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## Survey of Oral Health Awareness in Neuchâtel 9th Graders

#### **KEYWORDS**

prophylaxis,  
 questionnaire,  
 caries,  
 oral hygiene

#### **SUMMARY**

The oral health habits of pupils had not yet been analyzed for the canton of Neuchâtel. A questionnaire was provided to 9th grade high school pupils (final year) of the three schools located in the Neuchâtel area to assess both oral health knowledge and habits in this connection. The average age was  $15.5 \pm 0.8$  years, and 78.1% of the questionnaires were returned. The prophylaxis program was conducted for a total of 4.5 h during pupils' entire time at school. The results showed that both knowledge and oral health habits could be improved. As a positive outcome, 99% of the pupils brush their teeth before going to bed. Comparisons with similar 10-year-old studies from other cantons (Bern, Vaud) showed

major differences in knowledge, for example on the importance of fluoridation. Only 54% of the pupils in Neuchâtel knew that fluoride offers some protection against caries, in spite of the fact that 89% thought that brushing with fluoridated toothpaste protects against caries. Most of the pupils used a fluoridated toothpaste. Furthermore, we found that self-reported sugar consumption was correlated with caries experience, but brushing frequency was not. We recommend introducing a review course for pupils in their last school year, in order to practice interdental cleaning, redefine appropriate, tooth-friendly snacks, and emphasize the importance of regular dental check-ups.

## Introduction

Caries prevalence among children and adolescents in Switzerland has decreased. Epidemiological data show that compared to 1964, the dmft index has dropped by about 90% in 8-year-olds in Zurich Canton (STEINER ET AL. 2010). Furthermore, the World Health Organization (WHO) reported the global dmft/DMFT values in 7- and 12-year-olds to be 2.4 (PETERSEN 2003). Epidemiological data from Zurich Canton indicated a DMFT value of 0.8 among 12-year-old schoolchildren in 2009 (STEINER ET AL. 2010). Besides the wide availability of fluoridated toothpaste and table salt (almost 90% of the table salt consumed in Switzerland is fluoridated), the main reason for the low caries prevalence in these age groups is considered to be the group prophylaxis programs which have been conducted at kindergartens and schools up to the 9th grade since the 1980s (MARTHALER 2005). Although these data were collected only in Zurich Canton, they can be considered representative of Switzerland as a whole (MENGHINI & STEINER 2007, 2009).

Although the dmft/DMFT value has decreased in the age groups mentioned above, once pupils leave school at the age of 15 to 20 years, caries incidence increases (MENGHINI ET AL. 2010). Dental-health-related behavior and knowledge can be reliably surveyed using questionnaires (LEVINE ET AL. 2007). Data are available for Bern Canton (JUNGO-YÜZBASIOGLU & KRONENBERG 1998) and Vaud Canton (HANSEN 1999) which demonstrate adequate awareness of dental and oral health as well as the requisite corresponding behaviors. Comparable data for Neuchâtel Canton do not exist. It is only known that by the end of the 9th grade, Neuchâtel pupils have received 4.5 hours of dental prophylaxis instruction at school as two single and two double lessons (up to 2012). The purpose of the present study was to examine the extent of dental- and oral-health-related knowledge and behavior in graduating 9th graders in Neuchâtel Canton.

## Materials and Methods

A modified questionnaire based on JUNGO-YÜZBASIOGLU & KRONENBERG (1998) (Fig. 1) was used. In 22 questions, the dental- and oral-health awareness of 9th graders in the city of Neuchâtel was surveyed in June 2011. The participants comprised the graduating classes of three Neuchâtel schools (centre scolaire du Mail, centre scolaire des Terraux, centre scolaire de la Côte). The mean age was  $15.5 \pm 0.8$  years; 47.5% were female and 52.5% were male. All school levels were represented: maturité (university-track high school), moderne (middle school), pré-professionnelle (vocational-track high school), terminale (special education). A total of 311 questionnaires were distributed to pupils of these classes, and  $N = 243$  questionnaires were turned in, yielding a response rate of 78.1%.

In addition to descriptive statistics, the Spearman correlation coefficient and 95% confidence interval (without correction for multiple testing) were calculated for selected, suitable question combinations, applying a bootstrap method with 100,000 iterations per confidence interval using the software program R Version 2.14.1 (r-Project, Institute for Statistics and Mathematics, University of Vienna, Austria). The level of significance was set at  $\alpha = 0.05$ .

## Results

Of those surveyed, 48% were Swiss nationals, 20% possessed dual citizenship, and 32% were foreign nationals only.

