5/47.4/21.1/10.5	14.3/23.5/31.9/13.4/16.8	0.243
Oral hygiene				
Mean age of 1st tooth eruption in months (±SD)	6.6 (3.1)	7.4 (3.4)	6.7 (3.1)	0.283
Use of toothbrush (%): Not at all/ Only toothbrush/ Toothbrush + toothpaste	3/ 3/ 94	5.3/ 0/ 94.7	3.4/ 2.5/ 94.1	0.714
Who brushes (%): Not yet/ Child alone/ Child & parents/ Only parents	3/ 21/ 56/ 20	5.3/ 10.5/ 63.1/ 21.1	3.4/ 19.3/ 57.1/ 20.2	0.677
Brushing frequency (%): ≥1x/day/ ≤1x/day	79/ 21	89.5/ 10.5	80.7/ 19.3	0.361
1st tooth brushing at (%): 6–8 m/8 m–1 yrs/ 1–2 yrs/ 2–3 yrs/ >3 yrs	17/ 33/ 34/ 12/ 4	63.1/ 15.8/ 21.1/ 0/ 0	24.4/ 30.3/ 31.9/ 10/ 3.4	0.003
1st independent brushing (%): > 3 yrs/ 2–3 yrs/ 1½–2 yrs/ 1–1½ yrs/ Doesn't brush/ Not yet alone	26/ 28/ 4/ 3/ 2/ 37	31.5/ 10.5/ 5.3/ 0/ 5.3/ 47.4	26.9/ 25.2/ 4.2/ 2.5/ 2.5/ 38.7	0.416
Toothpaste (%): Fluoridated/ Not fluoridated/ I don't know	36/ 3/ 61	31.5/ 21.1/ 47.4	35.3/ 5.9/ 58.8	0.009
Parents brushing/day (%): 0–1x/ 1–2x/ 2–3x/ >3x	4/ 55/ 36/ 5	10.5/ 31.6/ 57.9/ 0	5/ 51.3/ 39.5/ 4.2	0.098
Parents' rating of their knowledge on "healthy teeth" (%): Very good/ Good/ Average/ Rather insufficient/ Poor/	13/ 46/ 33/ 6/ 2	10.5/ 47.4/ 31.5/ 5.3/ 5.3	12.6/ 46.2/ 32.8/ 5.9/ 2.5	0.902
Experiences at the dentist				
Age at 1st visit to the dentist in yrs, median (IQR) mean (±SD)	3 (2.8, 4.2) 3.9 (3.1)	3 (2.5, 4.5) 3.4 (1.5)	3 (2.5, 4.5) 3.9 (2.9)	0.859
Frequency of dental visits (%): Semianually & more often/ Annually/ When experiencing issues/ Never & rarely	30/ 30/ 26/ 14	21.1/ 47.4/ 15.8/ 15.8	28.6/ 32.8/ 24.4/ 14.3	0.483
Reason for dentist visit (%): Dental & gum issues/ No specific reason/ Regular check-ups/ Seek advice/ Extractions/ Filling	23/ 1/ 34/ 7/ 4/ 31	15.8/ 0/ 42.1/ 5.3/ 10.5/ 26.3	21.8/ 0.8/ 35.3/ 6.7/ 5/ 30.3	0.745
Dental fear (child) (%): Yes/ No	63.8/ 36.2	44.4/ 55.6	60.7/ 39.3	0.201
Dental fear (mother) (%): Yes/ No	30.6/ 69.4	47.4/ 52.6	33.3/ 66.7	0.249
Dental fear (father) (%): Yes/ No	23.3/ 76.7	12.5/ 87.5	21.7/ 78.3	0.513
Negative experiences at dentist (%): Yes/ No/ Don't know	23/ 73/ 4	31.6/ 57.9/ 10.5	24.4/ 70.6/ 5	0.204
Parents' cavity treatments (last 2 yrs) (%): 1/ None/ Multiple	38/ 39/ 23	42.1/ 47.4/ 10.5	38.7/ 40.3/ 21	0.465
Child's cavity treatments (%): ≥1/ None	41/ 59	31.6/ 68.4	39.5/ 60.5	0.607
Mean number of multiple cavity treatments (±SD)	3.6 (2.8)	2.4 (1.1)	3.3 (2.5)	0.370