A total of 15 classes answered. The school levels were not equally represented. One class ( $n=8$ ) of the lowest educational level ("terminale", similar to special education) participated, four classes ( $n=56$ ) of the "pré-professionnelle" (vocational-track high school) did so, and five classes each from the "moderne" (middle school,  $n=79$ ) and "maturité" (university-track high school,  $n=100$ ). Of those surveyed, 32 were smokers (13.1%), 3 of whom also consumed Cannabis.

Table I presents information about the dental- and oral-health-related knowledge and behaviors of the pupils surveyed.

Only weak correlations were found for almost all tested combinations of questions, for instance "nationality" with "knowledge about gum disease", "parents' profession" with "frequency of toothbrushing", or "frequency of toothbrushing" with "number of treated carious lesions". The only significant correlations involved 1. pupils' nationality and their knowledge of caries prevention (Rho:  $-0.2$ ; 95% CI [ $-0.31$ ;  $-0.07$ ]), and 2. self-reported number of treated carious lesions and consumption of sugared beverages during breaks (Rho:  $0.15$ ; 95% CI [ $0.02$ - $0.28$ ]).

## Discussion

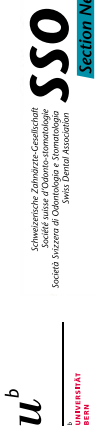
Due to time constraints, the use of a validated questionnaire (DEPLAZ 1987) was not authorized. The questionnaire used had to be shorter, and it summarized some aspects of oral hygiene, whereas individual aspects of the original questionnaire (properties of bristles, reasons for gingivitis, etc.) had to be omitted. Thus, comparisons with results of previous studies are possible only to a limited extent. The fundamental problem with all questionnaire-based surveys is that they allow estimation, and are not as exact as clinical studies. The response rate of 78.1% may represent a bias; the possibility cannot be excluded that the pupils with poor oral hygiene or inadequate oral-hygiene knowledge are those who did not answer the questionnaire. Nevertheless, the questionnaire employed here makes it possible to determine tendencies and extant knowledge of the pupils within the limitations described.

This survey demonstrated that the consumption of sugar, especially from sugared beverages, subjectively does not necessarily lead to more dental treatment. Moreover, pupils' knowledge about dental health is apparently imperfect regardless of the parents' educational level. It should be cause for consternation that pupils' general knowledge of fluoride's ability to prevent caries has obviously decreased: despite the fact that 83% of those surveyed use fluoridated toothpaste, only 54% know that fluoride is important for dental health.

The present study demonstrated that a great majority (93%) of the pupils surveyed have a general idea about caries etiology, but most know very little about other dental and oral diseases.

Over 90% of the population worldwide suffer from gingivitis (PAPAPANOU & LINDHE 2008); thus, it can be assumed that some of those surveyed here have gingivitis. However, only 47% of the participants reported being familiar with the term "gingivitis" (Tab. I). The term "dental hypersensitivity" was known by 56%. Otherwise, the term "erosion" is better known than "attrition", "abrasion", or "periodontitis". This may reflect the fact that the prophylaxis program at Neuchâtel schools primarily focuses on caries prevention. Nevertheless, 7% of the pupils reported never having heard the term "caries". This group shared no common factors in terms of level of education, sex, or nationality.

Travail de master  
en  
médecine-dentaire



En collaboration avec la SSO section Neuchâtel  
Avec le soutien du centre médico-dentaire de Neuchâtel

**Habitudes d'hygiène dentaire chez les jeunes de neuvième année**

Magali Müller

Sous la direction  
Dr. Klaus Neuhaus  
Prof. Adrian Lussi

**Questionnaire destiné aux écoliers de neuvième année**



dans le but de découvrir leurs habitudes et connaissances en  
prophylaxie dentaire.

Travail de master | Semestre d'été 2011  
Zahnmedizinische Kliniken, Université de Berne

No. :

*Ce questionnaire est confidentiel et anonyme*

**A : données générales**

Sexe : M  F

Numéro postal du domicile : .....

Année de naissance : '19 .....

Nationalité : .....

Profession du père : ..... Profession de la mère : .....

Quelle filière scolaire suivez-vous ?

terminale  pré-professionnelle  moderne  maturité

Pour les questions suivantes veuillez s.v.p. cocher les bonnes réponses.

**B : habitudes générales**

1. Que buvez-vous pendant les récréations? (plusieurs réponses possibles)

soft-drinks (cola, sprite etc.)	
eau	
sirop	
café et thé	
café et thé sucré	

2. Fumez-vous ...

des cigarettes	<input type="checkbox"/>	oui	<input type="checkbox"/>	non
autres : .....				