Parents: Knowledge about healthy teeth				
We can protect our child's teeth by reducing sugary food and drinks (%): ++/+/=/-/--	47/ 33/ 9/ 5/ 6	68.4/ 26.3/ 0/ 0/ 5.3	50.4/ 31.9/ 7.6/ 4.2/ 5.9	0.483
Fluoride toothpaste prevents dental defects (%): ++/+/=/-/--	41/ 21/ 22/ 7/ 9	57.8/ 31.6/ 5.3/ 5.3/ 0	43.7/ 22.7/ 19.3/ 6.7/ 7.6	0.208
Dental diseases in children are commonplace (%): ++/+/=/-/--	8/ 16/ 13/ 26/ 37	0/ 10.5/ 15.8/ 26.3/ 47.4	6.7/ 15.1/ 13.4/ 26.1/ 38.7	0.788
Brushing your teeth is a daily routine (%): ++/+/=/-/--	79/ 10/ 4/ 3/ 4	89.5/ 0/ 0/ 0/ 10.5	80.7/ 8.4/ 3.4/ 2.5/ 5	0.338
If our child consumes sugary food, he'll get dental diseases (%): ++/+/=/-/--	38/ 33/ 13/ 4/ 12	10.5/ 31.6/ 26.3/ 26.3/ 5.3	33.6/ 32.8/ 15.1/ 7.6/ 10.9	0.005
The health of the deciduous teeth does not matter (%): ++/+/=/-/--	11/ 8/ 5/ 15/ 61	0/ 10.5/ 0/ 26.3/ 63.2	9.2/ 8.4/ 4.2/ 16.8/ 61.3	0.411
No matter what we do, our child has bad teeth (%): ++/+/=/-/--	7/ 16/ 15/ 22/ 40	5.3/ 26.3/ 21.1/ 15.8/ 31.6	6.7/ 17.6/ 16/ 21/ 38.7	0.732
I know how my child brushes his/her teeth (%): ++/+/=/-/--	46/ 25/ 15/ 5/ 9	57.9/ 26.3/ 10.5/ 0/ 5.3	47.9/ 25.2/ 14.3/ 4.2/ 8.4	0.902
Fluoride in toothpaste strengthens the teeth (%): ++/+/=/-/--	37/ 24/ 24/ 8/ 7	57.9/ 31.5/ 5.3/ 0/ 5.3	40.4/ 25.2/ 21/ 6.7/ 6.7	0.186
It is important to have healthy teeth (%): ++/+/=/-/--	80/ 10/ 6/ 2/ 2	89.5/ 5.3/ 0/ 0/ 5.3	81.5/ 9.2/ 5/ 1.7/ 2.5	0.598
It is important to clean the teeth 2–3 times a day (%): ++/+/=/-/--	68/ 18/ 8/ 3/ 3	78.9/ 10.5/ 5.3/ 0/ 5.3	69.7/ 16.8/ 7.6/ 2.5/ 3.4	0.83
Nutrition				
Frequency of sweets (%): Daily/ Weekly/ Monthly & Never	40.4/ 45.5/ 14.1	42.1/ 52.6/ 5.3	40.7/ 46.6/ 12.7	0.555
Frequency of sugary drinks (%): Daily/ Weekly/ Monthly & Never	18/ 49/ 33	15.8/ 31.6/ 52.6	17.6/ 46.2/ 36.1	0.247
Frequency of fruits (%): Daily/ Weekly/ Monthly/ Almost never/ Don't know	79/ 13/ 3/ 4/ 1	73.7/ 15.8/ 0/ 10.5/ 0	78.3/ 13.4/ 2.5/ 5/ 0.8	0.547
Frequency tooth friendly sweets (%): Daily/ Weekly/ Monthly/ Almost never/ Don't know	10/ 29/ 9/ 27/ 25	0/ 47.3/ 0/ 31.6/ 21.1	8.4/ 31.9/ 7.6/ 27.7/ 24.4	0.325

Legend: m: months, yrs: years ++: applies, + rather applies, = neither, - rather not applicable, -- does not apply

Migration background

Among the participants, 16.0% (n=19) were of Swiss nationality, while 84.0% (n=100) had a migrant background, with 21.8% in the first generation and 58.8% in the second generation, while the status of 3.4% could not be determined due to missing information. 94.7% of non-migrant children spoke German as their native language, while only 36% of migrant children did so (Table 1; p < 0.001). Furthermore, parents' German language proficiency was significantly lower in parents with a migration background compared with native Swiss parents, with

fewer migrant parent being native German speakers and a higher proportion reporting only average or insufficient German skills (Table 1; $p < 0.001$). Lower household incomes were predominantly observed among participants with a migration background, while higher incomes were more frequently reported among Swiss participants (Table 1). This difference did not reach statistical significance, likely due to the relatively small sample size within the Swiss group.

63.2% of the children of Swiss parents started brushing their teeth at 6–8 months, whereas only 17% of children with a migration background initiated tooth brushing at this age. Children with a migration background were more likely to begin brushing later, with 34% starting between 1–2 years of age and 16% after 2 years of age (Table 1). The overall significant difference between groups with or without migrant background was most likely attributed to the difference in the 6–8-month age group ($p = 0.003$). Among Swiss children, 31.6% reported using fluoridated toothpaste, while 21.1% used non-fluoridated toothpaste. In comparison, 36% of children with a migrant background used fluoridated toothpaste and only 3% used non-fluoridated toothpaste. Notably, 58.8% of parents overall were unaware of whether their child’s toothpaste was fluoridated or not (Table 1).

In the section on parental knowledge about oral health, the question on whether sugary food consumption could lead to dental diseases revealed a significant difference ($p = 0.005$), since parents with a migration background were more likely to agree with the statement with 71% fully or rather agreeing, while only 16% disagreed. In contrast among Swiss parents, 42.1% fully or rather agreed, and 26.3% disagreed (Table 1).

Table 2. Sweets consumption in relation to age of 1st tooth brushing and daily tooth brushing habit.

Sweet consumption	Daily (%)	Weekly (%)	Monthly/Never (%)	Total (%)	<i>p</i> -value
1st tooth brushing					0.008
6–8 m	22.9	30.9	0	23.7	
8 m – 1 yrs	27.1	36.4	20	30.5	
1–2 yrs	31.2	21.8	73.3	32.2	
2–3 yrs	10.4	10.9	6.7	10.2	
>3 yrs	8.3	0	0	3.4	
Tooth brushing/ day					0.309
≥1x/Day	85.4	74.5	86.7	80.5	
≤1x/Day	14.6	25.5	13.3	19.5	

m: months, yrs: years

Table 3. Number of caries treatments in relation to age of starting tooth brushing, consumption of sweets or sugary drinks and daily tooth brushing habit.

Number of caries treatments	>1 (%)	None (%)	Total (%)	<i>p</i> -value
1st tooth brushing: 6–8 m/ 8 m– 1 yrs/ 1–2 yrs/ 2–3 yrs/ >3 yrs	19.1/ 23.4/ 34/ 17/ 6.4	27.8/ 34.7/ 30.6/ 5.6/ 1.4	24.4/ 30.3/ 31.9/ 10/ 3.4	0.086
Frequency of sweets: Daily/ Weekly/ Monthly or never	44.7/ 44.7/ 10.6	38/ 47.9/ 14.1	40.7/ 46.6/ 12.7	0.728
Frequency of sugary drinks: Daily/ Weekly/ Monthly or never	19.1/ 48.9/ 31.9	16.7/ 44.4/ 38.9	17.6/ 46.2/ 36.1	0.739
Tooth brushing/day: ≥1x/day, ≤1x/day	80.9/19.1	80.6/ 19.4	80.7/ 19.3	0.99

m: months, yrs: years

Age of first tooth brushing

Children who consumed sweets frequently (“daily” or “weekly”) tended to start brushing earlier, specifically before 1 year of age. In contrast, 73.3% of those who rarely consumed sweets (“monthly/rarely”) began brushing after the age of 1 (Table 2; $p = 0.008$). Furthermore, children who began brushing their teeth at an earlier age tended to require fewer caries treatments compared with those who started brushing later, although this trend did not reach statistical significance (Table 3).