**C : expérience personnelle et habitudes d'hygiène dentaire**

3. Avez-vous été soigné pour une carie durant les deux dernières années?

aucune	<input type="checkbox"/>
une carie	<input type="checkbox"/>
plusieurs caries	<input type="checkbox"/>

4. A quelle fréquence vous brossez-vous les dents ?

3x par jour	<input type="checkbox"/>
2 x par jour	<input type="checkbox"/>
1 x par jour	<input type="checkbox"/>
quelques fois par semaine	<input type="checkbox"/>
1x par semaine	<input type="checkbox"/>
moins qu'une fois par semaine	<input type="checkbox"/>

Fig.1 Questionnaire used

10. Quel(s) dentifrice(s) utilisez-vous? (nom) .....

11. Indiquez l'importance qu'ont eu les facteurs suivants sur votre apprentissage du brossage de dents?

	pas du tout	plutôt petite	plutôt grande	grande	sans avis
les parents					
les frères et sœurs					
les grands-parents					
les amis					
le maître d'école					
la prothylaxiste (la « dame des dents »)					
le médecin-dentiste					
la télé / pub / internet					

D : connaissances générales

12. Avez-vous déjà entendu parler de :

	oui	non
abrasion (perte de substance dentaire par contact avec un corps étranger)		
attribution (perte de substance dentaire par grincement de dents)		
carie		
érosion dentaire (perte de substance dentaire par l'acide)		
gingivite (maladie de la gencive)		
hypersensibilité des collets (sensibilité des dents au froid)		
parodontite (maladie de l'os alvéolaire)		

13. Comment se forme une carie?  
Les aliments sucrés nourrissent les bactéries qui attaquent les dents.  
En ne se brossant pas les dents.  
De manière naturelle puisque c'est une maladie que tout le monde a dans la famille.  
Les bactéries contenues dans l'eau se déposent sur les dents et les attaquent.  
Si la salive a une mauvaise composition.  
Lorsque les défenses immunitaires sont faibles.

14. Quelles sont les causes de la carie ?

	cause directe	cause indirecte	pas une cause	ne sais pas
sucres				
alcool				
bactéries				
diabète				
tabac				
cannabis				
autres drogues				
médicaments				
la nourriture				
le temps				

15. Par quel(s) moyen(s) peut-on éviter les caries ?

	vrai	faux	ne sais pas
en se brossant les dents 2-3 fois par jour avec du dentifrice au fluor			
en mangeant des fruits séchés			
en mangeant des pommes			
en ayant une alimentation non sucrée			
en préférant de l'eau à une boisson sucrée			

5. Quand vous brossez-vous les dents? (plusieurs réponses possibles)

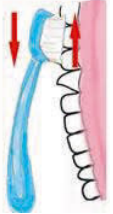

avant le petit déjeuner  après le petit déjeuner   
 avant le repas de midi  après le repas de midi   
 avant le souper  après le souper   
 après les en-cas   
 en rentrant de soirée (disco, ciné...)   
 avant de me coucher

6. Combien de temps dure votre brossage de dents ?


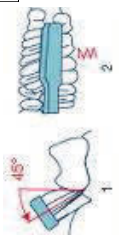
< 1 min  1-2 min  2-3 min  > 3 min

7. Quelle(s) technique(s) de brossage utilisez-vous?

horizontale (avant-arrière)  verticale (de la gencive vers la dent, du rouge au blanc)

circulaire  Bass

8. Quelle genre de brosse à dents utilisez-vous? (plusieurs réponses possibles)

aucune	<input type="checkbox"/>
dure	<input type="checkbox"/>
moyenne (medium)	<input type="checkbox"/>
douce (soft)	<input type="checkbox"/>
électrique	<input type="checkbox"/>

9. Utilisez-vous un moyen complémentaire d'hygiène?

Si oui le ou les quel(s) ?

rinçage  fil dentaire  brosse à dents  cure-dents

Autres : .....

À quelle fréquence ?

1x/jour  1x/semaine  1x/mois  plus rarement

Oui  non

Fig.1 Questionnaire used (page 2 and 3)

E : connaissances chiffrées

16. Estimez l'ordre de grandeur du prix de la restauration d'une dent cariée (sans traitement de racine) :

0 à 250.-
251 à 400.-
401 à 650.-
651 à 900.-

17. Combien de dents a un adulte ?

20 à 23
24 à 27
28 à 32
33 à 36

F : vision de la santé bucco-dentaire

18. Quelle(s) phrase(s) pourrait(ent), selon vous, s'appliquer à votre situation?

Je brosse mes dents, et je n'ai pas de caries.
Je brosse mes dents mais j'ai des caries.
Je ne brosse pas mes dents, et je n'ai pas de caries.
Je ne brosse pas mes dents et j'ai des caries.
Toute ma famille a des caries. C'est normal.