Table 4. Child’s Dental fear in relation to mother tongue and age groups.

Dental fear	Yes (%)	No (%)	<i>p</i> -value
Mother tongue: Swiss/ Non-Swiss/ Total	56/ 65.5/ 60.7	44/ 35.5/ 39.3	0.47
Age group: 1–4 years/ 5–8 years/ >9 years/ Total	44.7/ 71.4/ 61.1/ 60.7	55.3/ 28.6/ 38.9/ 39.3	0.034

Dental fear and dental visits

Among all children, 60.7% reported experiencing dental fear and this was significantly more prevalent in older age groups, with 71.4% of children aged 5–8 years and 61.1% of those aged 9 years and above reporting dental fear, compared to only 44.7% of younger children aged 1–4 years ($p = 0.034$; Table 4). No significant association was found between dental fear and the child’s mother tongue (Table 4). Similarly, there was no correlation between the frequency of dental visits and dental fear reported by either the children or their parents (Table 5). Although no significant relationship was observed between household income and the frequency of dental visits, descriptive trends indicated that families with monthly incomes of CHF 5,000–10,000 were more likely to visit the dentist regularly compared to lower-income households (Table 6).

Table 5. Dental fear in children or parents in relation to frequency of dental visits.

Dental visits	Half-yearly/ more often (%)	Yearly (%)	In case of problems (%)	Never/ Rarely (%)	Total (%)	<i>p</i> -value
Dental fear						
Child: Yes/ No	57.6/ 42.4	52.8/ 47.2	64.3/ 35.7	80/ 20	60.7/ 39.3	0.311
Mother: Yes/ No	27.3/ 72.7	25.6/ 74.4	48.3/ 51.7	37.5/ 62.5	33.3/ 66.7	0.202
Father: Yes/No	22.6/ 77.4	17.6/ 82.4	26.9/ 73.1	20/ 80	21.7/ 78.3	0.853

Table 6. Visit at the dentist in comparison to monthly net household income of the parents.

Dental visits	Half-yearly or more (%)	Yearly (%)	In case of complaints (%)	Never/ Rarely (%)	Total (%)	<i>p</i> -value
Income/Month in CHF						0.7
0–3,000	17.2	6.5	25	26.7	17.2	
3,000–5,000	27.6	29	33.3	20	28.3	
5,000–10,000	41.4	45.2	29.2	33.3	38.4	
> 10,000	13.8	19.4	12.5	20	16.2	

Discussion

This study aimed to identify risk factors in children undergoing scheduled dental treatment under general anesthesia. The results showed that the majority of participants had a migration background but regardless of the national background, parental awareness of oral health demonstrated significant gaps in knowledge, indicating potential for improvement in oral hygiene practices of parents and children. Dental fear emerged as a notable issue, particularly among older children. Additionally, almost 40% of children had a history of at least one caries treatment and approximately one quarter reported negative dental experiences. Furthermore, sugar consumption was relatively common, highlighting the need for targeted preventive measures.

Possible limitation of the current survey among parents of children undergoing scheduled dental treatment were the reliance on subjective responses which potentially imply inaccuracies from misunderstandings. To reduce this bias, the questionnaire was translated into commonly spoken languages. Another limitation of this study is the low participation rate, as the response rate was approximately 21.4%, highlighting a potential selection bias. Furthermore, the study design may have introduced a selection bias, as only planned procedures were included, involving patients who had previously been examined at the UZB, primarily focusing on caries treatment and excluding emergency cases or trauma patients. This bias may have influenced the representativeness of certain variables, such as migration background, which may not accurately reflect the overall population of patients treated during the study period. The vast majority of included patients were of migrant background (84%), which far exceeds the average of 55.8% migration background of the population >15 years in the canton Basel-Stadt in 2022. One explanation is that the proportion of children and adolescents with a migration background is higher than in older age groups, additionally, there is an obvious difference in the need for dental treatment under general anesthesia in the population with and without a migration background. In the current study, no data was collected on follow-up appointments or the need for follow-up treatment. However, patients received a follow-up appointment after general anaesthesia at the UKBB and were then integrated into an individualised recall system at the UZB. If they were referred by an external practice, they were advised to contact their private dentist with individualised treatment recommendations.