19. Êtes-vous d'accord avec les phrases suivantes ?

	pas du tout d'accord	plutôt non	plutôt oui	tout à fait d'accord	sans avis
Il est important d'avoir des dents saines.					
Il est nécessaire de se brosser les dents 3x par jour.					
Le savon est le meilleur dentifrice pour les dents.					
Les brosses à dents, dentifrices et fils dentaires se trouvent à un prix abordable.					
Je n'ai pas besoin de fil dentaire à mon âge.					
Le fluor est d'une importance capitale pour la santé de mes dents.					

20. Que seriez-vous prêt(e) à faire pour vos dents ?

	pas du tout d'accord	plutôt non	plutôt oui	tout à fait d'accord	sans avis
me brosser les dents plus souvent qu'actuellement					
un contrôle dentaire 1x/année					
utiliser tous les produits d'hygiène recommandés par mon médecin-dentiste					
me nourrir différemment					

21. Lorsque vous aurez terminé l'école, quand pensez-vous retourner chez le médecin-dentiste ?

dans 1 an
dans 2 ans
dans 5 ans
quand ça fera mal
lorsque mes parents me le diront
Je l'ignore

22. Pour diagnostiquer une carie, une radiographie de la dent peut être nécessaire. Seriez-vous d'accord de participer à un dépistage des caries comprenant deux radiographies dentaires ?

oui	non
-----	-----

Merci beaucoup pour votre participation.

Sources des images question 7:

Horizontale: <http://www.teteamodeler.com/sante/dent/brossage4-3.asp>; 2000, Tête à modeler

Verticale: <http://www.medfuehrer.de/Zahnmedizin-Zahnarzt/Diagnose-Vorsorge/Zahnbehandlung-Richtige-Zahnpflege.html>; 2011, medführer GmbH

Circulaire: <http://www.medfuehrer.de/Zahnmedizin-Zahnarzt/Diagnose-Vorsorge/Zahnbehandlung-Richtige-Zahnpflege.html>; 2011, medführer GmbH

Bass: [http://www.onmeda.de/aktuelles/themenspecial/mundgeruch/zahnpflege\\_mundhygiene-zahnputztechnik-16095-3.html](http://www.onmeda.de/aktuelles/themenspecial/mundgeruch/zahnpflege_mundhygiene-zahnputztechnik-16095-3.html); 2011, gofeminin.de GmbH

Questionnaire d'après KRONENBERG et al. [1], modifié et adapté.

Fig.1 Questionnaire used (page 4 and 5)

<b>Tab.1 Descriptive statistics of selected question complexes</b>						
<b>1. Drinks during breaks: What do you drink during breaks?</b>						
	Sugared beverages	Water/Coffee/Tea (unsugared)	No beverage during breaks			
Total	37%	42%	21%			
Women	41%	44%	15%			
Men	34%	41%	25%			
<b>3. Self-reported caries experience: number of fillings placed in the past 2 years</b>						
No lesion	One lesion	Several lesions	No answer			
75%	16%	8%	1%			
<b>4. How often do you brush your teeth?</b>						
3×/day	2×/day	1×/day	Less often			
64%	30%	5%	1%			
<b>5. When do you brush your teeth?</b>						
After between-meal snacks	Before breakfast	After breakfast	After lunch	Before bed		
3%	9.4%	94%	61%	99%		
<b>7. Toothbrushing technique</b>						
Fones	Stillmann	Horizontal	Mixed	Bass	No answer	
67% (19% solely)	6%	15%	59%	0%	1%	
<b>8. Duration of toothbrushing</b>						
<1 minute	1–2 minutes	2–3 minutes	>3 minutes	No answer		
5.8%	46.5%	35%	12.3%	0.4%		
<b>9.a Which auxiliary oral hygiene products do you use?</b>						
None	Dental floss	Toothpicks	Interdental brush	Mouthwash		
29.2%	30%	10%	7%	50%		
<b>9.b Frequency of use of auxiliary oral hygiene products</b>						
Never	1×/day	1×/week	Less often			
30%	42%	19%	9%			
<b>10. Fluoride is present in the toothpaste the pupil reports using.</b>						
Yes	Impossible to determine	No				
83%	16%	1%				
<b>12. Do you know the terms ...?</b>						
Caries	Cervical hypersensitivity	Gingivitis	Erosion	Attrition	Abrasion	Periodontitis
93%	56%	47%	30%	17%	9%	7%
<b>14. Which of these factors influence the development of caries? (correct answers in %)</b>						
Sugar	Not brushing your teeth	Poor immune defense	Unfavorable composition of saliva	Bacteria in the water	Genetic predisposition for caries	
89%	82%	22%	9%	62%	85%	
<b>15. How can caries be avoided? (correct answers in %)</b>						
Toothbrushing with fluoridated toothpaste	Drinking water instead of sugared beverages	Eating unsugared (between-meal) snacks	Eating apples	Eating dried fruit		
89%	82%	53%	26%	42%		
<b>19. Fluoride is important for my teeth.</b>						
Completely agree	Mostly agree	Disagree mostly	Disagree completely	No opinion		
23%	31%	9%	4%	33%		