In the present survey, parents with migration background reported lower household incomes compared to Swiss participants (Table 1). A Swiss study identified the primary caregiver's migration background as the most significant factor influencing early caries development in children, followed by family income (9). Descriptive trends further reveal that families with incomes between CHF 5,000 and CHF 10,000 were more likely to visit the dentist regularly compared to those from lower-income households (Table 6). A Swiss Health Survey study noted that oral health awareness varied with a higher awareness in higher versus lower income or education (10). In another Swiss study, parents with an income over 6,000 CHF, those of Swiss origin, and those with post-secondary education were more likely to attend regular dental appointments and prioritize a tooth-friendly diet compared to those with lower income, basic education, or foreign origin (11).

The mean age of the first dental check in this study was 3.9 years. However, the Swiss Dental Association recommends the first dental visit occurs at the age of two years (12). A routine check-up or advice was cited as the reason for the last visit to the dentist by 42% of

respondents, while 21.8% reported dental or gum problems as their primary reason (Table 1). Similarly, in the Swiss Health Survey study, nearly two-thirds of participants reported visiting a dentist within the past twelve months, with voluntary check-ups (33%) and recall appointments (25%) being the most common reasons across all age groups (10). In the present study, 61.8% of parents took their children to the dentist at least once a year, whereas 38.2% visited "never", "rarely", or "only in case of complaints" (Table 1). In a Swiss study, children with a high caries risk were generally less likely to attend dental visits than those with low caries incidence (9). Anxious patients are known to avoid dental appointments, even in the presence of pain, leading to dental issues that require more invasive or complex treatment (13). This behavior was further highlighted by a study investigating dental fear, which found that 82% of highly anxious patients avoided scheduled dental appointments, underscoring avoidance as a clear indicator of dental anxiety (14). In the current study, no correlation was observed between the frequency of dental visits and the dental fear reported by children or their parents (Table 5). 60.7% of parents reported that their children suffer from dental anxiety, and 24.4% of parents reported that their children have had negative experiences at the dentist. Dental fear is widespread globally and the prevalence reported in the literature varies and may reflect cultural or socioeconomic differences among populations, as well as variations in study designs. A systematic review estimated that the global prevalence of dental fear and anxiety is 15.3% (15). A study conducted in Switzerland in 2017 revealed that 13.3% of participants reported feeling "quite a lot" or "very much" dental fear and anxiety. In 2010, 49.3% reported some level of dental anxiety, which decreased to 41.9% in 2017 (16). The higher proportion of dental fear in the present study may be due to the selection of children undergoing general anesthesia, who are typically more anxious or are more likely to require general anesthesia due to low cooperation. Additionally, the variation in results between studies may be explained by differences in study design and the specific criteria used to assess dental fear. A systematic review analyzed 36 studies on dental fear and observed varying correlations between the child's age and dental fear. While some studies reported higher levels of dental fear in younger children, others found the opposite. Overall, higher levels of dental fear were reported in younger children (17). Research has shown that dental fear in children is often related to past negative experiences at the dentist and is a predictor of caries (18,19). In contrast to these data, the present study revealed that the youngest age group (1–4-years) reported the lowest incidence of dental fear (44.7%), which potentially reflects the approach of avoiding negative experiences from invasive caries treatment and an early decision in favor of general anesthesia.

The children treated in the current study were relatively young with a mean age of 5.9 years and 81.5% being under 9 years (Table 1). This observation was in accordance with data from a systematic review, which observed that with increasing age, the need for general dental anesthesia decreases in healthy individuals. After comprehensive dental care under general anesthesia, most healthy children were treated in the dental practice under local anesthesia (6).