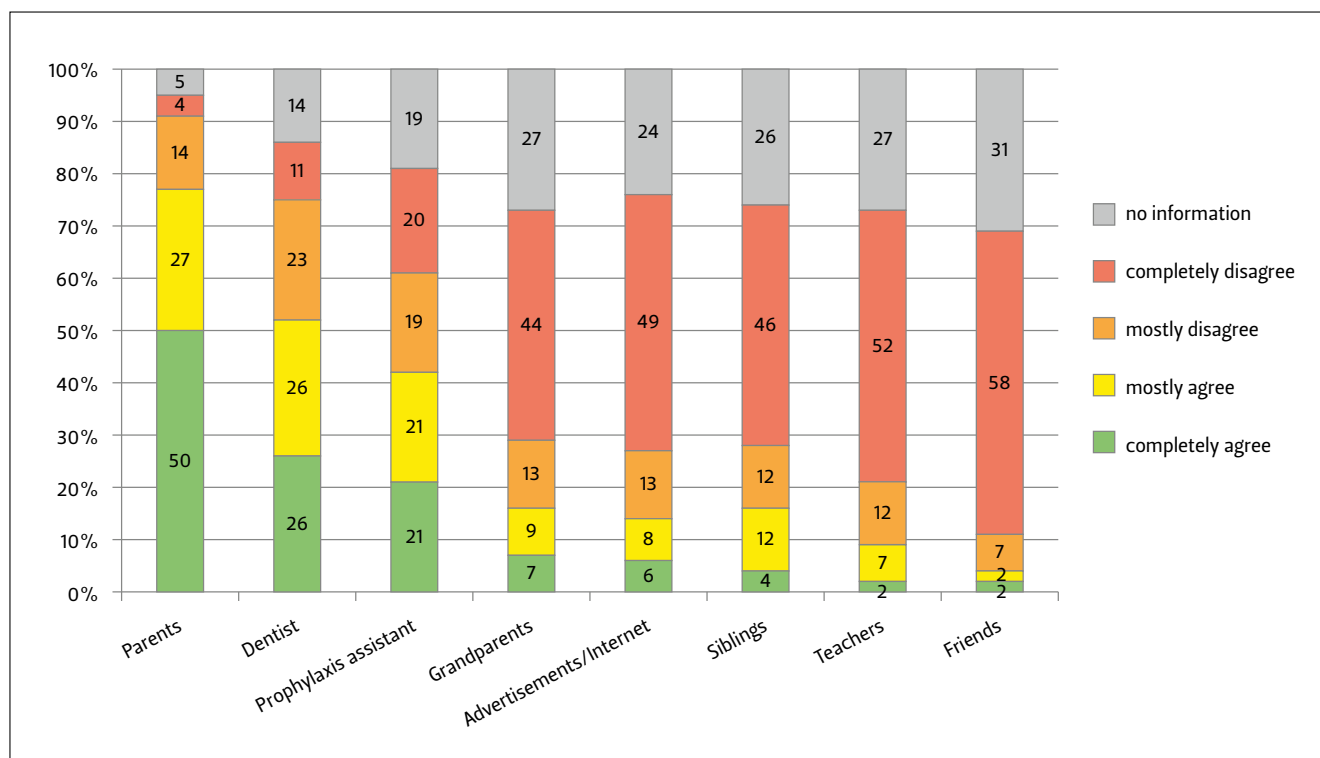


Fig. 2 Who taught you how to brush your teeth?

In general, parents pass along dental- and oral-hygiene behavior to their children (ADAIR ET AL. 2004; MITRAKUL ET AL. 2012). In the present survey, 77% of the pupils reported that they learned toothbrushing primarily from their parents (Fig. 2). Nevertheless, half of those surveyed indicated also having learned something from toothbrushing practice during dental prophylaxis lessons at school.

Diverse studies show that the educational level and socio-economic background of patients is correlated with their oral hygiene behavior and dental health (ISMAIL & SOHN 2001; PINE ET AL. 2004). In our study population, the educational status of the parent with the highest school-leaving certificate was included. 78% of the parents had at least a middle school (“moderne”) or higher school diploma. As opposed to other studies (HANSEN 1999), the educational level of parents in this population had no influence on the self-reported caries experience or the consumption of cariogenic foods/beverages. A possible reason for this is that the population (243 responders) might have been too small to demonstrate statistically significant correlations.