In the current survey, 18.5% of the children who required general anesthesia for dental treatment had underlying medical conditions, while the vast majority were systemically healthy but needed general anesthesia due to challenges with cooperation at the dentist, potentially attributable to dental fear. It is obvious that independent tooth brushing and support from

parents can be limited in these children, depending on the underlying chronic diseases. For uncooperative children, general anesthesia is a viable treatment option, especially when conscious sedation techniques such as nitrous oxide are not feasible (6). The primary reasons for referral to a Finnish hospital for general anesthesia were dental caries (45%) and dental fear (34.3%) (8). In a systematic review, caries was the common reason identified for the use of general dental anesthesia, affecting 6.5–90.8% of patients. In eight studies, lack of cooperation or fear of dental procedures was the second most common reason (6).

According to the current questionnaire, 40.7% of the parents reported that their children consumed sweets daily, while 17.6% reported sugary drinks every day. Significantly more parents with a migrant background agreed that sugary food consumption could lead to dental diseases (Table 1). Sugar consumption is a key factor in caries development and the WHO recommends limiting sugar to less than 10% of total energy intake (20). In Switzerland, only 45% of men and 44% of women consume less than 10% of their total energy intake from sugar (21). However, there are no comparable data on Swiss children. In the canton of Basel-Landschaft, changes in sugary drink consumption over the past 20 years may help explain the observed leveling off of caries incidence (4). A total of 82.3% parents fully or somewhat agreed with the statement that reducing sugar consumption can protect their child's teeth (Table 1). Similarly in a Swiss study, two-thirds of parents emphasized the importance of a diet supportive of their children's dental health and revealed a significant correlation only with income, without a confirmed association with factors such as country of origin, education, or children's caries incidence (11). A study in the USA found that children from lower socioeconomic backgrounds had higher consumption of soft drinks and instant beverages (22).

According to a study in the Swiss city of Winterthur (Canton of Zürich), dental prophylaxis instruction in kindergarten proved to be less successful in promoting a healthy dental diet (32%), but was particularly effective in teaching toothbrushing techniques (63%) (11). In the current study, 63.2% of the Swiss children started brushing their teeth at 6–8 months and generally started brushing earlier than the children of migrant parents (Table 1). In the cantons of Basel-Stadt and Basel-Landschaft, the Swiss Dental Association (SSO) offers free dental check-ups once a year for children in the age of two, three and four to promote early oral health prevention. In Basel-Stadt, the children's dental care program provides free check-ups and preventive measures in kindergartens and schools, along with paid treatments at the school dental clinic (UZB). Overall, 58.8% of parents in the current study rated their knowledge on health teeth as "good" to "very good"; however, the same proportion of parents was unaware whether their child's toothpaste contains fluoride. Additionally, almost two-thirds of parents rather or fully agreed with the protective and strengthening effects of fluoride on teeth (Table 1). The clear evidence of the caries protective effect of fluoride has been documented in several studies and review (23). From 1964 to 2009, Switzerland experienced an 83% reduction in caries, with fluoride contributing to about 50% of this decline. By 2009, 96% of children were using fluoride toothpaste (24).

It is known from previous studies that higher levels of dental hygiene awareness have been associated with significantly lower caries experience and fewer active carious lesions (5). In a German study, regular tooth brushing (at least twice a day) and visits to the dentist (twice a year) were identified as the most important preventive measures for reducing caries and toothache. In this study, children with disabilities reported more frequent toothache and

brushed their teeth less often twice a day, while the frequency of dental visits did not differ significantly compared to children without disabilities (25). In the current survey, 86.5% of parents fully or somewhat agreed on the importance of brushing 2–3 times a day. Overall, 19.3% of children brushed their teeth less than or at most once a day. Children who started brushing their teeth earlier tended to require fewer caries treatments compared with those who started brushing later. Furthermore, 34.3% of children began brushing independently before the age of 3. However, it is possible that parents interpreted this term '1st independent brushing' to include brushing with parental assistance. Parental assistance with daily oral hygiene is recommended until the age of 8 (11). A study conducted in the USA found that children did not reach the level of brushing proficiency seen in adults until they were 10 years old (26).