### Eating and drinking habits

The general eating and drinking habits of the pupils were examined to determine behavioral patterns. The question about the preferred beverage during breaks was of interest, based on the assumption that during the short breaks, pupils would not have time to brush their teeth. Studies by LEE & MESSER (2010) and LEE & BREALEY MESSER (2011) found significant correlations between the consumption of sugared beverages and caries treatment during the previous year. This was confirmed for Neuchâtel: our study showed that 37% of pupils drank a sugared beverage during breaks, and 24% had undergone one invasive dental treatment in the past two years. This correlation was significant.

Female pupils generally drank more during breaks than did male pupils, and they tended to consume more sugared beverages than did males (41% and 34%, respectively; Tab. I). Past treatment need was equally distributed between females and males. Pupils who drank water or sugar-free beverages during breaks reported only half as many dental treatments due to caries. However, the questionnaire did not yield information about current treatment need.

### Toothbrushing habits

The question about frequency of toothbrushing intended to provide insight into pupils’ daily routine: the reported frequency of toothbrushing could be an indicator of their dental health. However, the correlation between self-reported caries experience and toothbrushing frequency was not significant; a higher frequency of toothbrushing among 16-year-olds did not guarantee less caries. One explanation could be that given low toothbrushing frequency, caries predilection sites must already have been invasively treated at an early tooth age. It is not without reason that the group of 12-year-olds receives special attention in epidemiological studies.

76% of female pupils indicated that they brush their teeth 3×/day, compared to only 53% of the males. A positive finding was that 94% of those surveyed reported brushing their teeth at least twice a day ( $\sigma$ : 91%;  $\eta$ : 97%). Although the self-reported caries experience of the previous two years was not correlated with toothbrushing frequency in this study, good arguments exist for brushing teeth several times a day: among adolescents, it has been shown that optimal plaque removal is not attained every time the teeth are brushed. Thus, higher toothbrushing frequency increases the chance that plaque is thoroughly removed daily (JEPSEN 1998). Otherwise, for caries prevention, twice-daily toothbrushing is recommended as sufficient (RODRIGUES ET AL. 2011). In the present survey, pupils who indicated not brushing

their teeth after lunch (39%) underwent caries treatment almost half as often as those who also brush after lunch.

Some pupils brushed their teeth before breakfast (9.4%), and 3.3% brushed both before and after breakfast. It is of interest to compare this finding with those of a Europe-wide study by WEST ET AL. (2013) conducted on over 3000 18- to 35-year-olds: 44.2% of the examined patients brushed their teeth regularly before breakfast. In this international population, 40.8% brushed after breakfast, compared to 94% of the Neuchâtel pupils, and 42.8% Europe-wide vs. 61% of those surveyed here brushed after lunch. After-dinner brushing differed to a greater extent. 99% of the Neuchâtel pupils brushed their teeth before going to bed, but only 51.2% of the examined European population did so, with an additional 41.8% brushing regularly after dinner (WEST ET AL. 2013).

30% of the pupils reported not performing interdental care, but 42% indicated using interdental products daily. However, this was not statistically significant in terms of caries treatment in the previous two years. Nearly 30% of those surveyed mentioned using dental floss for interdental care.

As over 70% of the pupils did not use dental floss, the prophylaxis assistant responsible was asked whether she instructed them in its use. She demonstrated it on a model, but did not have the pupils practice it. IMFELD (2010) pointed out that today it is no longer recommended to systematically teach the use of dental floss in schools as a primary prophylactic measure, because the caries decline is largely due to fluoridation. Interdental care – preferably with interdental brushes – should be taught as secondary prophylaxis to patients who exhibit demineralization or have restorations on approximal tooth surfaces. However, since gingivitis is a widespread oral health problem which can be ameliorated by the use of dental floss (VAN DER WEJDEN & SLOT 2011), it should still be included in instruction on the use of interdental hygiene products in general.

### Caries prevention

There were obvious gaps in the knowledge of caries prevention in the surveyed population of pupils. 82% of those surveyed

agreed that to avoid caries, water should be drunk instead of sugared beverages. Where 8% denied such a relation, 10% reported not knowing the correct answer; this points to an additional need for information. Only 53% of pupils agreed with the statement that “by eating unsugared meals/between-meal snacks, caries can be prevented”. It is worth noting, however, that 89% of the subjects knew that sugar contributes to the development of caries. Knowledge gaps were also found in other, comparable studies (JUNGO-YÜZBASIOGLU & KRONENBERG 1988, LINN 1976).