Conclusion and outlook

The majority of children undergoing dental treatment under general anesthesia had a migration background and were affected at a young age, with dental fear posing a significant barrier to treatment. Additionally, high sugar consumption and gaps in oral health knowledge highlight the need for targeted preventive measures to reduce treatments under general anesthesia in this risk group.

A larger sample size would be beneficial in future research to allow for more detailed analysis. Future studies could consider a longitudinal approach, enabling researchers to track changes over time and gain deeper insights into the factors influencing the need for general anesthesia in high-risk children. Future research could further investigate the impact of follow-up appointments, including attendance rates and the need for additional treatments under general anesthesia. This research could help identify gaps in preventive care in different regions or age groups. Increasing participation through targeted strategies, such as additional incentives or reminders, would also enhance representativeness.

Zusammenfassung

Mundgesundheit von Kindern, die sich einer Vollnarkose unterziehen: eine Elternbefragung

Einleitung

Karies ist eine der häufigsten Erkrankungen im Kindesalter. In den Kantonen Basel-Stadt und Basel-Landschaft werden regelmässig Daten zur Mundgesundheit von Kindern erhoben, um den Zustand der Zähne und die zahnmedizinischen Versorgungspraktiken zu analysieren. Studien zeigen, dass der Rückgang der Kariesfälle in den letzten Jahrzehnten stagniert. Besonders betroffen sind Kinder mit Migrationshintergrund und jene aus sozioökonomisch benachteiligten Familien. In schweren Fällen ist eine Behandlung unter Vollnarkose erforderlich, insbesondere wenn eine Therapie unter Lokalanästhesie oder Sedierung aufgrund des Behandlungsumfangs oder mangelnder Kooperationsfähigkeit nicht möglich ist. Ziel dieser Studie war es, Informationen zur Mundgesundheit der betroffenen Kinder zu erheben und Risikofaktoren zu identifizieren, die zu einer Zahnbehandlung unter Vollnarkose führen.

Material und Methoden

Zwischen dem 30. November 2023 und dem 23. Dezember 2024 wurde eine Querschnittsstudie mit Befragung der Eltern von Kindern bis 18 Jahren durchgeführt, die am Universitäts-Kinderspital Basel (UKBB) eine zahnmedizinische Behandlung unter Vollnarkose erhielten. Alle Behandlungen waren geplante Eingriffe, wobei zunächst eine Konsultation am Universitären Zentrum für Zahnmedizin Basel (UZB) erfolgte. Ein anonymisierter, mehrsprachiger Fragebogen erfasste epidemiologische, sozioökonomische, Mundgesundheits- und Ernährungsdaten. Insgesamt nahmen 119 von 557 eingeladenen Eltern teil, was einer Antwortquote von 21,4 % entspricht. Die statistischen Analysen wurden mit R durchgeführt.

Resultate

Das Durchschnittsalter der behandelten Kinder lag bei 5,9 Jahren, wobei fast die Hälfte (47,9 %) zwischen 5 und 8 Jahren alt waren. 84,0 % hatten einen Migrationshintergrund und die Eltern wiesen signifikant geringere Deutschkenntnisse auf ($p < 0.05$). Ein niedrigeres Haushaltseinkommen wurde häufiger bei Familien mit Migrationshintergrund beobachtet. Schweizer Kinder begannen signifikant häufiger im Alter von 6–8 Monaten mit der Zahnpflege, während Kinder mit Migrationshintergrund tendenziell später die Zähne putzten ($p < 0.05$). Zudem konsumierten 40,7 % der Kinder täglich Süßigkeiten und 60,7 % litten unter Zahnarztangst, welche in den höheren Altersgruppen häufiger anzutreffen war ($p < 0.05$).

Diskussion

Diese Studie identifizierte Risikofaktoren bei Kindern, die eine zahnmedizinische Behandlung unter Vollnarkose erhielten. Die Mehrheit der Teilnehmenden hatte einen Migrationshintergrund und unabhängig von der Herkunft zeigten sich erhebliche Wissenslücken bei den Eltern bezüglich der Mundgesundheit, was auf einen Verbesserungsbedarf in der Aufklärung und

Prävention hinweist. Zahnarztangst war insbesondere bei älteren Kindern weit verbreitet. Zudem hatten 39,5 % der Kinder bereits mindestens eine Kariesbehandlung und etwa ein Viertel berichtete von negativen Zahnarztbefahrungen. Der hohe Zuckerkonsum unterstreicht die Notwendigkeit gezielter Präventionsmaßnahmen.

Künftige Studien sollten größere Stichproben und langfristige Beobachtungen umfassen, um nachhaltige Strategien zur Reduktion von Karies und zur Förderung einer besseren Mundgesundheit zu entwickeln.

Résumé

Facteurs influençant la santé bucco-dentaire des enfants sous anesthésie générale: enquête auprès des parents

Introduction

La carie dentaire est l'une des maladies les plus courantes chez les enfants. Dans le canton de Bâle-Campagne, des données sur la santé bucco-dentaire des enfants sont régulièrement collectées afin d'analyser l'état des dents et les pratiques de soins dentaires. Les études montrent que la diminution des cas de carie a stagné ces dernières décennies. Les enfants issus de l'immigration et ceux issus de familles socio-économiquement défavorisées sont particulièrement touchés. Dans les cas graves, un traitement sous anesthésie générale est nécessaire, notamment lorsque la thérapie sous anesthésie locale ou sédation n'est pas possible en raison de l'étendue du traitement ou d'un manque de coopération. L'objectif de cette étude était de recueillir des informations sur la santé bucco-dentaire des enfants concernés et d'identifier les facteurs de risque conduisant à un traitement dentaire sous anesthésie générale.

Matériel et méthodes

Entre le 30 novembre 2023 et le 23 décembre 2024, une étude transversale a été menée en interrogeant les parents d'enfants jusqu'à 18 ans ayant reçu un traitement dentaire sous anesthésie générale à l'Hôpital universitaire pédiatrique des deux Bâle (UKBB). Tous les traitements étaient des interventions planifiées, précédées d'une consultation au Centre universitaire de médecine dentaire de Bâle (UZB). Un questionnaire anonyme et multilingue a été utilisé pour collecter des données épidémiologiques, socio-économiques, ainsi que des informations sur la santé bucco-dentaire et la nutrition. Au total, 119 des 557 parents invités ont participé, soit un taux de réponse de 21,4 %. Les analyses statistiques ont été réalisées avec R.

Résultats

L'âge moyen des enfants traités était de 5,9 ans, près de la moitié (47,9 %) ayant entre 5 et 8 ans. 84,0 % avaient un passé migratoire et les parents présentaient des compétences linguistiques en allemand significativement plus faibles ($p < 0,05$). Un revenu familial plus faible était plus fréquent chez les familles issues de l'immigration. Les enfants suisses commençaient significativement plus souvent à se brosser les dents entre 6 et 8 mois, tandis que les enfants issus de l'immigration commençaient généralement plus tard ($p < 0,05$). En outre, 40,7 % des enfants consommaient des sucreries quotidiennement et 60,7 % souffraient d'anxiété dentaire, celle-ci étant plus fréquente dans les groupes d'âge plus élevés ($p < 0,05$).

Discussion

Cette étude a identifié des facteurs de risque chez les enfants ayant reçu un traitement dentaire sous anesthésie générale. La majorité des participants étaient issus de l'immigration et,

indépendamment de leur origine, d'importantes lacunes en matière de connaissances sur la santé bucco-dentaire ont été observées chez les parents, soulignant ainsi la nécessité d'améliorer l'éducation et la prévention. L'anxiété dentaire était particulièrement répandue chez les enfants plus âgés. De plus, 39,5 % des enfants avaient déjà subi au moins un traitement contre les caries et environ un quart avait fait état d'expériences négatives chez le dentiste. La forte consommation de sucre souligne la nécessité de mesures préventives ciblées.

Les études futures devraient inclure des échantillons plus larges et des observations à long terme afin de développer des stratégies durables pour réduire la carie dentaire et améliorer la santé bucco-dentaire.

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