It was apparent that pupils with dual nationality or foreign passport performed significantly worse when all answers about caries avoidance were considered cumulatively. In other words, Swiss pupils were better informed in this respect (Spearman  $CI[-0,31; -0,07]$ ). This can serve as an impulse for targeted primary prevention, i.e., prevention before damage is done, in foreign pupils.

The importance of fluoride in caries prophylaxis and treatment has been proven by numerous high-quality scientific reviews in the Cochrane Library (MARINHO 2009, MARINHO ET AL. 2013). 98% of the surveyed pupils believed that toothbrushing with fluoridated toothpaste is effective against caries. It is remarkable that only 54% of the Neuchâtel pupils could actively name the relationship between fluoride and dental health, especially since the school prophylaxis lessons emphasize that fluoride in toothpaste is the one most important means of caries prevention. In any case, 83% of the pupils reported using fluoridated toothpaste.

### Comparison with other Swiss studies in the literature

A comparison with the studies by JUNGO-YÜZBASIOGLU & KRONENBERG (1998) and HANSEN (1999) is worthwhile. Although more than ten years lie between the studies and the questionnaires were similar rather than identical, the results from the different Cantons are largely comparable. 343 school graduates in Bern Canton (JUNGO-YÜZBASIOGLU & KRONENBERG 1998) and 323 in Vaud Canton (HANSEN 1999) were surveyed about dental- and oral-health awareness. The questions in the present study were

**Tab. II** Comparison with results from the Cantons of Bern (1998) and Vaud (1999), values in percent.

	Bern 1998	Vaud 1999	Neuchâtel 2011
Toothbrushing $\geq 1 \times /d$	97.7	97.5	99
Toothbrushing $> 2 \times /d$	52.2	55.1	64
Horizontal brushing technique is bad	60	63	85 (do not use a purely horizontal technique)
Hard toothbrushes cause damage	80	74	20 (use soft toothbrushes)
Electric toothbrush is used	7.3	5.8	15.7
Dental floss is used (at least $1 \times /week$ )	34.5	28.8	25.5
Sugar (and bacteria) cause caries	79.3	83	98 (and 81)
Apples are good for the teeth	67.3	77	26
Dried fruit is not good for the teeth	50	41	42
Fluoride protects teeth	93	88.5	54
Next dentist visit only in case of pain	15.5	24.8	7
Next check-up in one year	42.2	-	52



somewhat modified, in order to not only examine the knowledge of pupils but also to motivate them to pay attention to their oral health (Tab. II).

JUNGO-YÜZBASIOGLU & KRONENBERG (1998) found that 97.7% of the pupils surveyed brushed their teeth at least once a day. In Vaud Canton, 97.5% did so. Ten years later in the city of Neuchâtel, 99% of those surveyed brushed at least once per day. Thus, the populations do not differ in this respect. In contrast, it is of note that ten years ago in Bern Canton, 52.2% of pupils brushed their teeth more than twice a day, in Vaud Canton 55.1% did so, and today in Neuchâtel, 64% brush their teeth more than twice per day. Progress over time was also documented for toothbrushing technique. In the study by JUNGO-YÜZBASIOGLU & KRONENBERG (1998), 60% of those surveyed and 63% of those in the HANSEN (1999) study knew that a strictly horizontal brushing technique can be detrimental. In contrast, 85% of the Neuchâtel subjects knew this. In this comparison, however, it must be borne in mind that the pupils in the previous studies were asked only about theoretical knowledge, while the Neuchâtel pupils were asked about the oral hygiene measures they employ themselves.

In terms of toothbrush characteristics, 80% of the Bern pupils knew that brushes with hard bristles can damage the gums, as did 74% of the pupils in Vaud Canton. Of the Neuchâtel pupils, 10% used toothbrushes with hard bristles, 20% used soft-bristled brushes, and the rest moderately hard-bristled toothbrushes. The use of electric toothbrushes increased from 7.3% ten years ago in Bern (5.8% in Vaud) to 15.7% in Neuchâtel in 2011. This seems to reflect the general trend that electric toothbrushes are the fastest growing market in dental prophylaxis today, and that knowledge about the dangers of hard bristles has spread. The question about caries-promoting factors was formulated differently in all three studies, but the results can still be compared. Of the four main factors (bacteria, substrate or sugar, host, and time), “bacteria” and “sugar” are included in all three studies.

79.3% of the Bern pupils agreed that the factors “bacteria” and “sugar” were causal in the development of caries. In a comparable Zurich study, 88.1% of pupils indicated sugar as a causal factor and 68.8% mentioned bacteria (DEPLAZ 1987). In Vaud Canton, 83% of the adolescents knew that sugar is bad for their teeth (HANSEN 1999).

In the questionnaire for the Neuchâtel pupils, factors responsible for the development of caries were divided into the categories “direct” and “indirect”. Taking both categories together, 98% of those surveyed believed that sugar had something to do with caries etiology, and 81% thought bacteria did. Hence, general knowledge can be assumed to be better nowadays than it used to be.

The question about healthy nutrition (“Is snacking on apples good for your teeth?”) yielded interesting results. In the study by JUNGO-YÜZBASIOGLU & KRONENBERG (1998), 67.3% of those surveyed said yes, where only 26% of the Neuchâtel pupils did so. Ten years ago, 77% of the Vaud pupils knew that moderate consumption of apples does not damage the teeth. It must be mentioned that in the 1990s, many primary schools in Vaud Canton officially promoted apples as a snack during breaks. In autumn, schools distributed apples for a small fee to pupils whose parents wished it. Thus, 9th graders in Vaud Canton probably had better foreknowledge.

On the topic of fluoride, there are a few differences between the three cantons. In the study by JUNGO-YÜZBASIOGLU & KRO-

NENBERG (1998), 93% of those surveyed knew that fluoride prevented caries, and in the study by HANSEN (1999), 88.5% of the pupils did so. Of the Neuchâtel pupils, 23% completely and 31% mostly agreed with this. This shows that inadequate knowledge of the relationship between caries prophylaxis and fluoride can be assumed for 46% of the pupils, despite the fact that 89% of those surveyed claimed that toothbrushing with fluoridated toothpaste protects against caries.

An interesting final point that was answered differently in the three study populations is the question about the next appointment with the dentist. 15.5% of the Bern pupils and 24.8% of the Vaud pupils indicated that they would next visit the dentist when they had pain. Only 7% of the Neuchâtel pupils would do so; 52% would visit the dentist for a check-up within the next year vs. 42.2% of those surveyed in Bern.

## Conclusion

Just as ten years ago, the present results clearly show that pupils' knowledge of dental and oral health needs improvement.

The reason for the insufficient knowledge of the Neuchâtel pupils could be that dental care instruction at school took place only four times during the entire period of schooling. It would thus be advantageous to provide re-instruction during the 9th grade. These lessons should emphasize an efficient toothbrushing technique, the importance of fluoride, and proper use of suitable interdental cleaning products. Especially those pupils who were already treated for caries stand to benefit from this approach. Another advantage would be provided by handing out an overview of “healthy” snacks and beverages. It is also important to remind pupils of the roll played by fluoride in caries prevention, to introduce relevant products and emphasize the importance of regular dental check-ups.

Luckily, since this survey was conducted, the school prophylaxis program of Neuchâtel has been changed – the number of instruction hours in dental prophylaxis at school has been increased. It is our hope that in the future pupils will profit from more frequent dental prophylaxis lessons. Nevertheless, the most important prerequisite for healthy teeth has already been met: pupils brush their teeth often.

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## Résumé

Les habitudes d'hygiène bucco-dentaire d'écoliers dans le canton de Neuchâtel n'ont pas été étudiées jusqu'alors. Le but de cette étude était d'évaluer, à l'aide d'un questionnaire en juin 2011, les connaissances et les habitudes d'hygiène dentaire d'élèves de neuvième année de trois écoles secondaires neuchâteloises (311 élèves). L'âge moyen était de 15,5 ± 0,8 ans. Le pourcentage de questionnaires retournés se montait à 78,1%. Tous les niveaux scolaires y étaient représentés. Ces élèves ont suivi au total 4,5 heures de cours de prophylaxie pendant tout leur cursus scolaire. L'interprétation des résultats a montré

autant les connaissances que les comportements d'hygiène dentaire peuvent être améliorés, tout en soulignant le point positif: 99% des élèves affirment se brosser les dents avant d'aller dormir.

La comparaison avec des études datant d'il y a dix ans dans les cantons de Berne et Vaud montre des différences marquantes de connaissances notamment en ce qui concerne l'importance de fluorures. Seul 54% des élèves neuchâtelois sont conscients du fait que les fluorures protègent contre les caries, cela bien que 89% des mêmes sujets sont d'accord avec l'affirmation que «se brosser les dents – avec un dentifrice aux fluorures – pro-

tège contre les caries» et que la plupart d'entre eux utilisent un tel dentifrice.

De plus, il fut constaté que le nombre de caries traitées dépendait moins de la fréquence de nettoyage que de l'ingestion de sucres que les élèves ont reconnu consommer.

En conclusion, nous proposons d'organiser un dernier passage de l'assistante en prophylaxie dans les classes de neuvième année pour réviser les bases de l'hygiène buccale, exercer l'usage d'un moyen complémentaire d'hygiène, réfléchir avec eux aux snacks appropriés et rappeler l'importance des contrôles dentaires après la scolarité obligatoire.

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